



SUSTAINABLE AGRICULTURE CODE

SAC2017
IMPLEMENTATION GUIDE



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EXECUTIVE SUMMARY

The Unilever Sustainable Agriculture Code is one of the major tools in our sustainable sourcing programme. Since 2010, when it was first launched, it has helped us gain a clear overview of how quickly we are progressing towards our sustainability ambitions in agricultural sourcing. Today, Unilever remains as committed to sourcing our agricultural raw materials sustainably as ever. Through the SAC, we continue to ask our suppliers and their farmers who supply them, to adopt sustainable practices on the farm.

Five years on, we increased our supply of sustainably sourced agricultural materials to 60% by the end of 2015. Our belief that sustainable agriculture constitutes a step-wise approach is captured by our ambition to drive continuous improvement through implementation of the SAC and by principles of the code itself. Hence, to reflect our evolving understanding of sustainability and the contexts – geographical, cultural and political – within which our farmers operate, Unilever launched the SAC2017. Aside from developing and maintaining a standard, that embodies the spirit of our program whilst laying down minimum requirements to achieve compliance to it, we feel it important to articulate what the remit for each criteria encompasses. Such guidance forms the basis of informed decision-making, which we perceive as crucial, to ‘unpack’ the complexity that these issues embody and effectively implement our standard to achieve greater impact. This is why we published the Unilever Sustainable Agriculture Code Implementation Guides in 2010. Now, with the launch of SAC2017, we deemed it necessary to re-evaluate and repackage this guidance to align with updates in our thinking and approach, as reflected by SAC2017.

The purpose of the implementation guide is to provide a source of information and reference material for users of the SAC2017, answering questions such as:

- What do Unilever mean by that?
- So, what does Unilever think I need to do to comply with the code?
- Where can I go to get advice and information on this?

Or even

- Why is this included in the SAC?

Hence, this document aims to provide suppliers and their farmers with practical advice on how to achieve the standards set out in the code and in so doing, drive the impact of sustainability to create real improvements to the lives of

farm workers, the resilience of ecosystems, and productivity of these critical farm businesses.

It must be noted that the Unilever Sustainable Agriculture Code and the accompanying Implementation guides aim to be a reference source of current best practice for sustainable agriculture, while at the same time it is not meant to be an exhaustive compilation. The ultimate responsibility for how and which practices are implemented reside with suppliers and their farmers.

WHAT IS DIFFERENT ABOUT THIS IMPLEMENTATION GUIDE?

Land Use Change

Our 2010 version did not cover land use change; it focused instead on improving practices in existing farms. In our new version, however, we cover the environmental and social challenges associated with land use change, including deforestation and the protection of valuable ecosystems and habitats. Another important issue is safeguarding community **Land Rights**: essential for protecting food security and inclusive development. But, however passionately we oppose ‘**land grabbing**’, we often come across political systems which do not give adequate protection to indigenous people and women. For that reason, our new code demands **Free, Prior and Informed Consent (FPIC)** from indigenous peoples and vulnerable communities before land use change takes place.

Ensuring alignment

Across the code as a whole, we make sure our position lines up with what is happening elsewhere at Unilever and beyond. For instance, our code is aligned with Unilever’s position on Eliminating Deforestation and has incorporated our 2016 Responsible Sourcing Policy. It also builds on our partnership, launched in 2014, with the International Fund

for Agricultural Development (IFAD). In addition, we are keeping an eye on the **High Carbon Stock (HCS)** participative process in order to bring learnings into the code.

Spotlight on health

To protect people's health at work on the farm, Unilever has also made new commitments to cascade **WASH** commitments down the supply chain. As a result, we have included more specific criteria focused on hygiene, training, toilet and washing facilities and drain design. We recognised the need for workers to be able to **hand-wash with soap** before eating in the previous version of the Code, and for toilet provision in farm accommodation and processing facilities (e.g. packing plants). So, in the 2017 version of this guide, we try to address the critically important issue of **avoiding open defecation** on farmland, whilst recognising that the provision of toilets around farms in all parts of the world is not going to be deliverable in the very short term.

The new version of the implementation guide asks "leading" farmers to promote healthy lifestyles amongst the farming community and workforce; this criterion will obviously be interpreted differently in different parts of the world, but could clearly focus on hand-washing and toilets in some places. **HIV/AIDs** prevention in others and **no-smoking** or **healthy-eating** campaigns elsewhere.

Boosting resilience

Our Code and implementation guides have always focused on practices that boost productivity and resilience; soil and water conservation measures, improving soil fertility, and the rational trade-offs amongst risk, yield and product quality that planting material choice and farm management involve. But for many farmers – and probably most smallholders – managing risk can be a higher priority than maximising yield and profitability as crop failure has such devastating financial consequences. Training for smallholders and other farmers, to increase understanding and empower better decision-making, is therefore an expanded area in this implementation guide, which also encourages suppliers to get involved in farmer savings, insurance and support programmes where appropriate. Our revised Code, which has incorporated Unilever's Responsible Sourcing Policy, has improved requirements for dealing with **grievances in the workplace**. It now stipulates that everyone in our supply chains should have recourse to transparent, fair and confidential procedures if they want to raise an issue or express a concern. Another new criterion focuses on **conflict resolution** and managing grievances between farms or plantations and the local community.

Climate Smart Agriculture

Like the 2010 version, the SAC2017 seeks to address the full spectrum of sustainability issues touching agriculture, and as such does not explicitly link criteria within the Code to Climate Smart Agriculture (CSA). CSA, the Food and Agricultural Organisations' embodiment of climate change themes for agriculture, requires farmers not only to reduce greenhouse gas emissions and increase carbon sequestration to offset climate change, but also to improve productivity and enable farming systems to become more climate resilient. In recognition of the increasing importance of CSA, we produced a guide to draw linkages with our code. These links have been included under criterion headings, where applicable, while the guide can be found on our [webpage](#).

Responsible Sourcing Policy for Farmers

In 2014, Unilever launched the Responsible Sourcing Policy (RSP) for suppliers, as a commitment to conduct business with integrity, openness, and respect for universal human rights and core labour principles throughout our operations. However, given that the SAC provides the foremost link between Unilever and our farmers, and given the relevance of the RSP principles to them, it made sense to include a new chapter titled, *Unilever Responsible Sourcing Policy for Farmers*, which became chapter 12 of the SAC2017. While there is some overlap between pre-existing SAC requirements and those within the RSP chapter, we have attempted to consolidate and cross-reference these as best we could. RSP was updated in 2016 and this version is referenced.

Smallholder farm references and exclusions

Like all sectors farming has many kinds of players – from large agribusinesses farming many crops over an expansive area, to cooperatives working together under one management system, and smallholders operating small-to micro-enterprise farm businesses. For each player, management capacity and sustainability issues effecting their business may differ significantly, so it is important to be pragmatic in our application of the SAC2017. Where smallholder farmers are concerned, we have highlighted criteria we consider not applicable, such as having formal documentation, like management plans, or issues that are relevant to mechanised activities, like requirements for the application of inputs. By maintaining a diversity of criterion tending to each theme (chapter) in the SAC, we hold all farmers accountable to our requirements for sustainable agriculture.

HOW THIS GUIDE HAS BEEN STRUCTURED

This is the second implementation guide which Unilever is publishing since the launch of the SAC in 2010. Compared with the first, the guide has undergone several changes, owing to 7 years' worth of experiences in application and the input from our stakeholders. Important changes worth highlighting are as follows:

Change in criterion category titles

As we amended existing and added new criteria to SAC2017, so did we consider the framing of the criterion categories under which each requirement falls. In SAC2010, requirements were classified as being either 'Mandatory', 'Must' or 'Should'. Their interpretation and what they are now referred to are as follows:

- **Mandatory** requirements – the name of which has not changed – are those for which non-compliance is considered unacceptable and constitutes a supplier being 'not sustainable' to the SAC.
- **Expected** requirements – originally classified as 'must' in SAC2010 – these are to be complied with, for which non-compliance is acceptable only for a certain percentage of requirements per chapter and overall.
- **Leading** requirements – originally classified as 'should' in SAC2010 – have the potential to become obligatory requirements (expected) in the future.

Citations and Further Information

For ease of access, web addresses of citations have been provided as footnotes, while links to further information on topics covered in chapters, have been provided as appendices at the back of most chapters.

Related documents to this guide can be viewed online. These are the [SAC2017](#) and the [Scheme Rules](#).



1 CROP AND PASTURE NUTRITION (FERTILISATION MANAGEMENT)

Fertilisers and/or composts are important, and expensive inputs to farming systems. Economic and environmental sustainability requires nutrients to be used efficiently and not wasted. This chapter covers aspects of nutrient choice, nutrient application rate and nutrient application methodology. Documentation is expected on larger farms.

Health and Safety aspects of nutrient management are covered in the **Social** chapter. As a consequence, Occupational Safety and Environmental Safety issues related to fertiliser, compost and manure management are separated in SAC2017. There is, of course, no need for risk assessments/ risk management procedures to be documented separately for the two chapters.

Increased use of fertilisers (both manufactured and organic) has undoubtedly played a large part in yield improvements for many crops worldwide over the last 60 years. Nevertheless, nutrients are often used inefficiently; either over-applied, unevenly applied, or applied with the different ratios of macronutrients (N:P:K) or imbalance of micro-nutrients; leading to:

- Wasted inputs and financial inefficiencies on farms;
- Reduced quality of product (for some crops);
- Water pollution, eutrophication and the contamination of drinking water sources;
- Negative impacts on biodiversity that thrives in nutrient-poor environments; and
- Atmospheric pollution and production of greenhouse gases. The release of N_2O from farmland (strongly linked to fertiliser use), along with animal husbandry, make farming one of the strongest contributors to global warming. Efficient use of Nitrogen-based fertiliser is critical for **climate smart agriculture**.

While over- and inefficient- use of nutrients has become commonplace in some parts of the world, many farmers in the developing world still have limited (financial and physical) access to fertilisers, and lack the knowledge of how to use what they do have efficiently. As a result, smallholder soils can sometimes be “mined” of nutrients, leading to poor crop yields, crops becoming less resistant to some pests, diseases, and poor ground coverage leading to increased erosion.

Supporting smallholder farmers

Although the financial and environmental problems associated with inefficient or inappropriate use of fertiliser are extremely important for smallholder farmers, such farmers are rarely able to afford the preparation or comprehend the value of documented rational fertiliser and nutrient management plans for their farms. For example, smallholders often have trouble affording suitable fertiliser if micro-credit is unavailable locally, since fertiliser needs to be purchased well before the crop is harvested and provides income.

Locally produced manure and compost is often an under-rated resource within “conventional” and/or smallholder agriculture, and in some parts of the world (e.g. parts of China), over-application of nutrients is common because both manure and inorganic fertilisers are applied.

These are both areas where national research or advisory organisations should be able to support the farmers.

Unilever suppliers, as traders, processors or co-operatives, should also be able to support the farmers who supply them, by providing training and helping to organise farmer-groups (**See also the Social and Training chapters**), thereby:

- Acting as channels for advice from national or local research or advisory organisations on fertiliser policy, or otherwise employing an agronomist directly to do this;
- Providing support to farmers who need credit to purchase fertiliser or other inputs. This may be:
 - Through direct provision of credit; or
 - In the form of an agreed contract of supply, so that a credit agency is aware that there will be income forthcoming to pay back the loan; and
 - By bulk-buying fertiliser on behalf of the farmers, thereby ensuring that the correct type of fertiliser is purchased and made available to farmers at a reasonable price.

Legal Requirements

In some cases, the legal/regulatory requirements for nutrient management are very strict, and cover most - or all - of the most important parts of the Unilever 2015 "Sustainable Agriculture Code".

In the UK, for example, use of nutrients is covered comprehensively in the new "Defra Code of Good Agricultural Practice" (PEPFAA in Scotland¹) and the "Nitrate Vulnerable Zones" rules². There is also increasing control of water pollution from agricultural inputs under the EU Water Framework Directive.

Evidence of compliance with such codes or regulation may substitute for the relevant SAC2017 criterion.

1.1 INTEGRATED NUTRIENT MANAGEMENT

F1	Expected. Nutrient Management Plan and nutrient application records
	There shall be a Nutrient Management Plan implemented on every farm. The plan shall be prepared and/or designed by a competent individual or authority, who may be part of the supplier agronomy team. The Nutrient Management Plan will include a requirement to keep records of nutrients applied for at least 2 years.
	Climate Smart Agriculture
	Nitrous oxide is the by-product of, amongst other sources, nitrogen fertilisers, with a greenhouse impact of almost 300 times that of carbon dioxide. In the United States, the use of synthetic fertilisers in agriculture contributed to 74% of N ₂ O emissions for 2013 ³ . The SAC2017 encourages more efficient use of nitrogen-based fertiliser, reducing emissions from nutrient applications. Furthermore, the responsible application of nutrients in synergy with prevailing soil structure and the provision of water should increase productivity on farms.

Soil fertility and well-managed nutrients are critical for farm productivity and profitability. Where nutrient supply is excessive or unbalanced, expensive inputs are wasted, water is often polluted and greenhouse gas emissions increase.

A crop nutrient management system must be in place, which aspires to optimise all crop, fodder crop, and pasture land nutrient supply, whilst balancing this with nutrient offtake when the crop is harvested. It is recommended that the Nutrient Management Plan be developed on a crop and location specific basis. Good practice is to use Nutrient Management Plan historical application records, combined with estimates of nutrient losses to the environment and take-off in harvested crops, to inform the Nutrient Management plan for individual fields based on past performance.

Along with the International Fertiliser Industry Association, we advocate the 4Rs of fertiliser management:

- Right source (type and form), at the
- Right rate,
- Right time and
- Right place.

There is no required format for the Nutrient Management Plan.

¹ <http://www.gov.scot/resource/doc/37428/0014235.pdf>

² <https://www.gov.uk/guidance/nutrient-management-nitrate-vulnerable-zones>

³ <http://www3.epa.gov/climatechange/ghgemissions/gases/n2o.html>

In the developed world, **farm nutrient management plans** are often required by legislation (especially if farms raise livestock), and contractors who apply fertilisers and manures must be licensed. Such legally required plans will usually cover the requirements for this criterion.

Nutrient Management Plans, developed by farming associations, governments, regulatory authorities and agronomy advisors, can also be downloaded from the internet and used/adapted when a local system is not available.

Examples of approaches for different regions are:

- UK: <http://www.nutrientmanagement.org/what-we-do/tools/farm-and-field-record-sheets/>
- USA: Most nutrient management plans are completed to specifications laid down by the National Resource Conservation Service (NRCS). A number of technical documents developed by them, and associated extension services, are available at: <http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/landuse/crops/npm/>
Specific examples of plans include:
 - https://extension.umd.edu/sites/default/files/_docs/programs/anmp/Willow_Farm_Model_plan_2015.pdf (Maryland, USA);
 - http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_007342.pdf (Iowa, USA)
- New Zealand: http://www.fertiliser.org.nz/Site/code_of_practice/appendices/appendix_4_nutrient_management_plan_template.aspx

Decision-support systems for nutrient management are now available for some crops, nutrients and parts of the world, some of which involve remote sensing, yield mapping and the fine-tuning of fertiliser applications.

COMPONENTS OF A NUTRIENT MANAGEMENT PLAN

- Aerial photograph or map or soil map of field(s);
- A current or planned crop production sequence or crop rotation;
- Results of analyses of soil, plant, water, manure, or organic by-product samples;
- Realistic yield potentials for crops in rotations;
- A listing of all nutrient sources;
- Recommended nutrient rates, timing, form, and method of application including incorporation timing for the time-period.

A useful addition to the above list is taking account of nutrients removed from the land during harvest.

Manure management plans

For practical advice on manure management plans, including how to work out where manure should and should not be used, and the area of land suitable for the application of manure resulting from your farm, we can advise using the UK government guide called 'Manure Management Plans, a step-by-step guide for farmers: <http://adlib.everysite.co.uk/resources/000/015/584/manureplan.pdf>.

This guidance is obviously more suited to temperate regions and European soils than to other parts of the world. Your own authorities may publish similar guides, which will usually be more applicable for your region.

Otherwise, we recommend the basic advice from the FAO on application techniques, with information on the circumstances under which they should be used. The following document is applicable to all countries and levels of mechanisation:

<http://www.fao.org/wairdocs/lead/x6113e/x6113e06.htm>

Obviously, the first guidance to look at is your local legislation, since it is crucial that all local laws are adhered to, regardless of the advice in this implementation guide.

Application records must have been kept for at least two years, and preferably, longer; 5 years is considered a good length of time for accumulated data to become useful for forward planning. In the case of arable crops in rotation, this means the application records for both the crop itself and the field on which the crop is being grown.

On each farm, **responsibilities** must be clearly assigned for planning and carrying out crop nutrition. Responsibility for planning may be assigned to a completely different person (e.g. a farm manager) to those responsible for machinery calibration or actual application (e.g. a farm worker).

The Plan should be drawn up by **competent individuals or authorities**, for example a farmer educated to college level in agriculture, a professional agronomy advisor/consultant, government or research institution advice, or a competent farmer with access to professional literature, websites or advice.

F2	Expected. Nutrient Management Plan takes crop needs into account
The nutrient requirements of the crop or pasture must be understood at all stages of growth, and used to design the Nutrient Management Plan. Not applicable to smallholders.	
Climate Smart Agriculture	
Discriminate and timed nutrient provisioning to meet crop-specific needs increases productivity; strengthens ecosystem resilience by reducing the likelihood of nitrate leaching thus securing soil integrity; and lowers GHG emissions ⁵ .	

Sensitivity to crop/pasture needs should enable farmers to fine-tune application rates and practices in order to minimise waste, pollution and emissions and improve production and profitability.

Nutrient requirements for the crops and pasture grown must be indicated in the Nutrient Management Plan.

- Local extension service or research institutes often issue recommendations for amounts and timing of fertilisation, based on crop demand throughout the crop cycle.
- The required information for a particular crop is often available on the web, although it may need to be modified for local conditions.

We expect large, professional farms and farming organisations to have a detailed understanding of the nutritional requirements for their “Unilever” crops and to use these insights to plan and document their fertiliser choice and application procedures.

Most legally required or crop-specific ‘off-the-shelf’ Nutrient Management Plans take crop needs into account. However, if the plan that is used on the farm does not do so, then this must be added into the planning process and incorporated into the Nutrient Management Plan.

Examples of crop-specific information available on the internet can be found at:

- <http://www.fertiliser.org/Library>
- [http://www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/agdex10073](http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/agdex10073)
- <http://www.fertiliser.org/ItemDetail?iProductCode=7351Hardcopy&Category=AGRI&WebsiteKey=411e9724-4bda-422f-abfc-8152ed74f306>

Fertilisers should be applied to maintain recommended levels of these nutrients in soils, leaves and/or harvested products. This includes the use of lime, where soil pH is below the recommended range for the crop, and also includes planning for the nutritional value/nutrient content of the crop or pasture to be within certain ranges, e.g.

- Nitrate content of vegetables must remain within a legal limit;
- Pasture/grassland for animal husbandry systems reliant on pasture, silage or hay may have recommended nutrient contents. Phosphorous and potassium levels particularly can vary widely in pastures and should be carefully monitored in case supplements are required.

“All stages of growth” include any nursery stage of production that takes place on the farm, juvenile stages and when the crop is moving into full production.

Although we only ask for records to be kept for 2 years, there is a good argument for keeping them (and referring to them) over a whole crop cycle or longer.

We have made this criterion “not applicable” to smallholders, but we would advise Unilever suppliers to provide training in this area and ensure that agronomy support for smallholders includes *understanding that different crops need different fertilisers applied at different stages of development*.

F3	Expected. Nutrient Management Plan informed by nutrient deficiency symptoms, soil and tissue analyses
Regular soil and/or tissue nutrient testing shall be used to adjust the application rates, as part of the Nutrient Management Plan. If this is not practical, the observation of nutrient deficiency/over application symptoms on the crop or pasture may be used as an indicator.	
Climate Smart Agriculture	
Soil testing informs the calculated application of inputs, preventing over-application that can result in harmful contamination of soils and the pollution of waterways. This is a sizeable problem in China, where overuse and misuse of fertiliser lowers uptake rates to 30% of all that which is applied, and has led to pollution and food safety problems. ⁶ Holistic nutrient management, while accounting for deficiency symptoms and analyses, stands to promote productivity; reduces the potential for environmental degradation, thus enhancing resilience; and mitigating emissions associated with erroneous nutrient application. ⁷	

⁴ <http://www.fao.org/docrep/018/i3325e/i3325e.pdf>

⁵ <https://www.chinadialogue.net/article/show/single/en/5153-The-damaging-truth-about-Chinese-fertiliser-and-pesticide-use>

⁶ <http://www.soils.wisc.edu/extension/pubs/A2809.pdf>

Crops and pasture deficient in nutrients have low productivity, whereas over-fertilisation results in wasted inputs, polluted watercourses and high rates of emissions of greenhouse gases. Monitoring crop and soil conditions and adjusting applications can minimise these problems.

Soil testing and tissue testing regimes need to be suitable for the type of land use and agricultural systems. For most systems, soil testing should be done every 4-5 years for each field/farm, but we recognise that this may be impractical for smallholders and unnecessarily frequent for farming systems involving small field but large landscapes with relatively uniform soils. For smallholders, general recommendations for fertiliser application in the Nutrient Management Plan may be based on soil testing performed on a selection of typical farms. Tissue testing can be useful, especially for perennial crops, but test results are often too late for corrective measures to be taken for annual crops. All farmers, including smallholders, are expected to be able to recognise Nutrient Deficiency (and Nutrient Over-application) symptoms and understand how to solve the problems they indicate.

Soil analyses will usually include assessments of pH, N, P, K and Mg, any nutrient where there is the risk of deficiency or excess supply and possibly trace elements (depending on local crop and soil vulnerability).

The Nutrient Management Plan should show how adjustments to the application rate of nutrients are made in response to the soil (or leaf/foliar) analysis results.

Nutrient deficiency symptoms are not expected to occur in professionally-run large farms except in exceptional circumstances (e.g. a new vegetable variety having unexpected micronutrient requirements).

As an absolute minimum, farmers (including **smallholder farmers**, or an agronomist working on their behalf) must be aware of the symptoms of nutrient deficiencies and excesses in the field. For example, N-deficient plants are often stunted, pale and spindly, whereas over-application of N results in very dark-coloured lush leaves and may delay ripening or increase the water content of some fruit. We recommend that **Unilever suppliers** support their farmers in these circumstances by:

- Organising training on deficiency symptoms and recommended fertilisers for Unilever crops on the local soil, and

- Considering to organise a soil analysis programme (probably in partnership with a government extension service or similar) that will help the farmer population improve their fertiliser choice and application practices.

F4

Expected. Nutrient Management Plan informed by soil and weather conditions

Soil conditions shall be used to adjust the application rates, as part of the Nutrient Management Plan. If different parts of the farm have different soils, nutrient management is expected to vary appropriately. Nutrient applications must be timed to avoid application during periods of heavy rain, snow or frozen ground, cracked, waterlogged or compacted soils, as nutrients will not be retained in the soil under such conditions.

Climate Smart Agriculture

By accounting for soil and weather conditions, the application of nutrients will be directly informed by locality variables, thus adopting a more informed approach to application, promoting productivity; limiting environmental degradation, boosting resilience of ecosystem services; and lowering emissions.

Knowledge of the soil's chemical, biological and physical composition must be a basic consideration for the choice of nutrient, application method and rate/frequency of application. For example, the soil type and texture (proportion of sand, silt, clay), soil organic matter content, potential rooting depth (or compaction problems), soil stone content, soil parent material and soil pH, can all affect the soil nutrient-holding and water-holding capacity.

If different parts of the farm vary in rooting depth, soil type, and texture, soil organic matter content, erosion or compaction problems, stone content, parent material, micronutrient availability or pH, nutrient management is expected to vary appropriately. Implementation of variable application rates all over the world would result in huge savings on environmental pollution and should be evaluated for the assessment of economic risks and benefits in local farming systems. See also **Soil Management chapter**.

If soils are very wet or susceptible to compaction, an assessment needs to be made as to whether fertiliser application should be delayed. Applying nitrogen fertiliser to poorly- drained or wet soils leads to high N₂O emissions. Although these losses are often acceptable financially (typically less than 5 kg N/ha/yr), N₂O is a highly potent greenhouse gas, and **emissions from fertiliser are the main source globally of this greenhouse gas**. Losses to water can also lead to unacceptably high levels of nitrate in natural water bodies (where eutrophication can result) and drinking water supplies.

Applying fertilisers, composts and manures to frozen, cracked, waterlogged or compacted soils is illegal in many parts of the world – and should always be avoided. Where fertilisers are applied under such conditions, we expect this to be an exception to regular practice and for there to be a very good explanation.

An effort should be made to spread manure earlier in cold weather climates (i.e. before winter sets in) to ensure that application to frozen soils is avoided. However, sometimes local laws may require this, e.g. in some areas of the U.S. there are daily manure spreading laws, used as a means to overcome inadequate manure storage. All legislation, local or national, needs to be complied with.

Split applications or fertigation make it easier to minimise the risk of losses due to unexpected weather conditions. Known high-risk times of year for nutrient applications should be avoided if possible, e.g. fall (autumn) application of nitrogen fertiliser to corn (maize).

F5	Expected. Nutrient Management Plan – Inputs – nutrient contents and associated risks
The nutrient content and availability of fertilisers, manures, composts, cover crops and crop residues used shall be recorded, tested and/or estimated, and the results used to inform the Nutrient Management Plan. Not applicable to small-holder farmers.	
Climate Smart Agriculture	
N-containing volatile emissions are subject to a complex set of chemical reactions in the atmosphere and result in greenhouse gases, acid rain and eutrophying deposits (sometimes in ecosystems dependent on low nutrient inputs for survival). Animal manure application also poses risks, like the introduction of human pathogens and heavy metals, uncertainty around the mineral content, and pollution through over-application. Reconciling the nutrient content of applied inputs and associated risks into the plan shall, result in better-informed decision-making, to the benefit of the 3 CSA themes.	

Clearly, knowing the content of nutrient inputs (including composts and manures) is particularly important for sound nutrient management, optimising productivity and minimising waste and pollution.

The nutrient content of all applied fertilisers must be known in order to make the necessary calculations required for a high quality Nutrient Management Plan.

Where fertilisers are applied, the N, P, K, S and micronutrients need to be applied in the correct ratios; any excesses will tend to be wasted and lost. Farm managers should be taking every precaution to minimise such losses and

be able to justify the choice of fertiliser and application method in terms of providing crops with the nutrition they need, pollution reduction and optimising costs and benefits.

Whereas the NPK and S content of commercially available “chemical” fertilisers is usually available on the pack or associated literature, it is less easy to find out the nutrients that are being applied via manures, composts, “green manures” or cover crops and by introducing legumes into the farming system.

Urea now accounts for around half of the N fertiliser used in the world because it is relatively inexpensive and cheaper to transport (because of its high N content) than many other forms of N fertiliser – but it is highly soluble and its efficiency is also decreased because of volatilisation losses. N-containing volatile emissions are subject to a complex set of chemical reactions in the atmosphere and result in greenhouse gases, acid rain and eutrophying deposits (sometimes in ecosystems dependent on low nutrient inputs for survival). Nitrogen is also lost from urea during storage, particularly if it becomes damp. Up to 20% of the nitrogen, content of applied urea may be lost to the atmosphere as ammonia. If the Nitrogen is lost before it can be accessed by the crop then it is clearly not only wasted (i.e. there is direct financial loss as well as non-optimal application rate), but also becomes polluting. Losses can be reduced by soil incorporation and good timing of applications including “split applications” in parts of the world where the risk of losses to water or the atmosphere are high because of the local climate (**See also criteria F7 and F10 of this chapter**). Urea may be pelleted or converted into a pilled form to reduce volatile losses, but is then more difficult to spread evenly using spinning disc equipment.

Animal manure not only contributes N, P, K and trace elements to the soil (where they tend to be released more slowly than from chemical fertilisers, but also helps build organic matter and soil structure (**see Soil Management chapter**). **Risks** that need to be managed include:

- Potential for human pathogens to be introduced to the production system (worker and food safety), especially if human waste is involved;
- Potential for heavy metal introduction, especially with human manure;
- Problems with handling the volume of manure required for effective nutrition if not complemented by other inputs;

- Introduction of new weed seeds with the manure;
- Uncertainty about the NPK content of the applied manure (see below); and
- Pollution arising from over-application of animal manures or other waste materials, applied as a form of waste-disposal.

These risks must be properly managed; this generally means that all manures need to be composted well before use and human manure must be carefully processed before use. Ready-to-eat crops - such as salads, fruits and vegetables, which are unlikely to be cooked before consumption - are particularly vulnerable to microbiological contamination. For some Unilever fruit and vegetable crops, this may mean that the use of manure is too risky for the processing and farming systems involved.

Every effort should be made to assess the available nutrient content of manure, slurry, composts and soil amendments used on the farm.

- For slurry, using on-farm assessment tools such as a slurry hydrometer or N-content assessment kit; or
- By having a slurry sample analysed in a laboratory; or
- If volumes are low or laboratory assessments impractical, by looking up average values in tables; and
- Used to inform decisions that need to be made on inorganic fertiliser application.

The following website has a set of useful calculators for nutrient and manure management:

<http://eservices.ruralni.gov.uk/online-services/FarmNutrient/index.asp>.

Animal manure can vary considerably in its nutrient content, depending on the animal or bird species, age and diet, the straw and urine content of the manure and loss of volatiles during composting or processing. Table 1 lists some typical contents.

Improving feed management, for example, in some livestock, ensuring a better energy and protein ration, can decrease the mineral N-content in manure, resulting in lower ammonia emissions and more efficient use of nitrogen. If the animals involved are part of the Unilever supply chain, the Feed Plan should cover this aspect required in criterion F113.

If manures are regularly applied to particular areas of land, nutrient levels can become very high. Soil sampling (**see criterion F3**) for the determination of soil nutrient contents is important to ensure that applications remain balanced. The sampling regime will vary depending on the manures being used and any particular risks associated with them, e.g. toxic metals are a high risk if human waste and pig and poultry manure are applied regularly.

TABLE 1. TYPICAL CONTENTS OF MANURES

	Nitrogen	Phosphorus	Potassium	Calcium	Magnesium	Organic matter	Moisture content
	(N)	(P2O5)	(K2O)	(Ca)	(Mg)		
FRESH MANURE	%	%	%	%	%	%	%
Cattle	0.5	0.3	0.5	0.3	0.1	16.7	81.3
Sheep	0.9	0.5	0.8	0.2	0.3	30.7	64.8
Poultry	0.9	0.5	0.8	0.4	0.2	30.7	64.8
Horse	0.5	0.3	0.6	0.3	0.12	7.0	68.8
Swine	0.6	0.5	0.4	0.2	0.03	15.5	77.6
TREATED DRIED MANURE	%	%	%	%	%	%	%
Cattle	2.0	1.5	2.2	2.9	0.7	69.9	7.9
Sheep	1.9	1.4	2.9	3.3	0.8	53.9	11.4
Poultry	4.5	2.7	1.4	2.9	0.6	58.6	9.2

Source: http://www.ecochem.com/t_manure_fert.html

Suppliers working on behalf of groups of smallholders may be able to organise and/or negotiate informative manure, slurry, compost and/or soil sampling and liaise with agronomists to recommend suitable application rates.

See also the information on the use of sludge and manures and their associated risks in the **Soil Management and Value Chain chapters**.

Previous crops and crop residues

Estimates of the contribution of previous **legume crops** grown on the land to the soil nutrient concentration (especially N) also need to be made. This will obviously vary depending on whether crop residues remain on the field. If the N content of the soil is high after legumes are harvested, early planting of the next crop in the rotation (or specific “catch” crops) will be required to take up the N before it is lost. Effective use of legumes in crop rotations, or between perennial crops, can considerably reduce reliance on increasingly expensive N fertilisers.

The harvesting and processing of agricultural residues should not be at the expense of soil’s long-term stability and that an appropriate amount of residues shall be left on the field to minimise the use of synthetic fertilisers.

For phosphate and potash, it is more important that applications and crop requirements balance over a rotation rather than for an individual crop.

F6	Expected. Nitrogen and phosphorus calculations
The Nutrient Management Plan must include a calculation of the amount of Nitrogen and Phosphorus to be applied in each year, taking into account all sources of nutrients applied and those available from the soil. The calculation must also include an assessment of the amount of nutrients removed from the crop or pasture by harvesting and/or grazing. Not applicable to smallholder farmers.	
Climate Smart Agriculture	
A substantial portion of greenhouse gas emissions associated with nutrient inputs are released in the field as nitrous oxide; hence, the application of nutrients must be correctly done. Quantifying the required application of inputs against available soil nutrients, provides confidence that inputs will not negatively impact productivity and unnecessarily result in higher emissions.	

Clearly, knowing the content of nutrient inputs (including composts and manures) is particularly important for sound nutrient management, optimising productivity and minimising waste and pollution.

A calculation must be made of a simple (input/output) nutrient balance of the crop, using best available information, considering nutrient inputs and nutrient off-take with the harvested part of the crop. Best practice is, of course to augment this with a more sophisticated assessment of nutrient balances and requirements considering more factors and covering a wider range of nutrients.

We recommend that soil potassium and micronutrients be also measured/calculated as part of the Nutrient Management Plan, although this will not be included in Code assessment /auditing requirements.

For smallholders, the Unilever supplier (or other competent entity) may supply this calculation, having first made sure that it is broadly representative of the practices taking place on a representative sample of farms.

For animal husbandry, it is important to ensure that manure is not applied to pasture and crops as a convenient means of disposal, if the soil is already so high in N or P that leaching and runoff will result in significant contamination of surface and groundwater.

Note that a negative nutrient balance is perfectly acceptable - and is good practice - where the soil reserves for the nutrient in question are high or where an acceptable nutrient balance can be achieved during a crop rotation.

TABLE 2: EXAMPLE OF NUTRIENT CALCULATION					
Nutrient inputs per hectare	N	P	Nutrient outputs per hectare	N	P
1. Available from the soil As estimated from soil analyses	20	15	5. In harvested crop 3337 kg at 0.0403 kg/kg N and 0.0053 kg/kg P	134	17.6
2. Crop residue inputs	3	0	6. Minus estimate of crop residues left in the soil that will be taken up by the next crop of a “catch” crop For this case study, presumed to be for vegetables in Northern Europe, this will be presumed to be “0” which is the standard default because of heavy winter rains.	0	0
3. Organic manures and composts Estimate from inter-planting of legumes (literature value) 10 0	10	0			
4. Mineral fertilisers N:P:K:S 891 kg/ha – as recommended by national vegetable growers association based on soil analysis results.	165	45			
Dolomitic lime (none, based on pH assessment)	0	0			
Muriate of potash	0	0			
Total Inputs	195	60	Total Outputs	134	17.6
Difference				49	42.4

F7	Expected. Minimise risks of contamination and pollution associated with nutrient inputs
Nutrient sources that can pose risks to people, the environment or product quality shall be avoided. This can be achieved either by testing inputs for contaminants to ensure that levels are below tolerable limits or by an assurance/investigation that shows the source of the material to be free from contamination.	
Climate Smart Agriculture	
The use of unregulated or untested inputs can pose a health risk to workers interacting with these chemicals, soil, water and wildlife, and in turn undermine product quality. Hence, minimizing risks would prevent negative impacts to productivity and safeguard resilience within the farms environmental setting.	

Application of untreated human sewage and human sewage-contaminated water (water from sewers and water that may be contaminated with runoff from sewage treatment facilities) directly to our crops is **prohibited** (See **Value Chain chapter**).

“High risk” materials, for which documented assurance of safety will be expected include:

- Treated human manure /sewage
(See <http://ec.europa.eu/environment/waste/sludge/> for information on the legal situation in the EU);
- Manures (risks depend on the particular type of manure used);
- Composted domestic and industrial waste - paper mill waste has proven to be particularly difficult to use in agriculture because of the dioxin and trace metal content;
- Ash, particularly if coal or coke has been used as a fuel (high risk of heavy metals); and
- Rock phosphate (high risk of heavy metals).

(Minimising risks of contamination and pollution associated with application storage and handling is covered by other criteria)

Suppliers are encouraged to work with smallholder farmers to identify risks in the local community as part of participatory training exercises on nutrient management (See **criterion F147**).

1.2 APPLICATION OF FERTILISERS, MANURES, COMPOSTS AND OTHER PLANT NUTRIENTS

F8	Expected. Application equipment – maintenance and cleaning
Application equipment must be maintained in good working order and safe to use. It is cleaned after use.	
Climate Smart Agriculture	
This will prevent the unintentional release of nutrient inputs, thus avoiding possible environmental degradation, which will protect productivity of farmed materials and limit emissions to those derived from intended inputs only.	

Poorly maintained application equipment should not be used to apply fertiliser where intended, as this may lead to lower productivity and an increased incidence of water pollution and greenhouse gas emissions. In the long term, it is likely that farm resilience will be compromised.

F9	Expected. Application equipment – calibration
Application equipment (including fertigation) must deliver the desired flow rates and distribution patterns. Manual application of fertilisers shall achieve even distribution and correct placement of the fertiliser.	
Climate Smart Agriculture	
By avoiding over- or under-application of inputs, application equipment will not pose undue negative effects on the economic and environmental setting.	

Accurate, even application of fertilisers is important to maximise their beneficial effects on yield, quality and profitability. It should be possible to achieve an application rate of within 5% of that desired, and a Coefficient of Variation no higher than 15%, using a well-calibrated fertiliser spreader.

For guidance on calibration, see the “Fertiliser spreaders manual”: http://www.wagrico.org/publishor/system/component_view.asp?LogDocId=82&PhyDocId=117

Supervision of hand-application of fertiliser is important, as workers are often tempted to “dump” large amounts of fertiliser in easily accessible parts of fields in order to reduce their workload. Where fertiliser is broadcast by hand on larger plots (rather than root zones around individual trees or bushes), workers need to be trained in good hand application techniques. It is good practice for hand application to split the total amount of fertiliser and apply half of it walking the whole plot “length-wise” and half of it walking ‘width-wise’.

See **section 4.2 Irrigation, in the Water chapter** for calibration of irrigation/fertigation equipment.

Fertiliser application equipment should be calibrated annually. This involves checking distribution patterns and comparing the results with manufacturer’s recommendations. Annual calibration is normally sufficient, but machinery must be recalibrated for fertilisers of different density or particle size.

F10	Expected. Application method adopted that minimise waste and pollution
High trajectory application techniques for spreading slurry and other nutrients are wasteful and also increase the risk of exposing water, living areas, public areas, or areas of high biodiversity value (which usually require low rates of nutrient inputs). High-risk techniques must be abandoned or modified by using technologies such as deflector plates, incorporation /injection of slurry or urea-based fertilisers, spot or hand application. Not applicable to smallholder farmers.	
Climate Smart Agriculture	
In selecting only responsible application techniques, the associated risks like volatilisation loss to sensitive features like watercourses and high biodiversity value areas and coordinated timing for effective uptake by crops, impacts that may be detrimental to productivity and emissions, can be avoided.	

Some application technologies carry much higher risks of losses to the atmosphere than others, leading to lower productivity and increased water pollution (with associated losses of ecosystem services) and greenhouse gas emissions. Since smallholders rarely have a choice of application technology this criterion is not directly applicable to smallholders.

Technology

Application techniques must be modified or abandoned to reduce exposure of sensitive areas. Techniques such as precision farming, spoon-feeding, fertigation, deflector plates, spot or properly supervised hand application may be appropriate, and incorporation into the soil may be the only practical way to reduce losses and pollution for some types of fertilisers. Careful timing of application (**See criterion F4**) should also reduce losses and pollution.

Some application technologies- such as high trajectory application techniques that “throw” slurry or manure into the air to spread it are inappropriate for areas close to living areas, watercourses or of high biodiversity value if there is no appropriate buffer zone or barrier. Slurries and liquid fertilisers should preferentially be injected to maximise accuracy of spread and avoid nutrient losses to the environment via run-off and volatilisation (which are polluting and increase the production of greenhouse gases).

Incorporating organic manure into soil or stubble is also usually preferable although often impractical on pasture.

Incorporation and injection reduces volatilisation loss (e.g. ammonia loss from manures and urea), losses with wind erosion and complaints from neighbours (e.g. when organic slurries are used). Even though incorporation/injection is more costly than traditional application techniques, it can be more cost-effective as losses are reduced. Slurries should be incorporated within 24 hours of spreading unless another method of minimising ammonia loss (e.g. trailing shoe, trailing hose, shallow injection) has been adopted.

In developing countries where tractors are usually not powerful enough for such techniques, incorporation of manure is often done using a plough. Change the last sentence to: A description and characteristics of common application systems for liquid and solid manure is provided by the Alberta State Department of Agriculture and Forestry here: [http://www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/epw11920/\\$FILE/4-5.pdf](http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/epw11920/$FILE/4-5.pdf)

Whatever technique is used for manure and slurry application the following points should be followed:

- Never allow slurry to pool or pond and runoff to surface water, adjacent property or drainage ditches; and
- Never apply slurry on heavily sloped land.

Drift is a particular problem for liquid fertilisers. It is generally recommended that **liquid fertilisers** should not be applied via sprinklers or spigot systems when wind-speeds are greater than 9 km/hr (~5 knots); high wind-speeds not only result in fertilisers being spread outside the crop, but also reduces the uniformity of spread within the crop. Drift is better controlled:

- At high application volumes and with bigger droplet sizes, so spray nozzles that reduce the presence of fine droplets are the best;
- By using deflector sheets attached to the spray boom to increase deposition and reduce losses of liquid fertilisers; and
- Drift control agents can also be added to certain types of fertiliser to reduce mis-application.

Spreaders and other application equipment need to be properly maintained and calibrated (See also **criteria F8 and F9**).

Buffer zones

Fertilisers must only be applied to the intended crop area, specifically avoiding water bodies, wildlife habitats and places of work, residential areas or where people pass by.

The location, width and management of buffer zones along waterways is usually defined by national or local regulations. In the absence of any regulatory requirements, we ask farmers to take steps to minimise the amount of fertilisers lost into surface water from waterways, drains and runoff from irrigation systems. This usually means that on-farm buffer zones are needed (where no fertilisers or manures are applied) near drainage points or areas that discharge into watercourses. The size will depend on many factors such as ground cover and slope as well as the fertiliser type, method of application and wind speed and direction, but as general guidance, the width should be at least 3 metres.

Buffer zones also need to be used to prevent fertilisers being applied directly to wildlife habitats. In Ireland and the UK, for example, fertilisers and manure should never be sprayed directly into hedges, which are considered important farmland habitats.

There are various sources of advice on how large such buffer zones need to be to be effective. In some cases, there are separate requirements or sizes of buffer strips for different legislation or support mechanisms (e.g. within the EU) for “no fertiliser application”, “no pesticide application” and/or “support for biodiversity” (e.g. to provide river-side wildlife corridors that connect across a landscape).

Timing

The timing of fertiliser application, especially those containing Nitrogen can be critical for avoiding waste and pollution. Fertilisers should be applied, wherever practical at times when the crop is growing quickly and will be able to take up the fertiliser before it is lost to water or the atmosphere. Fertiliser application to soils that are frozen, compacted, waterlogged or cracked must not be conducted (See **criterion F4**).

Split applications reduce the risk of fertilisers being lost in unexpected rains soon after application, and can be used to fine-tune application to the time when crops are most able to take up the nutrients, but split applications also usually mean doubling the cost of application and higher risks of soil compaction and damage to the crop.

Local factors

The choice of nutrients, application rates, method and timing will also need to take the needs of other crops and animal husbandry systems on the farm. For crops grown in rotation it will be particularly important to understand the nutrient value of the crop previous to the “Unilever” crop, and the nutrient value of any crop residues that remain after the “Unilever” crop has been harvested in order to avoid over-application (See **criterion F5**). Using cover crops or “catch” crops to take up nutrients remaining in the soil after harvest may be necessary to reduce nutrient losses to the environment.



2 PEST, DISEASE AND WEED MANAGEMENT

This chapter focusses on an **integrated approach to pest disease and weed management** for crops and on-farm pastureland used for animal grazing or the preparation of hay, silage or other animal feed for dairy and animal husbandry operations. Practical aspects of Crop Protection Products (CPPs - including pesticides, fungicides, herbicides, plant growth regulators) and CPP application are also covered in this chapter. Aspects of the management of vermin (e.g. birds, rodents, etc.) and other pests (e.g. cockroaches, flies, etc.) that might affect animals, animal housing facilities or other parts of the farm are also included.

Pest management on livestock farms includes management of pests that might affect crops, forage or pasture grown for animal feed. Direct use of pesticides on animals is covered in the **Animal Husbandry chapter** (Animal Health Section).

Please note that aspects of CPP management related to Health and Safety have been moved to the Health and Safety section of the **Social chapter**. This includes new prohibitions and phasing-out of WHO 1a and 1b active ingredients in CPPs.

The Storage of CPPs and CPP-contaminated materials is covered in the Farm Stores section of the **Value Chain chapter**, in response to requests to put all the stores issues together for ease of assessment. Disposing of Hazardous Waste is in the **Waste Management chapter**.

Pesticide residue impacts on Quality are covered in the **Value Chain and Continuous Improvement chapters**.

Integrated Pest Management (IPM) is the key to sustainable pest (including diseases and weed infestations) control. The objective of IPM is to adopt cultural, biological, mechanical, physical and other strategies to discourage the development of pests in the crop, and by doing so to reduce the need for CPPs.

CPPs are toxic chemicals and rarely impact solely on the target organism. IPM should ensure profitable farming, whilst minimising risks to the environment and human health. Poor management of CPPs can lead to:

- Wasted inputs and financial inefficiencies on farms;
- Reduced quality of product (illegally high residue levels may even make a crop unsaleable);
- Water pollution and the contamination of drinking water sources; and
- Negative impacts on biodiversity, including on species that provide ecosystem services such as pollination or pest control.

Supporting smallholder farmers

The financial, environmental and health problems associated with inefficient or inappropriate use of CPPs are extremely important for smallholder farmers, but small-

holders are often short of the knowledge and opportunities that would empower them to develop a full Integrated Pest management approach on their farms. Unilever suppliers will often need to develop training and support packages for the smallholders that supply them in order to comply with this chapter.

2.1 PEST, DISEASE AND WEED MANAGEMENT (IPM)

F11	Expected. Crop Protection Plan
	An Integrated Pest Management (IPM)/Crop Protection Plan must be in place based on IPM principles (prevention, observation, monitoring and intervention). The Plan will include the recommended thresholds or triggers to spray Crop Protection Products (CPPs) where these are available. The Plan must be reviewed annually for Unilever crops.
	Climate Smart Agriculture
	The adoption of an IPM will ensure that precautionary measures inform the application of CPPs – providing a formalized and holistic approach to manage the outbreak of pests, disease and weeds - effectively mitigating potential impacts to productivity and promoting resilience.

Protecting crops and pasture from damage and destruction by pests, diseases and weeds is vital for farm productivity and resilience. Unilever firmly believes that Integrated Management is the key to achieving sustainable farming businesses whilst minimising pollution and damage to the environment.

A Crop / pasture Integrated Pest Management (IPM) Plan must be in place. For Unilever crops, the plan must cover the management of outbreaks for:

- Major, or “key” pests, diseases and weeds that affect the crop or pasture on a regular basis (i.e. occur every year, most years, or 2 or 3 times in 5 years) and require active management or intervention; and
- Less likely problems, such as diseases known to affect the same crop elsewhere, for which a ready-made plan will ensure a timely response to an outbreak.

The IPM plan must cover interventions that take place outside the cropped area (e.g. the removal of secondary host species from field edges) or during the crop rotation (e.g. the removal of broad-leaved weeds during a cereal crop) that have implications for the health, yield or quality of the Unilever crop.

The plan must include the assignment of responsibilities for planning and carrying out pest, disease and weed control.

Under normal circumstances, a single plan will encompass all the components listed as Criteria F11-F19 in this chapter. It can be presented in any documented/electronic form the farmer chooses. An agronomist (e.g. employed by the Unilever supplier) may prepare the plan in full or in part on behalf of the farms that supply to a factory, as long as the farmers agree to take actions in accordance with the Plan.

For **pasture**, the IPM Plan can be a very simple document, and annual updates are not expected.

F12

Expected. Prevention: Crop rotation, and allocations to suitable parts of the farm

The IPM Plan must include processes and criteria for selecting suitable growing areas, field rotations and varieties in order to minimise the risks of inoculum build-up, infestations and contamination of the harvested product.

Climate Smart Agriculture

Globally, an average of 35% of potential crop yield is lost to pre-harvest pests. As a basis for responsible IPM, the selection of areas where pest populations are unlikely to cause crop failure, the incorporation of crop rotation practices to encourage unpredictability in pest habitat and the selection of seed varieties that are resistant to pests, attenuate the risk of pest, disease or weed outbreaks, and positively benefit the objectives of CSA are promoted.

This criterion may be “not applicable” for perennial cropping systems (including pasture), except where planting or replanting has taken place within the last 12 months.

Selecting suitable growing areas

The risk of pest, disease or weed outbreaks requiring CPP use (or repeated or heavy if some use is inevitable) can be reduced by:

- Avoiding planting fields or areas of fields where pest populations are likely to cause crop failure. For example, planting on parts of the farm known to be susceptible to waterlogging, frost, high winds or other predictable insult, is likely to weaken crops and makes them more susceptible to pests, disease or weed outbreaks;
- Choosing planting locations to avoid cross-infestation; and
- Allocating crops to parts of the farm where soil, drainage, irrigation options and/or the prevailing wind direction will minimise, delay pest, disease, or weed problems. Crops planted in unsuitable areas grow badly and are more susceptible to pests, disease leading to more soil, and fertiliser loss.

Crop rotation

Crop rotation can be used to reduce the build-up of inoculum and weed infestations, for example by:

- Managing weeds in the most appropriate part of the rotation;
- Using of cover crops to limit weed development; and
- Not cultivating crops susceptible to soil-borne problems in successive years.

Varieties

Crop cultivars/varieties with genetic resistance or tolerance of pests or diseases should be used when available¹.

F13	Expected. Prevention: Biological and physical controls
The farm agro-ecosystem is managed in such a way that problems are minimised, for example by variety choice or field margin management, to ensure that biological and physical cultural controls are used before (and/or in combination with) CPP application. Not applicable if no CPPs are used.	
Climate Smart Agriculture	
The introduction of natural, biological controls like insects enemies to pests, field margin management to improve habitat for pest predators, as well as physical controls like the use of barriers, conducting manual weeding and using plastic mulches to kill or prevent weed germination, can encourage ecological resilience and lower emissions associated with pesticide use.	

General aspects of farm management that help reduce the incidence or severity of pest, disease or weed outbreaks include:

- Trap crops;
- Cultivars with early maturity date, to avoid a late-season time-period when the pest populations are high;
- Fertilisation to promote rapid crop development;
- Field margin and windbreak or live fence management to encourage the development and maintenance of large populations of pest-predators. This concept can be extended to developing other non-cropped areas as habitats for beneficial flora, fauna and antagonists, such as,
 - Areas in orchards for ground-nesting solitary bees, or
 - Nest boxes for birds or bats
- Choice of irrigation system (e.g. drip systems may result in fewer fungal problems); and
- Crop and animal varieties derived from a wide genetic base and/or exhibiting traits including pest or disease resistance or tolerance.

Natural enemies for pests, diseases and weeds can also be supplemented with species not naturally present (classical biocontrol), or with larger numbers of naturally occurring species (augmented biocontrol). This approach is often adopted for crops grown in glasshouses, but can also be useful in fields. Examples of commonly used biological control include:

- ‘Nemaslug’, a microscopic nematode (*Phasmarhabditis hermaphrodita*) which will seek out and parasitise slugs, reproduces inside them and kills them;
- *Encarsia formosa*, a parasitic wasp, which use the greenhouse whitefly as a host;
- *Macrolophus caliginosus*, a predatory bug, used to control *Bemisia tabaci*;
- *Bacillus thuringiensis*, a bacterium that infects and kills various insect pests;
- Pheromones, which either attract and trap male insects or disrupt mating in pest populations.

Physical controls involve using barriers, traps, or physical removal to prevent or reduce pest problems. Examples include:

- Manual removal of infested/infected material;
- Manual weeding or insect removal;
- Water sprays to remove certain aphids and mites;
- Mesh screens in protected nursery areas to prevent small plants becoming infested;
- Coloured sticky traps to attract and trap pests (may be combined with pheromone technology); and
- Plastic mulches to kill or prevent weed germination.

Both biological and physical controls can be used in combination with chemicals, although care must be taken to use active ingredients that do not harm natural enemies, or whose application can be timed to minimise any negative impacts on them (See **criterion F22**).

For general crop-related issues see also: <https://croplife.org/crop-protection/stewardship/resistance-mangement/>

Animal husbandry – flies

Sanitation is an important cultural control for managing fly populations. Finding and eliminating breeding places for flies is the first step. The major fly breeding areas in livestock production areas are:

- Around manure storage areas;
- Around feeding areas;
- Under fences – in outdoor systems; and
- In poorly drained, moist areas.

Fly populations often increase rapidly after periods of rain, especially when it is warm. Heavily bedded, infrequently cleared out areas, such as calf pens, can be one of the main sites for fly breeding. Farmers are encouraged to look at the bedding to check for maggots (fly larvae). The best spots to check are around the water and along the edges of pens. These areas are moist and can get little traffic from

¹ Contact your Unilever buyer if our Specification conflicts with this requirement as the specification is likely to require updating.

livestock. If maggots are found, rid the area of manure. Good manure management is key – constant disturbance is required, and manure in areas that are not disturbed by livestock, e.g. along fences or around feed structures needs to be regularly moved or removed.

Infestation levels can be checked by either using sticky traps or simply counting flies on the animals. Natural enemies of flies, usually parasitic wasps, are often found on farms, their activity should be encouraged. In some regions, commercially produced parasitic wasps are available for release, e.g. in the Netherlands from Koppert. Speak to your local adviser to see if they are available.

For dairy production, further detail of using the IPM approach for the control of flies can be seen in the University of California guide “Management of Nuisance Flies: Dairy Design and Operational Considerations”, University of California Department of Entomology (2008)².

F14	Expected. Observation, monitoring and action thresholds
Farmers shall be able to recognise diseases, pest and weeds and be aware of defined thresholds for action e.g. through warning systems or on-farm monitoring. Farmers have a monitoring and scouting program for the crop in place. Not applicable if no CPPs are used.	
Climate Smart Agriculture	
Symptomatic diagnosis of disease, pests and weeds and the adoption of economic action thresholds that determine when yield and quality losses necessitate pest control can benefit the level of productivity and ecological resilience achieved.	

For weeds, where action thresholds are not conventionally used in practice, the expectation is that rational decision-making is in place, based on an understanding of the potential impact of weeds throughout the crop cycle.

Farmers must be able to **recognise** of symptoms of infestation disease, problematic weeds and invasive species (See the **Biodiversity and Ecosystem Services chapter**), and insect/mite/animal pests and weeds.

Scouting for pests is a key component of an IPM system. Different crops and different pests require different scouting frequencies and sampling methods, but the principle is the same – to compare actual infestation levels in the crop to the action threshold, in order to work out which action, if any, needs to be taken.

² <http://www.entomology.ucr.edu/>

An example of how to do this can be seen in the UC Davies Online IPM Guide for Tomatoes³. The UCD website (and others, including the website of the US IPM Institute) also gives IPM advice for several other crops⁴, so please search for information relevant to you. Also, ask your local extension service or crop adviser for specific advice.

Thresholds

The economic action threshold is the level of pest infestation that could cause economic damage. Until that threshold is reached, the cost of yield and quality loss will be less than the cost for control. This can be calculated if you know the economic consequence of a certain pest level, i.e. how much you estimate to lose in terms of yield or quality, and the cost of the pest control to prevent that damage. In many cases where economic action thresholds have been established by scientist, you may be able to find these from other farmers in your area or from extension staff/crop advisers.

Warnings and instructions to apply CPPs

In many cases, governments or commercial services provide **warning services**, often by e-mail or text. These can take the form of highlighting the need for extra vigilance when scouting or monitoring environmental conditions (e.g. whether leaves remain wet throughout the day) to determine whether the action threshold has been reached. Alternatively, they may take the form of “we recommend that you spray as soon as possible”.

F15	Mandatory. Intervention: Compliance with regulatory and customer requirements
Intervention can take place with biological and /or chemical CPPs registered and approved for use by the competent authorities, customer and/or supplier requirements. CPPs must be applied in accordance with the label requirement. If a license is required to apply CPPs under local regulations, this shall be obtained. Not applicable if CPPs are not used.	
Climate Smart Agriculture	
The responsible use of CPPs that meet regulatory and labelling specifications ensures that active ingredients that could be hazardous to the crop and environment, or which may lower ecological resilience through contamination and pollution of soil and water resources do not adversely affect crop productivity.	

³ <http://www.ipm.ucdavis.edu/PMG/C783/tomato-aphidfruitwormmon.pdf>

⁴ http://www.ipminstitute.org/Fed_Agency_Resources/IPM_elements_guidelines.htm

Regulatory requirements

Farmers must be aware of and demonstrate compliance with national legal obligations with respect to their choice of pest, disease and weed management control agents. Only biological and/or chemical methods that are legal to use on the crop or pasture can be used.

There must be no applications made:

- Outside the label instructions,
 - If there is no label, the product should not be used. The label usually includes information on hazards, first aid, storage and disposal requirements, instructions for use, personal protection equipment requirements, and application equipment and techniques. "The requirements of the label" also includes procedures for protecting workers who encounter CPPs, bystanders, such as re-entry timing, and minimising environmental risks.
- Beyond the expiry date of the CPP, or
- Of products forbidden by local legislation as well as those covered by global bans, e.g. the Montreal Protocol on ozone-depleting substances (includes methyl bromide) and the Stockholm Convention on Persistent Organic Pollutants (POPs) unless there is a local legislation waiver, for example off-label applications in minor crops.

In some cases spraying may be illegal if the proper procedures for consultation and notification of interested bodies have not taken place.

Customer requirements

The customer could be the Unilever supplier, or a Unilever operation. Lists of preferred CPPs can help farmers implement an IPM system, by guiding them to use less harmful active ingredients.

Unilever generic requirements, based on International Conventions and the WHO/FAO classification system are covered in criteria F83 and F84 in the Health and Safety section (since the focus is on human health aspects during handling or application). Unilever has additional requirements for some raw materials.

In the next few years we expect the GHS (Globally Harmonised System for labelling of chemicals) and FAO/WHO (JMPR) International List agreed system of chemical classifications to become available and used as the basis for regulatory requirements and decision-making systems. We reserve the option to shift our requirements to better align with the GHS/JMPR systems in the future.

F16

Expected. Intervention: CPP choice

Choice to be based on suitability for the crop and target organism, resistance management programs, plus advice on the label to protect vulnerable ecosystems and organisms. See also Health and Safety section for additional criteria. Not applicable if CPPs are not used. Not applicable to smallholder farmers.

Climate Smart Agriculture

CPP selection is a crucial process that accounts for influencing factors like crop need, cost, efficacy, availability, toxicity, legality and a number of other considerations. Farmers should leverage the experience of their suppliers and peers to help inform their selection. Assuming such an approach would drive direct benefit to increasing productivity, improving resilience and lowering emissions.

The expectation is that the reasons for the choice of active ingredient and/or formulated product, preferably based on a risk assessment, are listed in the Crop Protection Plan and understood by farmers.

If CPPs must be used, the choice of agrochemicals may be influenced by many factors. The critical considerations must be:

- Need;
- Efficacy; and
- Legality and customer requirements;
- Cost;
- Availability;
- Toxicity (See also criterion F82 – F89, Health and Safety section of the **Social chapter**), including the availability of suitable PPE;
- Eco toxicity;
- Implications of the application equipment used for limiting spray drift, etc.;
- Convenience;
- Ease or frequency of application (including the availability of appropriate machinery);
- Limiting the chance of the evolution of CPP resistant strains of insects or weeds (See also criterion F17) by rotating active ingredient used; and
- Avoiding damaging natural enemies of pests (predators and parasites) and bees (See also criterion F22, particularly for a detailed discussion on use of neonicotinoids).

For many "minor" crops – for example vegetables – there is often very little or no choice of CPP active ingredient(s) or formulations once these considerations have been taken into account.

Fly control (particularly relevant for animal husbandry)

Insecticides are the least preferred method of control. However, if used safely, and in conjunction with non-chemical methods, their use can contribute to good control. Knockdown insecticides, (Such as Pyrethrin), are best applied during early morning hours when stable flies are less active and are concentrated in overnight resting locations such as barns, tree lines, and shade structures.

Residual insecticides, e.g. permethrin, are best applied to structures on which flies tend to rest, e.g. building walls, fence lines, shade structures, surrounding vegetation. The use of any chemicals near livestock product storage areas, or milking areas in dairy production, must be carried out with extreme care, and in accordance with any Hazard Analysis Critical Control Point (HACCP) plans you have in place (See requirements in the **Value chain chapter**)

Where farmers have made different choices based on similar information, we recommend that Unilever **suppliers** – who will be aware of the situation because of collating responses to SAC2017 – discuss the variation with farmers and help the farmers shift to more environmentally benign options.

Note that some CCP active ingredients are banned by this Code, and only in exceptional circumstances will these banned active ingredients be tolerated (See criteria F79 and F80, Health and Safety section and the **Social chapter**).

F17	Expected. Intervention: CPP resistance avoidance
Where possible, the risks of developing resistance to CPPs must be lowered by rotating active ingredients with different modes of action. Not applicable if no CPPs are used. Not applicable to smallholder farmers.	
Climate Smart Agriculture	
CPP selection is a crucial process that accounts for influencing factors like crop need, cost, efficacy, availability, toxicity, legality and a number of other considerations. Farmers should leverage the experience of their suppliers and peers to help inform their selection. Assuming such an approach would drive direct benefit to increasing productivity, improving resilience and lowering emissions.	

Resistance to CPPs develops most quickly when a single active ingredient or different active ingredients with the same mode of action are used regularly. To prevent resistance developing, and thus protect the ability to use a range of active ingredients in the future, you should avoid repeated applications of the same chemicals, by:

- Rotating the class of chemical used;
- Addition of synergists, or mixtures of chemicals with different modes of action (although some countries have legal restrictions on this practice); or
- Concurrent mosaic application of different classes of chemicals.

Rotation of active ingredients can be particularly important for long-term management of weeds, and insect pests of crops, rats, vectors for human diseases (e.g. malaria) and for flies.

Animal husbandry – flies

Because they have short life cycles, flies develop resistance to pesticides very quickly, and using a different class of residual insecticide each time an application is made is important. One might, for example, select a pyrethroid for one treatment and switch to an organophosphate for the next treatment. Continue to rotate throughout the season to achieve maximum control and to keep resistance to a minimum.

Specific advice

For specific advice, ask your extension service or chemical supplier. Crop Life International, the crop protection industry body, also provides information and have working groups on the four main groups of CPPs (fungicides, insecticides, herbicides and rodenticides).

For general guidance on choice of CPP, see criterion F16.

F18	Expected. Intervention: No prophylactic use of CPPs
CPPs must not be used to prevent outbreaks of pests or disease (rather than in response to action thresholds being exceeded, or forecasting) except in exceptional circumstances and where evidence shows that that it poses lower risk to people and/or the environment than curative controls. Not applicable if no CPPs are used. Not applicable to smallholder farmers.	
Climate Smart Agriculture	
Should evidence prove that no plausible ground-based alternative is feasible, a risk assessment, detailing the risks and benefits of alternative approaches and listing risk reduction measures taken will be required. Should aerial spraying not have a higher risk to the environment or human health than ground-based applications, then use is warranted.	

Preventive, or prophylactic, use of CPPs can lead to higher overall, and unnecessary, use of products, and hence higher exposure of workers, non-target organisms (including natural enemies) and the environment. It also increases the risk of resistance forming to the active ingredient (See also criterion 17, Health and Safety section of the **Social Chapter**).

In most cases, the use of scouting and thresholds should remove the need for any preventative applications.

There are some exceptions, for example, where the pest population usually occurs, increases rapidly and is difficult to control. In these cases, it may be better to prevent the pest appearing in the first place. These cases are rare, so an assessment of the risks and benefits of such an approach should be carried out and a preventive programme only used if a benefit (in terms of overall risk) can be shown.

Seed treatments are *not* classified as “prophylactic” if used to protect against pests and diseases that are known to be present or high risk.

F19	Expected. Intervention: Fumigation and aerial spraying
If fumigation or aerial spraying is the only economic control option, it must be in accordance with local legislation. It must not pose additional risks for human health and the environment. Not applicable if no CPPs are used. Not applicable to small-holder farmers.	
Climate Smart Agriculture	
Should evidence prove that no plausible ground-based alternative is feasible, a risk assessment, detailing the risks and benefits of alternative approaches and listing risk reduction measures taken will be required. Should aerial spraying not have a higher risk to the environment or human health than ground-based applications, then use is warranted.	

The vast majority of farmers will find that this criterion is “not applicable”.

There are rare circumstances where fumigation or aerial spraying (e.g. from a plane or helicopter) is justified on the basis of efficacy and minimising negative impacts.

Soil fumigation using Methyl Bromide used to be a common practice for removing pathogens from the soil. Methyl Bromide use has since been phased out under the Montreal Protocol⁹ due to its ozone depleting properties, although other chemical soil fumigants e.g. Chloropicrin or Metam Sodium are sometimes available as alternatives.

Other control measures for managing soil borne diseases include crop rotation, steam, and cultural measures, (e.g. removing residues from soil and the use of sub-soiling and raised beds) and organic amendments (e.g. compost) are preferable to fumigation in the vast majority of circumstances.

As with preventive CPP application, a risk assessment of control alternatives must be carried out and fumigation only used if the overall risk can be shown to be as low or lower than the alternative controls.

Aerial spraying has many problems associated with it in terms of human and environmental exposure, as relatively high rates of losses and pollution are inevitable when spraying is done high above a crop. Ground-based applications should be used if possible. If aerial spraying is used it must be demonstrated that it poses no higher risk to the environment and human health than ground-based applications. It is particularly important to minimise spray-drift into vulnerable non-cropped areas.

See FAO guidelines on best practices for aerial application of pesticides: <http://www.fao.org/docrep/006/y2766e/y2766e00.htm>

In future, there is likely to be increased use of drones for spraying. Properly managed, these should reduce spray drift and enable more focussed applications. All use of drones must be in accordance with local regulations and/or best practice norms that are being developed internationally.

F20	Expected. Application records
Records must be made of the vendor, reason for spraying, trigger for spraying (action threshold or other), formulated product name, active ingredient name(s), active ingredient(s) concentration in formulated product, total amount of formulated product used, area sprayed and type of sprayer. Not applicable if no CPPs are used.	
Climate Smart Agriculture	
Not applicable	

All farmers must keep records of their use of CPPs.

This criterion lists our minimum requirements, many of which are also required for metrics reporting – see the **Continuous Improvement chapter**). If farmers employ a contractor to apply CPPs, they must extract this information from the contractor.

It is also useful to record the area sprayed, as the application rate/ha for each spray event can then be calculated.

We recognise that this can be difficult for individual smallholders to comply, especially if the smallholder have low literacy. Under these rare circumstances where a supplier or co-operative group (or similar) has taken the responsibility to develop spraying guidelines which the farmers follow, and smallholders are not capable of making records, the records may be made by the co-ordinating organisation. However, farmers themselves should make and keep these records wherever possible.

F21	Expected. Targeted application
	Systems must be put in place to ensure that CPPs reach all targeted areas and to minimise losses to non-target areas or the atmosphere. Not applicable if no CPPs are used. Not applicable to smallholder farmers.
	Climate Smart Agriculture
	Not applicable

CPPs that do not reach their target cause waste and pollution and reduce profitability.

Spray drift is a common result of the misuse of CPPs and a potential source of friction between farmers and their neighbours. To minimise **spray drift and spraying non-target areas**, the following precautions should be followed:

- Check the weather forecast before starting off; do not spray if high wind speed will cause spray to drift to non-target areas;
- Don't apply CPPs when heavy rain is likely;
- Shut off the sprayer when you are moving from field;
- Turn the sprayer off when turning around at row end;
- Set application equipment for the correct delivery rate and operate at the recommended speed; and
- Maintain and calibrate equipment (See also criteria F23 and F24).

Choice of technology

Most farmers are dependent on the equipment they or their contractors already have on farm. However, when new equipment is being purchased, serious consideration should be given to acquiring equipment that minimises drift.

- Equipment maintenance, such as replacing worn nozzles, (See criterion F8) is important;
- Using different equipment where the risks associated with spray drift are highest, e.g. by not using the boom or part of the boom close to a field boundary or by backpack-spraying small areas;
- Leaving buffer-zones unsprayed (the product label may provide information on when this is required);
- Using drift-reducing adjuvant chemicals as part of a spray-tank mixture; and
- Pelleted products and seed treatments are known to be problematical for birds.

Managing large (tractor-mounted) spraying units

- Keep the spray boom as low as possible, consistent with an even spray pattern at the correct target height;
- Check spray angles and adjust height accordingly;
- Use the coarsest appropriate spray setting; and
- When using a boom sprayer, reduce the operating pressure and forward speed but maintain the dose, volume and spray quality within the recommendations on the label.

Managing manual spraying

Backpack and manual spraying systems should always have an "off" setting that the operator can use – the CPP product must never just flow freely from a central distribution point. Operators must be instructed to avoid spraying non-target areas.

How big does the buffer zone need to be?

Local regulations, or CPP labels, are likely to specify the size of buffer zones. In their absence, please see the LERAPS or SAN recommendations:

<http://www.hse.gov.uk/pesticides/>.

The SAN Standard table of separations is available by searching for the farm standard⁵.

F22	Expected. Avoiding damage to beneficial organisms
Farmers must follow carefully the label instructions on CPPs to avoid damage to beneficial organisms (e.g. pollinators such as bees, and predators of pests such as parasitic wasps or insectivorous birds); choose active ingredients and formulations that are less damaging to the beneficial organisms; and apply at times of the day using application technology that minimises direct exposure of beneficial organisms and their habitats to the sprays. Not applicable if no CPPs are used.	
Climate Smart Agriculture	
Not applicable	

Most CPPs pose risks to non-target organisms – after all, they are designed to kill living things. However, it is possible to reduce the risks to beneficial organisms by adopting good Integrated Pest Management (IPM) practices. Part of good IPM is to choose CPPs – and apply them – in ways that minimise the risks to pollinators, predators and parasites of crop pests, and other beneficial organisms on the farm.

There are two stages to this process:

- **Risk Avoidance.** It may be an option to accept a certain amount of damage to the crop, and avoid CPP application all together. Spraying should always be seen as an option to avoid unacceptable damage rather than a routine practice. If applications of CPP are deemed necessary, it is important to figure out if the risk can be avoided by choosing a product that presents a lower risk to beneficial organisms. Farmers should consider the efficacy, spectrum of activity, mode of action and period of residual action of CPPs when making choices.
 - We do recognise that there are circumstances where there is little if any choice – for example, there are very few nematicides registered for use by many regulatory authorities
- **Risk Mitigation.** The adoption of risk mitigation measures that go beyond the good practices listed in other criteria of this Code must be adopted where specific risks to non-target organisms (particularly beneficial organisms) have been identified.
 - There may be mandatory risk mitigation procedures listed on the pesticide label, or specific risks identified (e.g. “toxic to bees”). If so, the risk mitigation measures specified on the label must be adopted. Note that products “toxic to bees” will also be toxic to wild bee

species (e.g. bumblebees) that may be more important pollinators than hive bees.

- The GHS (Globally Harmonised System for labelling of chemicals) currently in development should eventually help make such guidance internationally applicable⁶;
- Tables of toxicity are available from various sources, including the UC Davies IPM website. For an example see: <http://www.ipm.ucdavis.edu/PMG/r783900111.html>.
- Providing field margins or cover crops containing plants that natural enemies require/prefer for shelter, food, nectar, etc.
- Cultural practices such as strip cutting, which allow a gradual movement of beneficial organisms into nearby areas.
- Careful choice of active ingredients, timing, and method of spraying.

General Information on protecting bees and other insect pollinators may be found at the Pesticide Environmental Stewardship website⁷ and elsewhere. Such advice is usually:

- Apply pesticides **when pollinators or beneficial organisms are least likely to be present**, such as before or after blooming, or in late afternoon and evenings. Furthermore, before using a pesticide scout for pollinators; remember that some pollinators, such as *Normia* bees, rest in crop fields overnight and may be harmed by night time application of pesticides⁸.
- Different **delivery systems** can result in very different risk profiles, e.g. drip systems versus foliar sprays. Generally, liquid sprays or granules are less likely to affect non-target organisms than dusts. Spot treatments or hand application is often appropriate for controlling localised pest outbreaks before the pest spreads to the rest of the crop. Some microencapsulated pesticides are a similar size to pollen, and are therefore collected by bees, causing poisoning. Determine whether a different delivery system may reduce the risk. (See also criterion F21)
- **Spray drift** outside the crop must be minimised, especially onto pollinator-attractive areas such as wildflower field margins, beehives or nesting areas (See criterion F21).

⁵ <http://san.ag/web/our-standard/our-sustainability-principles/>

⁶ http://www.unece.org/trans/danger/publi/ghs/ghs_welcome_e.html

⁷ <http://pesticidestewardship.org/pollinatorprotection/Pages/default.aspx>

⁸ http://www.fws.gov/contaminants/Documents/Reducing_Risks_to_Pollinators_from_Pest_Control_factsheet.pdf

- **Seed coating** shall only be performed in professional seed treatment facilities, who must use the best available techniques to ensure that the release of dust during application to the seed, storage, and transport is minimised. On farm, adequate seed drilling equipment shall be used to ensure a high degree of incorporation in soil, minimisation of spillage and minimisation of dust emission.

Neonicotinoids

There has been a great deal of discussion about neonicotinoid-based CPPs and bee colony loss and damage in the last few years, resulting in curtailment of use by EU and other regulatory authorities (e.g. The European Parliament's note "Existing Scientific Evidence of the Effects of Neonicotinoid Pesticides on Bees"⁹). Neonicotinoids can be applied as foliar sprays, seed coatings, soil drenches or granules, as well as by direct injection into tree trunks or by chemigation (additive to irrigation water). In general, they have long half-lives in plants and soils and are transported around the plant systemically, raising concerns about residual effects. Dispersal of dust from dressed seeds (arguably a rare occurrence linked to particularly poor practice, but documented to have caused severe problems) is another route of contamination to non-target species and habitats. According to the NGO PAN Europe, sub-lethal toxicity to bees and other pollinators is the most likely exposure scenario in the field from neonicotinoid seed treatments; there are academic studies showing that when exposed sub-lethally, bees may become confused, fail to communicate feed or navigate, become more susceptible to pests or disease, and then the colony fails to thrive.

Manufacturers counter these arguments by pointing out that the older-chemistry products (those that neonicotinoids often replaced) were often considerably more toxic to a wider-spectrum of organisms; that colony collapse is not a new phenomenon, is clearly complex (varroa mite infestations and habitat loss are important components), and has only been linked directly to neonicotinoid use where there has been bad practice.

Neonicotinoid active ingredients include *thiacloprid* (e.g. "Barland", "Calypso" Bayer CropScience), *thiamethoxam* (Syngenta), *imidacloprid* (e.g. "Jade", "Gaucho", "Admire", "Merit", "Advantage", "Confidor", "Provado", "Winner" Bayer

CropScience and others), and *acetamiprid* (Nippon Soda and Sharda).

Of these, acetamiprid is the least toxic to bees, and is to be preferred if neonicotinoids are the most effective and least toxic option available (e.g. where the only practical, legal alternative is an organophosphate).

Fly control (particularly important for animal husbandry systems)

If pesticides need to be applied, they must be used in a way that minimises harm to flies natural enemies. Broad-spectrum pesticides should not, for example, be sprayed directly onto a fly development site as natural enemy wasp populations tend to be present on the surface of the development site, while fly larvae are somewhat protected beneath the surface.

Definitions

Pollinators – are species that pollinate crops and other plant species on the farm. Crops vary considerably in how dependent they are on pollinators in order to yield – oil-seed rape and apples are good examples of crops with high dependency. Many pollinator species are different types of bees, and it is worth noting that commercial honey (hive) bees are not always the best pollinators; wild species such as solitary bees and bumblebees are often important, so managing habitat for these – and not spraying the habitat with CPPs that are particularly toxic to bees is important. Some crop plants are pollinated by non-bee species (e.g. oil palm is weevil-pollinated).

Predators and parasites – are species that feed on the pests that attack crops. Many of the insect predators are wasps, so they are susceptible to insecticides. Insectivorous birds also feed on insect pests.

Neonicotinoids – are a class of neuro-active insecticides chemically similar to nicotine. They are systemic active ingredients in products designed to control (mainly) sap-feeding insects, such as aphids on cereals, and root-feeding grubs.

F23	Expected. Maintaining CPP application equipment
CPP application equipment must be maintained in good working order and safe to use. Not applicable if no CPPs are used.	
Climate Smart Agriculture	
Not applicable	

⁹ [http://www.europarl.europa.eu/RegData/etudes/note/join/2012/492465/IPOL-ENVI_NT\(2012\)492465_EN.pdf](http://www.europarl.europa.eu/RegData/etudes/note/join/2012/492465/IPOL-ENVI_NT(2012)492465_EN.pdf)

Equipment manufacturers' recommendations are to be followed. Leaking, mechanically- or electrically-unsafe machinery must not be used.

Annual maintenance

There must be a careful check of spraying equipment at least annually; to ensure that failing parts (valves, hoses, nozzles, motors) are replaced before the machine is needed.

Before each use

CPP application equipment must be checked before each use, ensuring:

- The spreader or sprayer is not leaking;
- Nozzles are not blocked or damaged;
- Appropriate nozzles are fitted for the machine and product being applied
- Equipment was properly cleaned after the previous use (otherwise it must be re-cleaned);
- Guarding has not been removed or damaged, and that the machinery is otherwise mechanically safe;
- Electrical connections and wiring are not damaged or exposed and that the machinery is otherwise electrically safe;
- That there are no loose connections or worn hoses; and
- Reminding yourself of the proper pressure and speed to use – and that they are practical with the equipment in its current condition.

In-field

One point of safety to particularly note: if the equipment becomes clogged or stops working properly when spraying, farmers and workers must always take safety precautions when fixing it. Gloves and eye protection must be worn, and a brush or soft copper wire used to clean out clogged nozzles. Never blow through nozzles with your mouth to clear them.

After use

The equipment must be cleaned, and any washings disposed of legally and with proper regard for human health and the environment (see criterion F66 of the **Waste chapter**).

Maintenance records for application equipment should be kept for at least 2 years.

F24	Expected. Calibration of application equipment
Annual checks of sprayers and other CPP application equipment must be conducted to regulate distribution patterns and application rate, to align with manufacturer's recommendations. Not applicable if no CPPs are used.	
Climate Smart Agriculture	
Not applicable	

In some countries (e.g. Germany), farmers cannot spray each year until the government checks equipment calibration.

Machine applicators must be checked at least once a year to ensure they deliver the correct flow rate and spread pattern. Recalibration will usually be necessary when different types of products are used.

Operators of backpack sprayers must be able to demonstrate how they use the equipment to apply the desired application rate.

Operators should be trained to recognise when re-calibration is needed.

APPENDIX 2A: REFERENCES AND FURTHER INFORMATION

General Guides - fertilisers

In the absence of national legislation or local research and guidance, we consider the following sites as good sources of guidance and codes of practice: The Agricultural Industries Confederation codes of practice linked to fertiliser use:

<https://www.agindustries.org.uk/sectors/fertiliser/publications/>

The world fertiliser manual for guidance on nutrient rates and good practice:

<http://www.fertiliser.org/ItemDetail?iProductCode=7351Hardcopy&Category=AGRI&WebsiteKey=411e9724-4bda-422f-abfc-8152ed74f306>

And the UK fertiliser recommendation manual RB 209 for general advice and nutritional values of organic manures: <https://www.gov.uk/government/collections/fertiliser-us-age>

General Guides - CPPs

Crop Life International “Guidelines for the Safe and Effective use of Crop Protection Products”:

https://croplife.org/wp-content/uploads/pdf_files/Guidelines-for-the-safe-and-effective-use-of-crop-protection-products.pdf

This is a good general guide to safe use of CPPs, which we consider to be a benchmark, and when these standards exceed those of national legislation, the Crop Life Guidance should be used instead.

FAO (2003) International Code of Conduct on the Distribution and Use of Pesticides: <http://www.fao.org/docrep/005/y4544e/y4544e00.htm>

Guidance is available from many national authorities, linked into national legislation. Many of these also provide good general advice, e.g.:

USA

“Pesticide Safety Tips for the Workplace and Farm - A Pictorial Guide to Best Pesticide Management Practices” Purdue University Cooperative Extension Service: <https://www.extension.purdue.edu/extmedia/ppp/ppp-61.pdf>

“Protecting our Water, Soil and Air: A Code of Good Agricultural Practice for farmers, growers and land managers”, Department for the Environment, Food and Rural Affairs (DEFRA): https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/268691/pb13558-cogap-131223.pdf

This comprehensive document consolidates and updates the former three separate codes for water, soil and air. It offers practical interpretation of legislation and provides good advice on best practice; ‘good agricultural practice’ means a practice that minimises the risk of causing pollution while protecting natural resources and allowing economic agriculture to continue. It has been written by technical specialists from Defra and Natural England.

Sources of CPP Registration Information for Key Supply Countries

California (USA)

California Department of Pesticide Regulation - Product/label database: <http://www.cdpr.ca.gov/docs/label/labelque.htm>

Brazil

Products registered for use are listed on the Ministry of Agriculture site (in Portuguese): http://agrofit.agricultura.gov.br/agrofit_cons/principal_agrofit_cons.

Kenya

Pesticides registered for use are listed on the Pest Control Products Board (PCPB) website <http://www.pcpb.or.ke>

The Netherlands

The following site contains a database of CPPs that can be searched to give a list of registered products. It is available in Dutch or English. Click on ‘Pesticides Database’ then ‘Standard Reports’ to choose the list you want: <http://www.ctgb.nl/>

Pesticides level for use in the EU

The following site contains a database of CPPs that are legal to use in the European Union: <http://ec.europa.eu/food/plant/pesticides/eu-pesticides-database/public/?event=homepage&language=EN>

Integrated Pest Management Guides by crop

University of California IPM Online - excellent site, which gives detailed advice on IPM in a number of crops, including onions, tomatoes, potatoes, spinach, and several fruit. There is a focus on Californian pests, but much of the advice will be generally applicable and/or can be adapted: <http://www.ipm.ucdavis.edu/PMG/crops-agriculture.html>

Cornell University Guide for Integrated Field Crop

Management - includes advice on soybean, forage crops and grains (New York State focus). <http://nmisp.cals.cornell.edu/publications/impactstatements/CornellGuide.pdf>

University of Massachusetts Amherst - includes guidelines for Apples, strawberries, pumpkin and squash (Massachusetts focus): <http://www.joe.org/joe/2000june/tt1.php>

Equipment Maintenance and Calibration

University of Minnesota - Pesticide Application Procedures and Equipment (Chapter 9): http://www.extension.umn.edu/agriculture/pesticide-safety/ppat_manual/Chapter%209.pdf

Government of South Australia Primary Industries and

Resources - Factsheet on spray cleaning, maintenance and calibration: www.epa.sa.gov.au/files/477374_pesticide_commercial.pdf

Risk Assessment

Crop Life International "Guidelines for Emergency Measures in Cases of Crop Protection Product Poisoning" Guide to help inform risk assessments related to the use of CPPs, and how to deal with pesticide poisoning in an emergency can be found on the Crop Life International website at: https://croplife.org/wp-content/uploads/pdf_files/Guidelines-for-the-safe-and-effective-use-of-crop-protection-products.pdf

FAO "Guidelines For Personal Protection When Working With Pesticides In Tropical Climates": http://www.fao.org/fileadmin/templates/agphome/documents/Pests_Pesticides/Code/Old_guidelines/PROTECT.pdf.

CPP Application

"Guidelines on Good Practice for Ground Application of Pesticides" Food and Agriculture Organization of the United Nations Rome, 2001: <http://www.fao.org/docrep/006/y2767e/y2767e00.htm>

Red Tractor's CPP Application Record Forms: <http://assurance.redtractor.org.uk/contentfiles/Farmers-5599.docx>

New South Wales (Australia) Department of Primary Industries: <http://www.dpi.nsw.gov.au/agriculture/farm/chemicals/general/records/instructions/how-to-fill-out-your-pesticide-application-record>

APPENDIX 2B: SUSTAINABLE AGRICULTURE NETWORK “TABLE OF SEPARATIONS”

Type of crop management							
		High input use		Low input use		Organic	
Slope:		≤ 8%	> 8%	≤ 8%	> 8%	≤ 8%	> 8%
1. Terrestrial ecosystems (metres):							
a. Secondary growth (without significant human disturbance for minimum 10 years)		10	20	5	10	3	5
b. Primary and secondary forests, bush lands, grass lands and paramos	Crops with Aerial / Sprayboom Fumigation		30		20		
	Crops without Aerial/ Sprayboom Fumigation or Agroforestry Crops	10	20	10	10	5	10
2. Aquatic ecosystems (metres):							
a. Perennial and seasonal streams, brooks, creeks (width less than or equal to 3 m)		10	20	5	10	3	5
b. Rivers (width greater than 3 m), lakes, lagoons, swamps, marshes, bogs	Crops with Aerial / Sprayboom Fumigation		30		20		
	Crops without Aerial/ Sprayboom Fumigation or Agroforestry crops	10	20	10	10	5	10
c. Springs	Crops with Aerial / Sprayboom Fumigation	20	50				
	Crops without Aerial/ Sprayboom Fumigation or Agroforestry crops	15	30	10	20	10	10
3. Areas of human activity (metres):							
a. Public roads		10		5		5	
b. Buildings: Housing or similar use	Crops with Aerial / Sprayboom Fumigation	30		30		10	
	Crops without Aerial/ Sprayboom Fumigation	20		10		5	
	Agroforestry crops	10					
c. Buildings: Permanent use	Crops with Aerial / Sprayboom Fumigation	10		10		5	
	Crops without Aerial/ Sprayboom Fumigation	20					
	Agroforestry crops	10					
d. Buildings: Infrequent use	Crops with Aerial / Sprayboom Fumigation	10		5		0	
	Crops without Aerial/ Sprayboom Fumigation or Agroforestry crops	5		2			

Source: Sustainable Agriculture Standard (Version 4). 2010. http://www.san.ag/biblioteca/docs/SAN-S-1-4_Sustainable_Agriculture_Standard.pdf

APPENDIX 2C: GUIDANCE ON HOW TO PHASE-OUT THE USE OF WHO CLASSIFICATION 1A, 1B AND II COMPOUNDS

Background

Unilever wants to be part of the move to reduce the risk to people and the environment linked to the use of crop protection products (CPPs). This means reducing the use of the most hazardous CPPs in agriculture.

Risk, can and should, of course, also be reduced by procedures and equipment that minimise exposure to hazardous CPPs. This includes requiring secure storage and that workers use proper personal protective equipment (PPE).

However, there is always a danger that accidents, misunderstandings, theft, misuse or fire will result in unacceptable risks if a highly toxic CPP is used at all.

By reducing the “hazard level” of CPPs that are used on the farms that supply our raw materials, we will almost inevitably be reducing the risk to operators, other farm workers, bystanders and the environment. This is why we are pushing our suppliers to find alternatives to CPPs classified as WHO 1a and 1b - and if possible – as WHO II.

The World Health Organisation (WHO) system of hazard classification is related directly to how toxic the chemical is to mammals (usually laboratory rats) and as such is a reasonably good indicator of how acutely toxic (=poisonous) the substance is to humans. Of course, CPPs have many modes of action and ways of being absorbed, stored or accumulated in living organisms, so a measurement of acute toxicity is a relatively crude way of assessing “hazard”. It does not assess chronic effects, such as risk of developing cancer after long term exposure, and it does not assess hazards to the environment (such as toxicity to bees, earthworms or aquatic ecosystems).

Acute toxicity and LD50 values

An LD50 value is the amount that KILLS half the rats it is fed to.

It is presented as milligrammes (of the active ingredient) per kg body weight.

The amount that would be likely to kill a large human (of 100kg) would be around 100 times this, although a small child would need proportionally less to be killed. The following table shows the relative acute toxicity of different classes of CPPs, as classified by the WHO:

Class		LD50 for rat (mg/kg body weight)			
		Oral (by mouth)		Dermal (through the skin)	
		Solids	liquids	Solids	liquids
1a	Extremely hazardous	<5	<20	<10	<40
1b	Highly hazardous	5-50	20-200	10-100	40-400
II	Moderately hazardous	50-500	200-2000	100-1000	400-4000
III	Slightly hazardous	>501	>2001	>1001	>4001
U	Product unlikely to present acute hazard in normal use	>2000	>3000		
O	Not classified – believed obsolete				
FM	Fumigants not classified under WHO				

Even less acutely-toxic active ingredients (WHO II) can be lethal to humans. Paraquat (Gramoxone) is a good case in point; Gramoxone is still a major cause of accidental death, suicide and “forced suicide” (=murder) in some parts of the world among farming communities, mainly because it is easily available to vulnerable people. It is for this reason that many Sustainability Standards (including the Rainforest Alliance/SAN standard used by Unilever for some of their raw materials) prohibit the use of paraquat.

How to phase out the most toxic compounds

In many countries, it is not legal to use WHO 1a or 1b compounds (although in some countries they are still available illegally). In others, their use is still relatively common – even though less acutely toxic alternatives are available.

Most WHO 1a and 1b (and II) compounds are rodenticides or insecticides; we suggest they you consider any feasible non-chemical methods as first preference, followed by WHO Class III, and Class II in that order.

In practice this means finding out what options are available to you, by:

- Discussing options with independent agricultural advisors;
- Discussing options with your grower's association or Crop Board;
- Speaking to your chemical supplier about what options are available for less toxic compounds that nevertheless manage the pest or disease, explaining that you are being required to phase out WHO 1a/b products;
- If your supplier says there aren't any, push him/her to give a suggestion;
- If you still cannot find an alternative, speak to us so we can try to help. We may be able to find out for you, or work with you to persuade your researchers or regulatory authority to make an option available.

WHO 1a chemicals – less toxic alternatives **must** be sought and used

Aldicarb	Brodifacoum	Bromadiolone	Bromethalin
Calcium cyanide	Captafol	Chlorethoxyfos	Chlormephos
Chlorophacinone	Difenacoum	Difethialone	Diphacinone
Disulfoton	EPN	Ethoprophos	Flocoumafen
Hexachlorobenzene	Mercuric chloride	Mevinphos	Parathion
Parathion-methyl	Phenylmercury acetate	Phorate	Phosphamidon
Sodium fluoroacetate	Sulfotep	Tebupirimfos	Terbufos

WHO 1b chemicals – less toxic alternatives **must** be sought and used

Acrolein	Allyl alcohol	Azinphos-ethyl	Azinphos-methyl
Blasticidin-S	Butocarboxim	Butoxycarboxim	Cadusafos
Calcium arsenate	Carbofuran	Chlorfenvinphos	Coumaphos
Coumatetralyl	Zeta-cypermethrin	Demeton-S-methyl	Dichlorvos
Dicrotophos	Dinoterb	DNOC	Edifenphos
Ethiofencarb	Famphur	Fenamiphos	Flucythrinate
Fluoroacetamide	Formetanate	Furathiocarb	Heptenophos
Isoxathion	Lead arsenate	Mecarbam	Mercuric oxide
Methamidophos	Methidathion	Methiocarb	Methomyl
Monocrotophos	Nicotine	Omethoate	Oxamyl
Oxydemeton-methyl	Paris green	Pentachlorophenol	Propetamphos
Sodium arsenite	Sodium cyanide	Strychnine	Tefluthrin
Thallium sulfate	Thiofanox	Thiometon	Triazophos
Vamidothion	Warfarin	Zinc phosphide	

WHO II chemicals – less toxic alternatives **should** be sought and used if possible

Alanycarb	Anilofos	Azaconazole	Azocyclotin
Bendiocarb	Benfuracarb	Bensulide	Bifenthrin
Bilanafos	Bioallethrin	Bromoxynil	Bromuconazole
Bronopol	Butamifos	Butylamine	Carbaryl
Carbosulfan	Cartap	Chloralose	Chlordane
Chlorfenapyr	Chlorphonium chloride	Chlorpyrifos	Clomazone
Copper sulfate	Cuprous oxide	Cyanazine	Cyanophos
Cyfluthrin	Beta-cyfluthrin	Cyhalothrin	Cypermethrin
Alpha-cypermethrin	Cyphenothrin [(1R)-isomers]	2,4-D	DDT
Deltamethrin	Diazinon	Difenzoquat	Dimethoate
Dinobuton	Diquat	Endosulfan	Endothal-sodium
EPTC	Esfenvalerate	Ethion	Fenazaquin
Fenitrothion	Fenobucarb	Fenpropidin	Fenpropathrin
Fenthion	Fentin acetate	Fentin hydroxide	Fenvalerate
Fipronil	Fluxofenim	Fuberidazole	Gamma-HCH [ISO], Lindane
Guazatine	Haloxypop	HCH	Imazalil
Imidacloprid	Iminoctadine	Ioxynil	Ioxynil octanoate
Isoprocab	Lambda-cyhalothrin	Mercurous chloride	Metaldehyde
Metam-sodium	Methacrifos	Methasulfocarb	Methyl isothiocyanate
Metolcarb	Metribuzin	Molinate	Nabam
Naled	Paraquat	Pebulate Permethrin	Phenthoate
Phosalone	Phosmet	Phoxim	Piperophos
Pirimicarb	Prallethrin	Profenofos	Propiconazole
Propoxur	Prosulfocarb	Prothiofos	Pyraclofos
Pyrazophos	Pyrethrins	Pyroquilon	Quinalphos
Quizalofop-p-tefuryl	Rotenone	Spiroxamine	TCA
Terbumeton	Tetraconazole	Thiacloprid S	Thiobencarb
Thiocyclam	Thiodicarb	Tralomethrin	Triazamate
Trichlorfon	Tricyclazole	Tridemorph	Xylylcarb

Other Issues to consider in Phase-out plans

Standard-setting organisations (and some Unilever supply chains) often have “prohibited lists” of CPPs based on acute toxicity and other issues – for example on bioaccumulation or interference with reproduction (endocrine disrupters) or being highly toxic to some non-human organisms such as bees, earthworms or fish. “Prohibited lists” also usually include CPPs that would leave unacceptable or illegal residues if used on the crop. Another issue to consider is whether the chemical is commonly used in poisonings (as in the Paraquat case above). This will vary geographically, and data may be available from your national health ministry.

All these issues will help you decide what your priorities are in your phase-out plans.

Other "unacceptable" CPPs

The Rainforest Alliance prohibited CPP list provides a good summary of chemicals that should not be used wherever practical alternatives exist: http://www.rainforest-alliance.org/agriculture.cfm?id=standards_farms.

Note - this is NOT a Unilever Standard, and Unilever requirements (for example linked to residues or legality in country of application) may differ from this list.

What if there is no alternative?

If there is no efficacious alternative to a WHO 1a or 1b (or II) compound available locally, then **WE NEED TO KNOW**.

We need to be able to add our voice to the pressure for research into alternatives – or to use our network to help you and your farmers find better solutions.

Source: The WHO Recommended Classification of Pesticides by Hazard and Guidelines to Classification. 2009. http://www.who.int/ipcs/publications/pesticides_hazard_2009.pdf



3 SOIL MANAGEMENT

This chapter is concerned with the conservation of high quality soil and minimising soil loss and degradation.

In keeping with Unilever's commitments on minimising Greenhouse Gas emissions from our supply chains there are two new criteria linked to peat soils; a mandatory criterion banning the conversion of tropical peat soils (of any depth) to agriculture and an "expected" criterion focussing on careful management of peat soils that are already being used for agriculture. Peat soil use in horticulture (e.g. for supply of seedlings) is covered in criterion F137 (sustainable inputs).

As eroded soil is a problem in many surface waters, often linked to eutrophication problems, there are additional related criteria in the **Water Management chapter**.

3.1 GENERAL

F25	Expected. Soil management plan
There shall be a soil management and conservation plan implemented on every farm. The plan shall be prepared and/or informed by a competent individual or authority (E.g. A farmer educated to college level in agriculture, a professional agronomy advisor/ consultant or government or a research institution advice). The records of the soil management plan will be kept for at least 2 years. Not applicable to individual smallholder farmers.	
Climate Smart Agriculture	
Soil is not renewable in a short time and under most conditions; around 1cm is formed every 100 to 400 years, rendering active soil management critical to securing increased productivity, enhanced resilience and lowering emissions. The mapping of on-farm soil characteristics will inform appropriate measures to for adoption in the plan.	

Looking after the soil on a farm is fundamental to the long-term success of agriculture. Where soil is lost or damaged, nutrient- and water- holding capacity is reduced, and inputs are more easily lost to water and the atmosphere before they are used by the crop.

A soil management plan must be in place covering at least the areas of the farm where the Unilever crop or pasture is grown. It makes sense to include other areas that are part of the same crop rotation. Unilever does not require the soil management plan to be in any particular format, and parts of it (or the whole thing) may be combined with other farm management plans or systems. It can be presented in any documented/electronic form the farmer chooses.

It will usually be worthwhile to base the soil management system around a large-scale map of the farm(s) (please note that a map of the farm is also recommended for the Biodiversity Action Plan). The map/plan should identify areas where the soil has different characteristics (e.g. different soil types, slope, aspect etc.) and requires different management.

Under normal circumstances, a single plan will encompass all the components listed as criteria F27 - F35 in this chapter.

A competent person (e.g. an agronomist employed by the Unilever supplier) may prepare the plan in full or in part on behalf of all the farms that supply to a factory, as long as the farmers agree to take actions on their own farms in accordance with the plan.

Unilever does not expect individual smallholder farmers to create and document the appropriate management systems, create maps that cover the landscape or be able to afford or understand the benefits of soil analysis programmes. In these circumstances, it is the responsibility of the Unilever supplier to provide guidance based around recommendations of local research institutes/government or other sources of professional advice.

Farm soil management systems are a **legal requirement** in some countries. Where this is the case, agronomy businesses set themselves up to provide management systems or plans as a service, and the associated documentation and maps may be sufficient to comply with this criterion.

In the USA, for example, there is:

- Free technical assistance to assess and plan erosion control systems from the Natural Resources Conservation Service (NRCS); and
- A requirement for grassed waterways and other practices requiring earthworks - some USDA Programs may help offset some of the implementation costs.

The following links show examples of soil management plans for dairy, beef and outdoor pig farms:

- http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0006/167028/soil-dairy-beef.pdf
- <http://www.bpex.org/environment-hub/soil-water/SoilManagementPlan.aspx>

F26	Expected. Including assessment of risks
The soil management plan must include an identification of the major risks to soil and the suitability of the land for its intended use based on soil and topography, organic carbon levels, risk of erosion, compaction, salinization/desertification, and special soil resources. Not applicable to individual smallholders.	
Climate Smart Agriculture	
By conducting a risk assessment or evaluation of the risks of soil loss or damage associated with an array of land use practices, these can be qualified to inform the selection of appropriate management interventions, benefiting the pillars of CSA for soil.	

The Plan must include sufficient information to identify areas where soil conservation and/or fertility are at relatively high risk. This criterion requires a risk assessment or evaluation of the risks of soil loss or damage to have been made for the farm. The output may be presented as a document or map.

Assessments for many farms may be combined into the same document or map, and Unilever suppliers may wish to co-ordinate the process for the farms that supply them. Sources of information include:

- Farmers themselves, who will often already be actively taking risk-reduction measures, or who know where there are already signs of problems on their farms or in the local area. Incorporating farmer's input into maps and plans for soil management will often be best combined with other participatory mapping processes, for example, to support the development of a Biodiversity Action Plan (See the **Biodiversity and Ecosystem Services chapter**);
- Government and local government information and maps;
- National or international databases and soil maps; and
- Locally-applicable guidance combining information on soils, slopes and cropping patterns.

The risks to be considered include:

- Soil erosion;
- Soil compaction;
- Soil chemical degradation;
- Loss of organic matter; and
- Risks to soils on farms arising from events outside the farm boundaries.

A) Risk of **soil erosion**

Soils may be eroded by rainfall, runoff, and wind, or (to a small extent) by removal during harvest. When soil is eroded, it is usually the most fertile topsoil that is lost. This not only results in a reduction of the value of the land for farming, but the eroded soil also pollutes waterways (mainly through water erosion) and may be deposited on land where it may, for example, inundate fences.

Soil erosion can have direct short-term costs to farming operations as seeds and young plants, applied fertilisers may be washed away with the soil, or young plants may be damaged or inundated by wind-borne soil. Topsoil is preferentially eroded, and so the soil with good nutrient- and water- holding capacity is preferentially lost.

The risk of **soil erosion by water** depends on the:

- Amount and intensity of rainfall; Special measures may need to be taken to reduce the risks of erosion at times of storms;
- Soil type;
- Farm and field design;
- Slope of the land - even a small increase in slope has a huge effect on erosion; and
- Length of the slope. This is because the faster and more turbulent the water movement is, in and on the surface layers of the soil, the more erosive it is. The further the water flows downhill, the faster and more turbulent it becomes. Slope length can be reduced by:
 - Terracing;
 - Bunding or drainage across the slope;
 - Locating windbreaks, shelterbelts and other field boundaries across the slope;
 - The crop or animal husbandry system in place and the stage of development of the crop or pasture. This is because soils are more vulnerable at times when crop cover is sparse or when overgrazed;
 - Management measures taken to reduce soil erosion such as contour planting, bunding, micro-catchments, soil collection and redistribution systems, retaining stubble after harvest and mulching. In many parts of the world, it is common for steep slopes to be farmed

- using tractors travelling up and down the slope- to reduce the very real risk of the tractor turning over when driven across the slope. Terracing, or choosing more adaptable machinery when it needs replacing, can significantly reduce soil erosion in these systems; and
- Improving road or drain design.

It is important to protect natural watercourses (streams, rivers, wetlands) from eroded sediment. This is usually best done by ensuring that there is a riparian strip of native vegetation along the edges of watercourses, into which field drains normally discharge – rather than discharging directly into the river (See also **Biodiversity and Water chapters**).

“**Tillage erosion**” involves the translocation of soil downhill as part of tillage operations where the soil is disturbed or turned-over. Over many years, this flattens out the landscape. Higher areas tend to have thinner, poorer soils, more stones and lower nutrient- and water- holding capacity.

Wind erosion is a serious problem when:

- Soil is not covered (is there bare soil at the time of year when winds are strongest?)
- The surface soil is loose, dry and light; or when
- The wind is strong enough to start the soil moving. As guidance, for sandy soils, this is at around 28 km/h.

Wind speed at soil level may be reduced by installing windbreaks or by directly protecting the soil. When mapping risks, current windbreaks should be identified, and their impact estimated, based on their size, structure and location.

Removal of soil with the harvested product is only a problem for certain crops (mainly root crops), but can be a serious problem where it does occur. It is obviously important to adjust harvesting machinery to minimise the problem. Soil moisture content also seems to be an important factor, so harvesting at times of high moisture content should be avoided. Where soil is transferred to a processing factory, soil recovery during washing or processing should be carried. See table 3.

TABLE 3: EROSION RISK ASSESSMENT	
Steps	Description
1. Classify soils and land according to risk of water and/or wind erosion	Use national databases of soils and/or the advice of agronomists or Ministry of Agriculture. Take account of conditions under exceptionally heavy rainfall because this is when most erosion occurs. Also take account of other risks due to the soil/plant combinations, such as avoiding very fine seed-beds (which are subject to soil slaking and crusting)
2. Map the slope of the land on the farm	Slope is likely to vary within fields as well as between fields. Evaluate length of slope at the same time as plotting gradient. Identify most vulnerable areas and do a site visit to see if there is already evidence of erosion
3. If wind erosion is a problem, map wind direction at most vulnerable period	Identify current windbreaks on map, estimate their impact based on their size, structure and location.
4. Removal of soil with harvested product	Determine if this takes place.
5. Evaluate risks and prioritize actions	Based on the assessment findings, rank areas according to incidence and severity of erosion risk. Use this ranking to prioritise the order of actions to be taken.

B) Risk of **compaction**, including puddling, crusting (surface capping), or developing impermeable “pans”

Compacted soils resist root penetration, thereby limiting crop, pasture growth and development and making shallow-rooted crops, and pasture more susceptible to drought. Compacted soils also hold less air and water. Crusting will limit water penetration and may prevent germinating seeds from emerging on the surface.

Although animals and people can cause significant soil compaction, the most serious problems are caused by farm machinery. Farm machinery has been getting heavier, and compaction problems worse, in many areas of the world. Moreover, as the timing of field operations becomes more critical, often linked to the availability of machinery or planning for specific harvest windows, the pressure to use heavy machinery on wet and unsuitable soils has increased; it is very tempting to get machinery into the field on the first dry day after a long period of heavy rain, but this is the time when the soil is most vulnerable.

Although short-term compaction risks can be assessed and managed researchers are now beginning to understand more long-term problems associated with subsoil compaction by agricultural machinery. Soils vary in their resistance to compaction; one study estimated that 32% of subsoils in Europe are highly susceptible and another 18% are moderately vulnerable.

It makes sense for all farmers to understand which areas of their farm are most susceptible to compaction and to manage them appropriately. If local soils are at risk of crusting, slaking, or hardpan development, these risks should also be assessed, mapped and managed. See table 4.

Compaction by livestock

Specific pasture management advice, including optimal stocking rates and suitability of plant species, is region-specific and you should speak to your agricultural adviser or extension service for how to best manage your pasture. Stocking rates can also be affected by legislation on nitrate loading limits per hectare.

C) Risk of **chemical degradation**

Whether a soil is at risk of soil chemical degradation or not is affected by many factors, only some of which the farmer can control. The soil management plan should make sure the issues listed in the table are managed to prevent soil damage (please note that there is no single recommended range for these factors – your local soil testing lab should provide you with a recommended range soil in your area), see table 5.

D) Risk of **organic matter (OM)** decline

Soil organic matter /organic carbon is important for soil water and nutrient management; declines in OM generally make crops and pasture more vulnerable to drought and reduce fertiliser/nutrient use efficiency. Declines in soil OM worldwide is one of the important causes of Greenhouse Gas (See **Energy and GHG chapter** for more information) emissions, and conservation of soil OM is therefore vital for Climate-Smart agriculture.

TABLE 4: COMPACTION RISK ASSESSMENT	
Steps	Description
1. Classify soils and land according to risk of compaction	Risk factors include soil type, texture, tillage methods and machinery used
2. Identify areas where compaction is already a problem, and other vulnerable areas	Since compaction can vary within a field, assessments should be carried out in various areas of any one field. Assessment can be carried out in three main ways: <ul style="list-style-type: none">• Visual assessment – Plant growth and root development are adversely affected by compaction, so a visual assessment of the field can indicate areas of compaction. Compacted soils are also prone to waterlogging and surface ‘ponding’.• Carry out a ‘spade test’• Penetrometer – a penetrometer can give a more consistent way of assessing compaction
3. Evaluate risks and prioritise actions	Based on the assessment findings, rank areas according to incidence and severity of compaction risk. Use this ranking to prioritise the order of actions to be taken.

TABLE 5: CHEMICAL DEGRADATION RISK ASSESSMENT	
Step	Description
1. Soil pH	<p>Soil pH influences many facets of crop production and soil chemistry, including availabilities of nutrients and toxic substances, activities and nature of microbial populations, and activities of certain CPPs.</p> <p>The soil is at risk of acidification if:</p> <ul style="list-style-type: none"> • Rainfall is high (because this tends to leach out cations such as Calcium, Magnesium and Potassium); • Acid rain; • Soils are lighter-textured sands and loams with low organic matter levels; or • Soil is naturally acidic; • Long-term use of certain fertilisers (including sulphates, nitrates and urea). For example, by applying ammonium-based nitrogen fertilisers to naturally acid soils at rates in excess of plant requirements; and • Continual removal of plant and animal produce and waste products from the field – the impact is greatest when large quantities of material are removed e.g. in the production of silage, hay or sugarcane. <p>Risk factors that can contribute to soil alkalinisation include:</p> <ul style="list-style-type: none"> • Low rainfall; • High clay content; and • Over-liming.
2. Salinization	<p>Soils are at risk of salinization where there is low rainfall, groundwater is saline, if irrigation water contains salts, and if irrigation management or drainage is poor. Salinity should be measured regularly using a recognised measurement method. If the risk of salinization is high, the quality of irrigation water used is particularly important. Care should also be taken in the timing and quantity of irrigation used (see also the Water Chapter for detailed advice). Salinization itself can be managed by installing suitable drainage systems and flushing salts away.</p>
3. Chemical imbalances	<p>Macro- and micro-nutrient levels</p> <p>Soil nutrient concentration is affected by many factors, including the type of crops grown, the fertilization regime used, the yield obtained, climate, soil type and past land management practices.</p> <p>Soils are at risk of macronutrient imbalance if fertilization takes place without suitable soil testing to assess crop needs. Micronutrients are most likely to limit growth in highly leached acid sandy soils, organic soils, soils with high pH and soils that have been very intensively cropped and heavily fertilized with macronutrients only.</p> <p>These risks are generally best assessed as part of the Nutrient Management Plan (Nutrients Chapter, criterion 1).</p> <p>Fe, Al, Se, Cu, Mn and Na Concentrations</p> <p>At high concentrations, these elements become toxic to plants, so they must be monitored regularly if this is a high risk, to ensure they remain at suitable concentrations in the soil. pH and organic matter levels also affect the availability of these elements to crops (Al, for example becomes toxic to crops at pH lower than 4.5).</p>
4. Contamination	<p>Crop Protection Products (CPPs)</p> <p>The risk of contamination by CPPs depends on the following:</p> <ul style="list-style-type: none"> • The type of CPP used – some are less biodegradable than others, e.g. atrazine persists for up to 2 years, some are more toxic to beneficial soil organisms than others, e.g. carbamates are highly toxic to earthworms; • The quantity and frequency of CPP application; • Soil type and pH – e.g. some adsorb more tightly to clay particles and at low pH levels. <p>The risk of soil contamination should be adequately managed by appropriate CPP use, as described in the Integrated Pest Management chapter.</p> <p>Heavy metals</p> <p>Heavy metals such as copper, zinc and molybdenum are often essential trace elements but excessive concentrations can damage overall soil fertility, crop yield and quality. In many cases, Unilever crop specifications (and often-legal limits) specify maximum content of heavy metals in produce (because of human health risks) and contaminated crops may be un-saleable on the international market.</p> <p>The risk of heavy metal contamination depends on whether the soil has been previously used for industrial purposes e.g. mining or combustion, the underlying geology, atmospheric deposition and the current and past sources of CPPs (traditional fungicides often contain copper) fertilisers and composts, especially farm manures. (See also the Agriculture – Crop and Pasture Nutrient (Fertilisation) Management chapter). Use of sewage sludge on the land presents a particularly high risk.</p> <p>Poly-aromatic Hydrocarbons (PAHs)</p> <p>PAH contamination of soil arises mostly from the atmosphere by PAH created in industrial processes, although vehicle exhaust emissions, forest fires and volcanic eruptions are also significant sources. PAH can persist for years in soil.</p> <p>Other sources of PAH soil contamination are sewage sludge, irrigation with coke oven effluent and leachate from bituminous coal storage areas or hazardous waste sites.</p> <p>Veterinary medicines</p> <p>Contamination can arise from animals excreting directly onto soil, or from application of contaminated manure or slurry. Again the risk can be managed by being confident in your source of manure</p> <p>Harmful bacteria</p> <p>Application of untreated manure or sewage sludge presents a risk of contamination from pathogenic bacteria such as Salmonella spp., Listeria monocytogenes and Escherichia coli O157:H7. Cattle manure appears to carry a relatively high risk. Proper composting of manure kills bacteria and therefore carries a lower risk of soil contamination. Farmers should therefore ensure that manure has been suitably composted before use, or that a suitable time has elapsed between application and harvest. This will depend on climatic factors, so local advice should be sought.</p>
5. Evaluate risks and prioritise actions	<p>Based on the assessment findings, adopt a scoring matrix to rank areas according to incidence and severity of risk of degradation. Use this ranking to prioritise the order of actions to be taken.</p>

TABLE 6: RISK ASSESSMENT SUMMARY	
Steps	Description
1. Combine	Combine assessments for erosion, compaction, chemical degradation, loss of organic matter and risks arising from off-site factors
2. Prioritize actions	Based on the risks involved and management changes needed.
Source: RSP impact assessment guidelines, http://rsb.org/pdfs/guidelines/RSB-GUI-01-008-01-v2.1%20RSB%20Soil%20Impact%20Assessment%20Guidelines.pdf	

Critical factors include:

- The soil type;
- **Peat** (See criteria F32 and F33) and muck soils are particularly high in OM and therefore their loss is important for GHG production worldwide;
- Conversely, losses of even small amounts of OM from low OM soils (e.g. **high sand soils**) can be critically important for water (See Water chapter, particularly criterion F39) and nutrient management (See **Crop and Pasture Nutrient (Fertilisation) Management chapter**);
- Erosion of soil (See above: Erosion removes topsoil, which is where the OM is concentrated); and
- Tillage/turnover of soil, which makes OM more vulnerable to oxidative loss

E) Risks to farm soils arising from events elsewhere

As well as risks from pollution and landslides (see above), farm soils are at risk from desertification and flooding.

These risks should also be identified.

- **Subsidence and landslides** can be viewed as extreme forms of soil erosion. Farmland and farm infrastructure may be at high risk from activities (e.g. deforestation, road building, mining etc.) or geological formations outside the farm boundaries.
See table 6.

The RSB Standard¹ has developed a set of guidelines for the evaluation of soils and implementation of conservation measures. This could provide the basis for compliance with the risk assessment and other criteria in this chapter.

F27	Expected. Allocation of activities to suitable soil and topography
Crops, pasture and animal housing are allocated to land with suitable soil and topography. Parts of the farm with unsuitable soil or topography (e.g. areas of rocky or shallow soil, steep slopes, areas subject to flooding, near trees) must not be planted with crops, even if it is physically easier to “blanket plant” the whole area. Planning of the planting is required when choosing which crops to put on which soils and in which areas of the farm, in order to avoid direct risks (and the spread of) pests, diseases and weeds. Not applicable to individual smallholders.	
Climate Smart Agriculture	
Consideration of soil type characteristics is important to recognise those prone to erosion, high drainage, low organic matter, thus managing the risks of soil exhaustion and spread of soil-borne pests.	

This criterion is “not applicable” if there is so little variation in soil characteristics or topography on the farm that it does not influence decision-making.

Crops must be grown only where soils are proven suitable for that crop and in appropriate rotations or with intercrops. This includes managing the risk of soil exhaustion and soil-borne pests (including insects, diseases and weeds). Stocking rates for pasture may need to vary with soil type.

In most parts of the world, soils are relatively uniform across a farm, but in others, there can be a great deal of variation. Even where soils appear to be similar, e.g. in gently-undulating prairie lands, years of cultivation and soil erosion will have flattened out the landscape, leaving the former hill-tops with thinner, more depleted soils. Where there is variation, this should be mapped and consideration given to varying management in different areas.

¹ <http://rsb.org/pdfs/guidelines/RSB-GUI-01-008-01-v2.1%20RSB%20Soil%20Impact%20Assessment%20Guidelines.pdf>

Why is soil type important?

The main soil types present will inform the type of agriculture that should take place, and appropriate management. Aspects to consider are as follows:

- Sandy, light soil types tend to be more prone to erosion and drain quickly;
- Heavier clay soils tend to be less prone to erosion, although have more limited permeability, thus increasing the risk of soil wash. Therefore localised flooding and run-off potential is greater;
- Soils with low organic matter (OM or organic carbon - OC) tend to have low water- and nutrient-holding capacity and low microbial activity – and often, relatively low crop yields;
- There may be unusual soils present – for example “acid sulphate” soils in Indonesia or pockets of saline soils in the Mediterranean region or Australia – that require specialised management and choice of crops; and
- The crop rotation may need to be organised to reduce the risk of soil-borne pests (e.g. nematodes) or disease.

Once the general soil type has been shown to be suitable for proposed/current farming activities, it makes sense to ensure that the soil is suitable within the farm. Clearly, there can be different soil types, depths or slopes in different parts of a farm or field. In many cases, slightly different management for different areas would improve both profitability and environmental management without unduly complicating management systems.

A farm **plan/map** will usually be available, and is a useful tool for many other aspects of sustainable farm management (e.g. the Biodiversity Action Plan). Such a map is useful for identifying any areas on the farm unsuitable for:

- Particular crops (e.g. row crops such as potatoes and sugar beet may be unsuitable on moderate and steep slopes; soil may be too heavy or stony for certain vegetables);
- Animal husbandry (e.g. unfenced edges of rivers); and
- Particular management techniques (e.g. for annual crops the crop rotation must be designed to maintain farm profitability, which in the long-term, means conserving the soil, and, in the short-term, minimising costly exercises such as tillage or agrochemical applications, as well as maximising profitability on any one crop or animal activity).

In extreme cases, analysis of management system information will lead to the identification of areas of fields or of the farm where it is uneconomic to do certain types of farming. If farming is uneconomic, the land should be taken out of production and managed for its biodiversity value (See also the **Biodiversity and Ecosystem Services chapter**).

Where the area of agricultural land (>20 ha) is acquired or its use is changed, the soil and topography must be evaluated to ensure it is suitable for the intended use. In many countries, the Ministry of Agriculture (or equivalent) has maps available showing “zoning” or suitability of different areas for different crops. Good maps are also available for Europe and globally (with some exceptions) from the Harmonised World Soils database – see European Commission ‘Soil Atlas of Europe’, European Communities 2005² and the FAO maps from the Harmonised World Soil Database³. Note: These require the download and installation of free software.

F28

Expected. Management of erosion risks

Unless the risk of soil erosion is assessed as insignificant (see guidance for criterion 26), the risk must be managed. This includes identifying areas of the farm particularly susceptible to erosion, and putting in place management plans, grazing and cropping systems that reduce the risk. Monitoring soil cover and effectiveness of land management systems in place (drains, bunding, terracing, contour planting, windbreaks, cover crops etc.) to minimise erosion must then be incorporated into the management plan.

Climate Smart Agriculture

Each year, an estimated 10 million ha of cropland are lost due to soil erosion⁴, making it critical to manage this risk and protect productivity. Aspects like improving farm design, field design and management, crop and livestock management and field management practices, serve to mitigate the risk of erosion. This will also limit the loss of nutrients, pollution of water and impact on carbon sequestration benefits, which healthy soils deliver.

Where erosion risk have been identified, the farm must be actively managing the land to reduce the risk. The table below (table 7) summarises the most commonly used options to reduce the risk of soil erosion and the volume of soil eroded.

2 http://eusoils.jrc.ec.europa.eu/projects/soil_atlas/index.html

3 <http://www.fao.org/nr/water/news/soil-db.html>

4 www.mdpi.com/2077-0472/3/3/443/pdf

TABLE 7: REDUCING RISK OF EROSION AND VOLUME OF SOIL ERODED	
Improve Farm Design	
Improving Road design on-farm.	Badly located roads and road designs that result in poor drainage patterns are common causes of serious soil erosion. Reduce runoff into fields and vulnerable areas from roads and other hard areas (e.g. farm-yards) by improving road layouts, locations of farm gates and installing drainage.
Drainage design on farm	Use drains to divert water away from vulnerable areas. Surface drains should preferentially run across slopes, rather than directly down them, because this increases infiltration and reduces erosion. Where this is not practical, consider lining drains (with grass or hard surfaces) and installing grade stabilizing structures. Maintain drains, ditches and water outlets, and return sediment back to the field. See also criterion F36.
Fencing, windbreaks and other field boundaries	Dividing fields “across the slope” to reduce water erosion, and allowing or planting vegetation along the borders of crops (rather than clearing and maintaining bare soil) can be very important for reducing erosion.
Taking vulnerable land out of production and planting soil-stabilizing vegetation instead	This is sometimes called “critical area replanting”. It involves stabilizing areas where gullies or other serious erosion would otherwise occur, by planting and maintaining perennial vegetation (grasses, trees, shrubs). Such areas can also act as biodiversity havens (see the Biodiversity and Ecosystem Services chapter) and protect watercourses (See the Water chapter)
Relocating field access points away from river banks and the bottom of slopes	These areas are particularly prone to erosion, and relocation of field gates can reduce the problems significantly. You should avoid placing gates and access points at the lowest point of a field, to reduce the potential for channeling surface water run-off and to cut off the route for any eroded soil particles). Strategic placement of access points, watering points and gates, is particularly important for animal husbandry in wet regions and where the level of animal movement is high.
Risks arising from animal grazing, watering areas and pathways	Consider hard standing around such areas. Animals should be excluded from drainage lines and water-courses – soil loss in these areas is high in heavy rain, so these areas should usually be fenced off to prevent grazing.
Improving field design and management	
Terracing	Terracing or smaller earthen embankments trap water and sediment running off cropland upslope and reduces gully erosion by controlling flow within the drainage area.
Contour farming and strip-cropping	In contour farming, tillage and planting operations are carried out along contours, thereby reducing erosion arising from water and soil flow down the slope. If the erosion risks are high (or slope greater than ~10%), strip-cropping may be appropriate, where a strip of grass or close-growing crop is alternated with the main crop. The permanent or semi-permanent strips slow down runoff and trap eroding soil. On steeper slopes, terracing (see above) is appropriate.
Micro-catchments and Silt collection pits. Water and sediment control basins.	Other types of soil or sediment traps in-field can be used to hinder soil erosion down slopes. Micro-catchments (small holes) can be dug between every second row of plants – they are often used for tea – and emptied out when they fill up. Larger pits and basins can be placed strategically in and around fields in order to trap water and sediment running off cropland and to reduce gully erosion by releasing water slowly either by infiltration or a pipe outlet and time line.
Irrigation design and Management	Take care when irrigating to avoid run-off. Do not allow overflow water to create gully erosion. (this is also covered and assessed in the Water chapter)
Seedbed design and Management	Avoid too fine a seedbed. If a fine seedbed is required, e.g. for carrots, use windbreaks or mulch in erosion-prone areas.

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Crop and livestock management	
Crop choice	Steeper slopes, without terracing, are often unsuitable for row crops such as potatoes or sugar beet: Perennial crops or grassland are better choices.
Crop rotation	The sequence of crops in a rotation should be planned to avoid leaving soils unprotected at times of maximum rainfall; in the UK, late sowing of winter cereal crops is a problem.
Fertilisation	Applying fertiliser to encourage good plant growth can be beneficial
No-tillage and reduced tillage	Tillage is conventionally used to reduce weed pressure, but can leave soil more prone to erosion. No-tillage options, such as direct drilling combined with the use of herbicides or mechanical weed removal, may be effective, either long-term or occasionally in a rotation depending on the soil and weed pressure. However, care is needed to ensure that soil surfaces do not “crust” and become impermeable, which increases erosion.
Timing field operations	Whenever practical, try to leave bare soil exposed for as little time as possible, especially at times when heavy rain is expected. Dates of planting, use of early (or late) varieties, and grazing management can also affect how well protected soils are from erosion.
Nurse crops	Nurse crops such as winter rye, barley or oats help cover and hold the soil together around young, vulnerable, high-value perennial crop plants e.g. tea or forage crops. Such nurse crops are often removed early in the life of the main crop; oats, for example may be down or slashed high before seed starts to be set.
Catch crops and cover crops	Protect soil in winter by early sowing or use of cover crops (See also Crop and Pasture Nutrient (Fertilization) Management chapter) as this practice also helps retain nutrients on the land).
Stubble and crop residue management	Retaining stubble and crop residues, or using green manures, helps hold the soil together and covers the surface with a water-permeable layer, helping reduce water flow and runoff.
Mulches and manures	Applying mulches and manures also helps stabilize surfaces, reduce water flow and can improve soil structure and water-holding capacity as well as nutrients.
Animals	<p>Overgrazing is a common issue and leads to a huge amount of soil erosion in both developing and developed countries. Organized grazing, allowing soils to recover between sessions, and appropriate stocking levels can do much to reduce problems. Serious erosion and soil damage can be caused around watering and supplementary feeding areas for livestock.</p> <p>In cattle production, cattle should be moved to another area before bare patches appear – a rotational grazing system, where cattle are moved regularly (the time of which varies depending on the rate of growth, and hence the season and weather conditions), can be used. Other methods, e.g. set stocking, can also work well, as long as grazing is well planned, by estimating grass yield, grazing rate etc.</p>
Tree planting	<p>The most effective remedy against serious erosion (slips, slumps etc.) in pasture land is to plant deep-rooting trees in a widely spaced pattern. In severe cases the soil should be retired from grazing and fenced. If possible, the affected hill slope should be replanted. Fertilization helps the establishment of planted trees and helps slips to recover (See advice in the New Zealand Ministry of Agriculture Soil Conservation Technical Handbook⁸)</p> <p>General advice on windbreaks, which can be remarkably effective in conserving soil and water in windy areas, can be found in the Water chapter (See criterion F39).</p>
Controlling soil loss due to harvesting	
Soil moisture content at harvest	According to recent research, soil moisture content at harvest seems to be the most important factor in soil loss due to harvesting. In general, the higher the moisture content the higher the soil loss. ¹ Farmers are therefore advised to avoid harvesting at times of high soil moisture content.
Retrieving lost soil from processing facilities	Where soil is lost, it can often be retrieved from washing/processing facilities. If possible this should be done, and the soil returned to the field.

Erosion outside the farm boundaries

If the risks arise from actions taking place outside the farm boundaries (e.g. deforestation increasing the risk of landslides), risk management is likely to involve farmers, and/or farmer groups - potentially with a Unilever supplier in support - lobbying for the risk to be reduced.

F29	Expected. Management of compaction risks
Unless the risk of soil compaction is assessed as insignificant, the risk must be managed. Compaction risks need to be reduced from methods that deal with the symptoms for minor compaction problems, e.g. breaking soil caps and subsoiling, to methods that deal with the causes, e.g. controlled traffic, conservation tillage. Not applicable to individual smallholders.	
Climate Smart Agriculture	
Each year, an estimated 10 million ha of cropland are lost due to soil erosion ⁶ , making it critical to manage this risk and protect productivity. Aspects like improving farm design, field design and management, crop and livestock management and field management practices, serve to mitigate the risk of erosion. This will also limit the loss of nutrients, pollution of water and impact on carbon sequestration benefits, which healthy soils deliver.	

If no heavy machinery is used, the soil is not subject to high animal density and the soil is not prone to crusting or developing impermeable pan layers, then this can be classified as “not applicable”. As smallholders rarely use machinery, this criterion has been classified as “not applicable to smallholders”. See table 8.

Livestock

Soil compaction from livestock (sometimes known as ‘pugging’ or ‘poaching’) can reduce pasture yield, encourage weed growth and reduce nitrogen fixation, so needs to be avoided where possible. It is most likely to be an issue in temperate regions when the ground is wet, so action may only be needed in certain regions and at certain times of the year. For example, in temperate winters especially, animals may need to be restricted to one area of the field at a time, with the area being rotated over time. In regions where compaction is a risk, animals should also be restricted to designated laneways to and from areas of high use (e.g. feeding or milking areas) and stocking densities should be checked to ensure they are not too high.

Other strategies (aside from those discussed above which focuses on large animals) include:

- Keeping pasture cover dense – compaction is worse where pasture cover is sparse;
- Installing several watering points and shade areas (helps to break up the herd into smaller groups). Access can be rotated to further reduce compaction risk; and
- Use loafing areas or feeding pads – these are areas can be constructed from either a porous material or concrete (although care should be taken that this will not cause hoof injuries).

If soil compaction is identified as already being a problem, certain pasture management techniques can be used to help alleviate the issue, for example growing deep-rooted grass species (e.g. Phalaris, Tall fescue, Cefalu, arrowleaf clover), although the suitability of species will vary depending on region and soil type, so speak to a local adviser before taking action. Such techniques can help break up compacted soil layers, or increasing soil organic matter to enrich and strengthen soil.

F30	Expected. Soil Organic Carbon/ Organic Matter
Management practices must be put in place that maintain or enhance Soil Organic Matter /Organic Carbon.	
Climate Smart Agriculture	
Soil organic matter is important for soil fertility, soil structure and soil physical properties, in biological soil health and as a buffer against toxic and harmful substances. Management practices that increase production should lead to increased SOC, such as fertiliser application, crop rotation, improved cultivars and irrigation. In so doing, resilience of the soil to absorbing changes or shocks and the capacity for renewal is increased and emissions reduced through carbon sequestration.	

Maintaining or enhancing soil organic matter / organic carbon generally help reduce greenhouse gas emissions and improve water-use-efficiency and fertiliser-use-efficiency. Minimising erosion (as eroded soil is usually the topsoil with relatively high OM, using mulch and cover crops is normally effective in maintaining soil OM. It is much more difficult to build up good levels of OM if they have been depleted.

It is possible to aim for too high a level of soil organic matter, at which point greenhouse gas emissions could increase when the soil is cultivated, carbon and nitrogen mineralised, and excess of these released as carbon dioxide and nitrous oxide. Soils containing too much organic matter can also cause problems with plant roots not having sufficient contact with soil.

TABLE 8: WAYS TO REDUCE COMPACTION RISKS	
Machinery	
Tyres – use enlarged width or low-pressure tyres.	Lengthening and spreading out the area where wheels contact the soil reduces the pressure at any one point. Large diameter wheel rims, large tyres and tyres specifically designed to reduce pressure (e.g. “floatation” tyres), are all-effective.
Reduced machine weight /axle weight.	Axle weight may be reduced by reducing the weight of the machine or increasing the number of axles. Organize harvests so that the maximum machinery load is close to the field gate, and only bring lighter machinery (including the weight of fertiliser, manure or harvested product) into the field.
Field management practices	
Reduced tillage, conservation tillage, direct-drilling of crops	An assessment of the current tillage practices and whether they can be changed to reduce the risk of compaction is useful. Information on conservation agriculture is provided by FAO ⁷ . Reduced impact of machinery is especially important for wet soils.
Working soils when they are dry	Wet soils compact more easily.
Reducing the number of machinery passes.	The number of passes may be reduced by increasing the width of spray-booms and other (lighter) equipment, performing multiple activities on each pass and from the reduction in spraying frequency that may occur after implementation of IPM.
Using tramlines and Controlled Traffic Farming	Most compaction occurs in the first one or two machinery passes. If tramlines are used, this confines the damage to a small proportion of the field. Enlarging the row effect is maximised in controlled traffic farming systems.
Surfacing pathways	This can limit foot traffic to artificial surfaces, preventing compaction of surrounding soils.
Seasonal livestock removal or restriction	Confining animals, especially at times of high rain, drought or in winter when grass grows slowly and soils are more vulnerable. Restricting livestock to one area of a field, which changes over time, is also effective.
Reduction in management of hedges, live fences and other natural vegetation along field boundaries	These measures reduce the risk of compaction in areas that are particularly susceptible – field edges are often the areas with the highest farm traffic.
Take field corners out of management	Field corners provide opportunities for natural vegetation and soil to remain undisturbed, thus preserving soil health in these areas and benefiting biodiversity on the farm.
Tramline management	Running a shallow tine behind the wheel will help reduce surface compaction
Techniques for rectifying compaction	
General	<ul style="list-style-type: none"> • “Resting” the land, by introducing a period of fallow or set-aside into the crop rotation; • A period of no- or low-tillage; and • Cultivating strong- deep-rooting cover crops, and making the soil more resistant to compaction by increasing its organic matter content.
Surface-soil compaction	In pasture, a soil aerator is ideal for rectifying surface compaction. The tines or spikes need go into the soil between 10 and 15 cm to be of value. Otherwise, moldboard or chisel ploughing the compacted layer can usually remove surface compaction. In some cases, cover crops can also help reduce minor compaction.
Sub-soil Compaction	<p>Difficult to rectify. Till only to the depth needed, use appropriate machinery (avoid a moldboard plough, chisel ploughs are better as long as they are heavy enough to penetrate the compacted layer. Modern ploughs are even better) and – obviously – do this only on dry soil.</p> <p>Mechanical measures, such as subsoiling (deep-ripping) pasture or cropland can also be used. However, the effectiveness of subsoiling depends on soil texture, moisture content, soil profile and compaction extent, and DOES NOT provide a permanent cure for compaction – if the source of the compaction is not removed or effectively managed, the soil will become compacted again.</p>

The aim of the management plans should be to increase soil organic matter; unless the soil is already approaching levels where high, OM is creating problems.

The GY Associates' brochure, "Profiting from soil organic matter"⁵, includes management advice for maintaining SOM, and contains a table of C:N ratios for commonly used organic resources.

F31	Mandatory. No damage to important local ecosystems
No soil shall be taken from local nature reserves, riverbanks or land set aside for conservation, for the use on the farm (e.g. for use in nurseries).	
Climate Smart Agriculture	
Traditionally, local practices in some regions involved the digging in riverbank or local woodland for nursery soil. However, the importance of such soil is recognised to have carbon storage and other ecosystem benefits, and is therefore prohibited.	

This criterion will be "not applicable" for most crops and pasture. However, where the local tradition is still to dig in the riverbank or local woodland/forest for nursery soil (for vegetables or perennial tree crops), we wish this practice to stop immediately.

Soil should instead be taken from parts of the farm where extraction will not result in further soil loss or degradation

F32	Mandatory. Peat soils (land conversion)
No NEW planting (conversion to agriculture) or draining on tropical peat soils (of any depth)	
Climate Smart Agriculture	
Converting peat soils to agricultural use is almost inevitably accompanied by drainage of the soil and then increased rates of erosion. The oxidation – sometimes burning – of peat soils after drainage or erosion is major source of Greenhouse Gas emissions worldwide.	

Converting peat soils to agricultural use is almost inevitably accompanied by drainage of the soil and then increased rates of erosion. The oxidation – sometimes burning – of peat soils after drainage or erosion is major source of Greenhouse Gas emissions worldwide.

Unilever has made "no deforestation" commitments to eliminate production from areas where tropical peat soils have been destroyed (e.g. by drainage) from company supply chains. Although the focus of this commitment is on land conversion for the production of palm oil, paper and board, soy and beef, as it was made in the context of

the Consumer Goods Forum priorities, it is clear that the destruction of tropical peat soils for any other raw material is equally damaging.

The expectation is that any Environmental Impact Assessment undertaken before land is converted should include the identification of areas of tropical peat soil, and that plans are made to conserve areas of such soils during land conversion activities. This includes taking steps to maintain high water tables, if falling water tables would otherwise leave the peat soil open to drying-out and rapid oxidation.

We recognise that small areas of peat may not have been identified during an EIA if they were covered in vegetation during surveying, but expect contractors involved in land conversion to have standing orders to avoid removing or draining areas of peat soil if they come across them during operations.

Note that the **Responsible Sourcing Policy for Farmers and Biodiversity and Ecosystem Services** chapters of SAC2017 cover other land conversion issues.

F33	Mandatory. Peat soils on farm
Peat soils must not be subject to high stocking rates, or other management practices that lead to high GHG peat soil emissions. This criterion is "not applicable" if there are no peat soils on the farm.	
Climate Smart Agriculture	
Many farms worldwide are already located in areas of peat soil, or the farm contains pockets of peat soil. These soils are often very important for arable and vegetable production and for live-stock farming. However, drainage makes these soils highly vulnerable to oxidation, and if /when the vegetation cover is broken (at harvest or by overstocking animals), they are very vulnerable to wind erosion as the dry peat is very light and loose.	

All farms that contain peat soils are expected to have **specific** management systems in place to try to minimise soil loss. This will usually mean compliance with local guidelines, drawn up in relation to the local conditions. In the absence of local guidelines, the soil management system should include specific sections on:

- Water table management, as water tables need to be kept high to slow down peat oxidation – but not too high or crops and pasture will become waterlogged
- Use of cover crops and ground cover to slow down oxidation

⁵ <http://www.gya.co.uk/docs/GYA%20Brochure%20SP.pdf>

F34	Mandatory. No use of agricultural soils as waste dumps
Neither you nor your workers ever dispose of inappropriate materials (such as untreated sewage, medical or veterinary waste, oil, CPPs, CPP packing or containers) on your land unless specifically allowed by law and it is safe to use the affected land for food production.	
Climate Smart Agriculture	
Not applicable	

Disposal of wastes and chemicals (including veterinary medicines, animal “dip” contents, etc.) on land, unless they are explicitly allowed and safe for application on agricultural land for food production, is **prohibited**.

There are obvious exceptions to this, including:

- Spraying of dilute pesticide remnants, which is recommended practice for many countries to avoid disposal at a point source which may occur near water courses;
- Composts derived from waste organic materials; and
- Situations where the only option for waste disposal is burial on-farm.

The risk of all **veterinary medicines** entering the soil should be understood – this information will often be included on the medicine data sheet, but if not, manufacturers should be able to give you relevant information. Some veterinary medicines pose a risk to soil health, e.g. copper or zinc sulphate, which is sometimes used in foot-baths to control hoof diseases in cattle and is included in pig rations/feed to increase growth rates.

When copper sulphate is applied to soil, it binds to organic matter and therefore accumulates in the upper soil layers. As plants only require small amounts of copper to grow (annual removal rates are less than 0.55 kg/hectare for a typical grain or forage crop) therefore high copper levels can accumulate in soils and can be toxic to plants and soil microbes. A suitable disposal system should be in place, and practices adopted to reduce the amount used, or disposal rates diluted and spread over larger areas of land (dilution effect). If copper/zinc is applied to the land, then concentrations in the soil must be monitored to ensure levels do not become toxic. For further information relating to copper sulphate visit: <http://tristatedairy.osu.edu/Proceedings%202007/Epperson.pdf>

Plastics

Large volumes of plastic waste are created on farms using plastic mulch, polytunnels, etc. When possible biodegradable plastics can be used (mulch film) in order to reduce the volume of plastic waste.

Regulatory requirements

Farmers must be aware of and demonstrate compliance with national legal obligations concerning waste disposal on farms. Safe disposal of chemicals and waste are discussed in the **Waste Management chapter**.

F35	Expected. Soil Quality Monitoring
Soils must be monitored to confirm that soil degradation is not taking place and that management plans are resulting in improvements. Monitoring must include concentrations of available macronutrients (see nutrients chapter), pH, Soil Organic Carbon/Organic Matter, salinity, micronutrients, heavy metals, excessive erosion and compaction where there is a risk of degradation in these parameters.	
Climate Smart Agriculture	
Not applicable	

Concentrations of available soil macronutrients (Nitrogen, Phosphorous and Potassium) will normally be monitored as part of the Nutrient management Plan (See criterion F1), in order to improve production and profitability in the short term.

Monitoring other factors, particularly those that have been classified as “high risk” is important for long-term soil management and for ensuring that protective and remedial actions are effective. For most farms, once every three to four years is adequate for this purpose, and for annual crops this often works out to once in the rotation, at the same point in the rotation.

However, rapid changes in soil nutrient test values can occur where the soil has a low capacity to hold nutrients or when crops that extract large amounts of a particular nutrient are grown. More frequent sampling will be necessary on coarse-textured soils or where crops that remove large quantities of particular nutrients are grown (e.g. potassium and processing tomatoes). Advice on frequency for your particular situation should be sought locally from an extension officer or agronomist.

Soil Organic Matter – monitoring should be for Soil Organic Matter, Organic Carbon or humus – whichever is the better-understood system locally. The sampling system should be focussed on areas where remedial action is most likely to be needed, e.g. on the tops of hills. Annual monitoring of every field is clearly not required, but results and particularly trends should be looked at carefully alongside management practice to identify factors affecting OM levels.

Salinity – results are affected by soil amendments e.g. gypsum, so be careful not to sample within 3 months of such an application. Test results should be looked at alongside irrigation practices and irrigation water quality, to identify which factors may be responsible for either causing or ameliorating the problem.

Heavy Metal content – relevant metals may differ from location to location, so testing should include all metals identified in the risk assessment. If copper/zinc is applied to the land, then concentrations in the soil must be monitored to ensure levels do not become toxic (See criterion F34).

Erosion can be monitored by looking for visual clues such as gullies or eroded soil in local water bodies – or by marked-up soil level indicators. Monitoring the provision of erosion-reduction measures (e.g. terraces, improved crop or soil cover at critical time of year, terracing etc.) can also be an effective way for a group of farms to better-understand how the group is improving over time.

Compaction can be monitored using the Spade test or porometer measurements.

For all the above, a good **sampling regime** should be used, enabling a representative sample to be obtained. The number of samples can vary, but around 3-4 per hectare is a commonly used guide.

APPENDIX 3A: REFERENCES AND FURTHER INFORMATION

General Soil Management Guides

UK Department of the Environment, Food and Rural Affairs (DEFRA) "Protecting our Water, Soil and Air. A Code of Good Agricultural Practice for farmers, growers and land managers." The 'CoGAP' consolidates and updates the former three separate codes for water, soil and air: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/268691/pb13558-cogap-131223.pdf

United Nations University Press (1995) "Sustainable management of soil resources in the humid tropics" – superb manual covering many aspects (available online): <http://archive.unu.edu/unupress/unupbooks/uu27se/uu27se00.htm>

FAO (1975) "Sandy Soils" – specific guidelines for the management of sandy soils: <http://www.fao.org/soils-portal/soil-management/management-of-some-problem-soils/sandy-soils/en/>

Association of International Cooperation of Agriculture & Forestry (2003) "Handbook of Tropical Soil Management soil management" A guide for the improvement of soil fertility in tropical regions. Accession number 04A0028432 (not available online)

Oxford University Press (2003) "Tropical soils – properties and management for sustainable agriculture": By A.S.R. Juo and K. Franzluebbers. Hardback, 281 pp. ISBN 0195115988. (not available online).

Soil Maps

European Commission 'Soil Atlas of Europe', European Communities 2005. Can be downloaded from <http://esdac.jrc.ec.europa.eu/content/soil-atlas-europe>

FAO maps from the Harmonised World Soil Database: <http://www.fao.org/soils-portal/soil-survey/soil-maps-and-databases/harmonized-world-soil-database-v12/en/>

Drainage Design

FAO Irrigation and Drainage Paper no. 62 "Guidelines and computer programs for the planning and design of land drainage systems", FAO, Rome 2007: <http://www.fao.org/docrep/010/a0975e/a0975e00.HTM>

Manitoba Agriculture, Food and Rural Initiatives, Soil Management Guide: <http://www.gov.mb.ca/agriculture/environment/soil-management/soil-management-guide/>

Soil Erosion

The following document is a useful description of how to use grade stabilisation structures to prevent gully erosion: Some examples (with photos) of soil erosion prevention methods from Tennessee, USA: http://www.knoxcounty.org/epw/agriculture_bmp.php

Ministry of Agriculture and Fisheries, New Zealand "Agricultural Practices which control erosion". Good guide with pictures: <http://maxa.maf.govt.nz/mafnet/rural-nz/sustainable-resource-use/land-management/erosion-risks/erosiona.htm>

Some examples of poor practice and consequent erosion from New Zealand (photos with description on following pages):



A hillside in northern New Zealand showing creeping erosion. Large sections of soil are slowly creeping downhill, leaving deep cracks behind. Notice the difference in soil management between the farm on the left, which uses fertiliser and the one of the right side of the fence, which does not.



A hillside near the one on the left, showing land clipping where sheep and cattle tread. Clips are small drops of soil, leaving bare soil behind.



A slip or land slide on a hill side in northern New Zealand. The bare soil left behind is very vulnerable to erosion from raindrop impact and should be fertilised and re-sown, followed by fertiliser maintenance. Seeding alfalfa, which is a leguminous deep-rooting ground cover, resistant to drought, could hasten the soil's recovery.



A form of creep caused by tunneling and subsequent collapse of the underground tunnel. Such erosion forms creeping gullies that are very hard to contain. Planting trees uphill preventively and inside the gully helps to contain it and to minimise erosion by water. Retirement would not necessarily be a remedy.



The erodible hillside has been retired from grazing and fenced off. Natural vegetation is allowed to re-establish, pioneered by the leguminous and prickly gorse. Gorse is considered a pest because it infests poor farmland and is hard to eradicate. But for hillslopes like these, it brings natural nitrogen fertiliser, while preparing the soil for the native bush (on left).



A hillside preventively planted in poplar trees, widely spaced in order to let light through. Trees anchor the soil, cycle deep nutrients and provide decomposing litter to feed the soil. Fallen branches and stems slow down sheet wash. Leaf litter covers the soil against raindrop damage. Stems and branches can be used in gullies to stem the flow of water.



A hill side is preventively planted in widely spaced poplar trees. These trees bring many advantages and may make a decisive difference in the sustainability of this grassland. The trees are not intended to be harvested, but need occasional maintenance.



To overcome gully erosion and land slides, the gullies have been planted with poplar trees in dense formation. Poplar trees can be planted as tall posts, reaching over cattle and sheep, so the area does not need to be fenced off.

Conservation Tillage

Excellent information from FAO on conservation agriculture. <http://www.fao.org/ag/ca/>

Windbreaks

Links with general agroforestry (e.g. alley cropping, etc.) and recommendations for species choice and management in tropical areas is available from the World Agroforestry Centre website: www.worldagroforestry.org

Soil Compaction

The Encyclopaedia of Earth Land Author: Matthias Lebert, Last Updated: September 21, 2008: <http://www.eoearth.org/view/article/156084/>

Grains Research and Development Corporation, South Australia. How to identify soil compaction and fix it with progressive tillage: An Extension kit for farm managers and advisers. (Practical guide to assessing and managing soil compaction): <http://www.howtomanuals.net/how-to-identify-soil-compaction-and-fix-it-with-progressive-tillage.html?page=2>

Factsheet on using a penetrometer to measure soil compaction: <http://extension.psu.edu/plants/crops>

Taranaki Regional Council's guide, Soil and Pasture Management: <http://www.trc.govt.nz/assets/taranaki/environment/land/dairying-environment/issues/2.pdf>

Pennsylvania State University Agronomy Guide 2009-2010, Part 1, Soil Management (Compaction) A Good general guide to preventing and rectifying soil compaction: <http://extension.psu.edu/agronomy-guide>

Macro and Micro-nutrients

UK Department of the Environment, Food and Rural Affairs (DEFRA) "Fertiliser recommendations for agricultural and horticultural crops (RB209): Seventh edition (2000)" Main aim of the document is to advise UK farmers on fertiliser use, but covers principles of soil protection with respect to fertiliser application: <https://www.gov.uk/guidance/fertiliser-recommendations-for-crops>

Food and Fertiliser Technology Centre, "The Functions and Critical Concentrations of Micronutrients in Crop Production": <http://www.agnet.org/library.php?func=view&id=20110804135342>

Safe use of Sewage Sludge

ADAS Safe Sewage Sludge Matrix (2001): <http://s3-eu-west-1.amazonaws.com/media.aws.stwater.co.uk/upload/pdf/SSM.pdf>

Sodic Soils

Colorado State University Extension Service, "Managing sodic soils": <http://extension.colostate.edu/topic-areas/agriculture/managing-sodic-soils-0-504/>

Saline soils

FAO (1998) "Salt-Affected Soils and their Management": <http://www.fao.org/docrep/x5871e/x5871e00.htm>

Soil Organic Matter

Purdue University Extension Service, "On-farm soil monitoring for water resource protection" Practical guide to simple, on-farm monitoring methods (US-focused). <https://www.extension.purdue.edu/extmedia/WQ/WQ-43.pdf>

Soil Sampling for High Yield Agriculture: by Dr. Harold Reetz. Practical guide to getting a representative soil sample for monitoring: <http://www.prosodol.gr/sites/prosodol.gr/files/sampling.pdf>

University of Nebraska, Soil Sampling for Precision Agriculture (focus on precision agriculture, but sampling method suggestions are good): <http://cropwatch.unl.edu/ssm/soilsampling>

Training

Food and Agriculture Organization of the United Nations, Rome, Italy Quote FAO (2000): Guidelines and Reference Material on integrated Soil and Nutrient Management and Conservation for Farmer Field Schools. Not available online.



4 WATER MANAGEMENT (RESOURCE AND ENVIRONMENTAL MANAGEMENT)

In most of the world, from where Unilever buys agricultural products, water is becoming more of a problem. Although climate change is exacerbating the problems that farmers have always faced with heavy rainfall events and flooding, it is in the area of competition for water that farming is under most pressure. Not only are some areas becoming more drought-prone, but also competition for water from increased domestic and industrial use, as populations and standards of living rise, is a bigger issue. To remain productive and resilient, farms must have access to water and use it wisely.

This chapter is divided into two parts; **general water management** and **irrigation**. If the farm does not use irrigation, the whole irrigation section is “not applicable”.

Links with other chapters include the obtaining of permits for water extraction and related issues, including community water rights (See the **Unilever Responsible Sourcing Policy for Farmers chapter**), eroded soil and nutrients in water bodies (as erosion management is covered in the **Soil Management chapter**), and aspects of drinking water provision and sanitation (See **Social chapter**). Soil salinization associated with irrigation is also covered in the **Soil Management chapter**.

4.1 IMPROVING WATER USE AND WATER USE EFFICIENCY (EXCLUDING IRRIGATION)

F36	Expected. Drainage and drain design and management
Drains must be constructed in such a way that soil erosion is minimised during drainage (e.g. running across slopes, lining with vegetation or hard surfaces). Drains must discharge into riparian areas rather than directly into surface waters, or diffuse discharge/protected discharge must be arranged.	
Climate Smart Agriculture	
Flooding, waterlogging and soil salinization reduce yield and pose unnecessary negative environmental consequences, making good drainage design and management important. Although this criterion specifically asks for drainage systems to be designed and managed in a way that minimises soil erosion and sedimentation onto surface waters (which we classify as the highest risk), the intention is also to try to ensure that such systems do not have other negative environmental consequences, such as avoiding flood damage to crops. In so doing, the consequence of soil erosion and sedimentation of watercourses are mitigated, averting impacts on productivity and improved resilience.	

Water management is becoming increasingly important on farms, as rainfall becomes more unpredictable and intense as a consequence of climate change, and competition for land and water increases. Good drainage is important to minimise problems of direct loss of production due to flooding, soil erosion, and nutrient losses (with associated pollution and emissions).

Flooding, waterlogging and soil salinisation reduce yield; good drain design and management is clearly important. Poor drain design and water table management systems may also have unnecessary negative environmental consequences.

Although this criterion specifically asks for drainage systems to be designed and managed in a way that minimises soil erosion and sedimentation onto surface waters (which we classify as the highest risk), the intention is also to try to ensure that such systems do not have other negative environmental consequences, such as avoiding flood damage to crops.

Drainage

Good drain design and maintenance minimises soil loss and erosion. Drain design and management will vary with topography and climate. Drainage is especially important in areas where there are:

- Periods of excessive rainfall;
- Shallow water tables;
- Arid and semi-arid conditions (where rainfall does not exceed evapotranspiration);
- Brackish or saline water ingress; and
- Irrigation water is known to contain salts and contaminants.

Good drain design and maintenance is particularly important alongside farm tracks and roadways and within fields (where the general principle is that drains running across the slope, with a gentle fall, are less erosive than drains running down the slope). Drains are particularly prone to creating erosion if they have steep, long slopes and are not lined by a hard surface (e.g. concrete) or grass-lining. Of course, to be effective, drains must be checked and cleared regularly.

If possible, in order to reduce the ingress of soil, phosphates and pollutants into surface waters, drains should discharge into riparian areas (rather than directly into rivers or streams) or sediment traps (for tertiary drainage or tile drains). In some cases, discharge into constructed wetlands is appropriate.

Drainage of land should not result in changes in water table height that peat soils on farm or adjacent to the farm dry out and become subject to loss and oxidation (this is covered in criterion F33 and will not be audited as part of this criterion).

Water table management and water harvesting

Water table management is important in many parts of the world;

- To reduce the concentration of nitrate and other pollutants in the drainage water;
- To increase water retention and reduce drought stress on high value crops and pasture grown on organic and sandy soils; and
- To minimise oxidation of peat soils (See also criterion F33).

Water table management is most commonly achieved by restricting drainage, e.g. by blocking drain outlets. The water table then drops relatively slowly over time due to evaporation, evapotranspiration and seepage unless it is raised again by rainfall. This is a commonly used technique to prolong the growing season in parts of the world where a rainy season is followed by a dry season.

With sub-irrigation, water is pumped slowly and nearly continually into open ditches or a subsurface drainage system to maintain a near constant water table. When large rainfalls occur and the field water table rises above the desired level, the irrigation pump is stopped. The excess water then drains from a control structure in the ditch or drain outlet (FAO definition). If this type of water table management is used, the "irrigation" section of SAC2017

should be used. (See also criteria F39 and F42). The outlets for water table management systems must be treated in the same ways as drainage outlets to minimise environmental damage.

Drainage channels may be part of a system that improves water retention and harvesting to alleviate water shortage, e.g. by using contour bunding or mulching.

See also: FAO Irrigation and Drainage Paper no. 62 "Guidelines and computer programs for the planning and design of land drainage systems¹", FAO, Rome 2007

F37	Expected. Water infrastructure
	Ensure water infrastructure is in good working condition by inspecting taps, water supply pipes, water troughs, drainage channels and receiving waterways regularly, and ensure rapid repairs when leaks are found. Where necessary protect pipes from frost damage. Not applicable to smallholder farmers.
	Climate Smart Agriculture
	Land with sandy soil subject to high winds is particularly susceptible to drought and soil loss. This criterion encourages the development of more water-retaining practices on farms, especially where they have not traditionally been used, as wind speeds and water shortages are likely to increase in many parts of the world as a result of climate change.

Water leaks can, over time, lead to unproductive and unsustainable losses of vast amounts of water, with all the wasted costs, environmental impact and associated emissions.

Inspection and maintenance

Inspection, clearing and repair of drains and receiving waterways should be done at least annually, before the time of year when heavy rains are most likely.

Where water supply to irrigation systems, animal housing, pack-houses, factory units or other water-intensive operations is metered, the meter should be checked regularly (e.g. weekly) to make sure water use is not unexpectedly high; less frequent checking is appropriate for other operations.

Where water supply is gravity-fed or pumped locally from a stream or river, the system should be checked regularly for leaks, and to ensure that water flow in the source waters is being maintained; this is particularly important – and may be a legal requirement – during dry weather where the source water flow or level must be maintained because of biodiversity or community values. This includes water diverted into on-farm reservoirs/dams.

¹ <http://www.fao.org/docrep/010/a0975e/a0975e00.htm>.

F38	Leading. Reduction in water use, including re-use of water (excluding irrigation)
Water use in washing-down animal housing and yard areas should be reduced by scraping or sweeping floors before washing down, using high-pressure hoses, or re-using wash down water from food preparation areas. Not applicable if the farm only uses "domestic" volumes of water.	
Climate Smart Agriculture	
Not applicable	

While in some regions there is plenty of water available, in other areas water scarcity is a serious issue, and it is important to start thinking about water use efficiency. Climate change predictions are that many more parts of the world will start to see short-term or long-term water shortages in the future. Moreover, conflict for water with local communities and other water users (downstream urban areas or industry) may put further pressure on water supplies for agriculture; in areas of high risk it will be important to develop a responsible approach to resource management in partnership with local communities and other water users (See also criterion F40).

The major uses of water on farms are for irrigation (See separate irrigation criterion F46), animal drinking, milk-cooling (dairy farms) and the washing-down and cleaning processes involved in factories, yards and food preparation areas. For farms with any of these facilities, it makes sense to develop a plan to reduce water use and increase water use efficiency.

The first step is to monitor current water use. Once a baseline of water use is established, proactive steps can be taken to increase efficiency and optimise water use.

In addition, while water appears to be a plentiful resource, it is important to determine if this is actually true by investigating the status of a farm's specific watershed/catchment. It is therefore important to assess the current levels of water stress and risk of

Management strategies to decrease water use

Washing-down animal housing and yard areas for animal husbandry operations, washing vegetables or washing-down packhouses and primary processing areas can consume large volumes of water. Water use efficiency can be encouraged by adopting the following measures:

- Separating "clean" and "dirty" areas more efficiently, so that some areas do not need to be washed-down as often;
- Sweeping or scraping floors before washing down to remove solid waste and reduce the amount of water required for cleaning;
- Animal systems using wastewater to flush feeding areas and free-stall barns, directing the water flow to the manure/slurry storage area (this also prevents pollution with nutrient-rich water and enables nutrients to be used on the land);
- Using a high-pressure hose to clean more quickly and with less water (in animal systems take care not to use the hose on the animals themselves.);
- Ensuring pipework and water infrastructure is in good condition with no leaks (See criterion F37); and
- Collecting rainwater from roofs of pack-houses, factories and stock housing, which provides an alternative source of water, as well as potentially reducing the volume entering the slurry storage / effluent systems. If rainwater is collected for use as drinking water appropriate, treatments should be implemented to render the water potable.

This criterion encourages innovative thinking about how the costs and volume of water used can be reduced. The questions may assist in providing alternatives to conventional water use to make consumption more efficient.

- Would installing high-pressure hoses be effective?
- Could preliminary sweeping or scraping of floors reduce the volume of water needed?
- Is a drinking-water quality water supply required from preliminary wash-downs of dirty areas, or could water from food preparation areas be re-used (e.g. in different parts of a dairy operation)?

Note: It must be stressed that livestock drinking water should never be limited (See **Animal Husbandry chapter** on Freedom from thirst and criterion F114). This requirement must not be compromised by water efficiency measures.

F39	Leading. Water retention in soil
In areas where high wind-speeds are encountered, use wind-breaks or cover crops to reduce water (and soil) loss. Wind breaks should also be used to protect livestock from extreme weather.	
Climate Smart Agriculture	
Land with sandy soil subject to high winds is particularly susceptible to drought and soil loss. This criterion encourages the development of more water-retaining practices on farms, especially where they have not traditionally been used, as wind speeds and water shortages are likely to increase in many parts of the world as a result of climate change.	

Land with sandy soil subject to high winds is particularly susceptible to drought and soil loss. Encouraging soil Organic Matter accumulation, for example by planting perennial tree crops or pasture, or cover crops) is an important component of this, and is covered in the **Soil Management chapter**.

This criterion is included specifically to encourage the development of more water-retaining practices on farms, especially where they have not traditionally been used, as wind speeds and water shortages are likely to increase in many parts of the world as a result of climate change.

Windbreaks

Windbreaks are important for minimising wind erosion in many parts of the world, and are also used to protect crops and animals from wind and associated water loss. They are usually best composed of lines of trees – although plastic netting and other mechanical barriers are widely used in horticulture.

There is usually good local advice available on the type of windbreak, and location for windbreaks, suiting local climate and topography.

General advice is:

- It is important for the windbreak to be porous and allow 30-50% of the wind to pass through – in other words the wind should be reduced and not diverted up and over the break (because then, eddies can cause just as much damage as if there were no break at all). The porosity should be roughly evenly distributed throughout the height of the break (i.e. both trunk/stem and canopy areas).
- Windbreaks should be placed strategically. Erosion is reduced for a distance of 10-30 times the height of a good windbreak, so windbreaks should be frequent enough to protect the land. Plans should also take into account the growing rate of trees used for windbreaks.
- Windbreaks may be a single row of trees (a “living fence”) or multi-row. Multi-row designs obviously offer more options for replanting and maintenance when trees reach the end of their useful life, but may take up more space. Often a similar level of wind protection can be provided by one row of one species or more rows of a less sturdy species or species mix.
- If deciduous species are used, it is important to be sure that the windbreak provides the desired level of protection at the critical times of year. In many cases, it is better to use evergreen species.
- Since windbreaks do take up land, compete with crops for water and create shade (which may reduce crop yield), and may also have leaf-fall that may contaminate crops (e.g. vegetables) or harbour pests and diseases, it is important to choose species that do not create other problems on the farm, and balance the risks and values created. Windbreaks are not suitable everywhere.

Note that where it does not interfere with machinery use, having trees interspersed in the landscape rather than planted in long rows may be just as effective as conventional shelterbelts in reducing wind damage to crops – this approach is used, e.g. in South India to protect tea from the monsoon winds. Many smallholder agroforestry systems take advantage of the sheltered conditions created by trees to grow annual crops.

Windbreaks can also become useful wildlife corridors (See **Biodiversity and Ecosystem Services chapter**). Information related to wind erosion can be found in criterion F28 of the **Soil Management chapter** for general advice.

Cover crops and crop residue retention

Conservation tillage and crop residue retention / mulch on the soil surface help conserve soil and water. Cover crops can be beneficial under some circumstances, but under others, they compete with crops for water.

F40	Mandatory/ Expected. Sustainable withdrawal (abstraction) of water.
Tick whichever applies - F40a, F40b or F40c	
F40a- No water withdrawal. Note - if you irrigate or are involved in animal husbandry, this option is not available to you.	
F40b-Legal Compliance. If it is necessary to have a license or permit to extract the volume of water you use, the license must have been obtained, and the volume of water stated on the license must not have been exceeded	
F40c - If no license or permit is required, there must be evidence that current rates of abstraction are acceptable to relevant authorities (e.g. in the form of metered delivery and payments through a national distribution scheme, or there has been advice from water authorities or a relevant consultant that current rates of abstraction are acceptable).	
If the farm only uses "domestic" volumes of water, F40a applies. For purposes of this document, water abstraction and water withdrawal are the same thing. This is not applicable to small-holder farmers if legal compliance is a non-issue.	
Climate Smart Agriculture	
Compliance with abstraction regulations (where in place) is paramount to safeguard the longevity of water resources, thus serving as a policy measure to improve socio-ecological resilience and protect continued productivity in agricultural lands.	

Before any water harvesting scheme is established, local authorities should be approached to check any legislation or regulation, e.g. licensing requirements. In some countries, like South Africa, a permit is also required to undertake activities that might result in water flow reduction (e.g. tree planting).

In normal years, the authorised volume for abstraction should not be exceeded, although we accept that, in any individual year, the permitted volume may have been exceeded if the Authorities are made aware of the discrepancy, that this is not a long-term problem (i.e. It does not occur more than ~3 years out of 10). Furthermore, where long term plans require more water, a permit for higher volume allocation must have been applied for.

A Unilever supplier or co-operative management may negotiate permits or collect evidence from the catchment or water-distribution authorities' evidence, on behalf of the group of farmers involved (See also the **Unilever Responsible Sourcing Policy for Farmers chapter**).

Where no permit is required, and water volumes are high (e.g. for irrigated agriculture, animal husbandry operations where animals are housed inside for part of the year, dairy operations, pack-houses, farm operations involving vegetable-washing, etc.), Unilever is looking for evidence that the local water-resource authorities recognise that the farm water use is legitimate. Where many small farms are involved (e.g. smallholder dairying operations) the expectation is that the Unilever supplier /co-operative or other "umbrella" organisation will be able to show that the water use is recognised as appropriate by local government/ catchment management authorities.

New infrastructure

New dams must be constructed in accordance with local rules, regulations and good practice guidelines.

F41	Leading. Equitable water distribution within the catchment
Water harvesting and withdrawal are monitored, and systems are in place to try, as far as practicable, to meet the needs of local communities, other water users, as well as wildlife and eco-systems in the catchment. If there are Land Care or Catchment Management Plans available, these should be complied with. Where water is abundant and there are no conflicts over resource allocation, this criterion is "not applicable". Not applicable to individual smallholders.	
Climate Smart Agriculture	
Compliance with abstraction regulations (where in place) is paramount to safeguard the longevity of water resources, thus serving as a policy measure to improve socio-ecological resilience and protect continued productivity in agricultural lands.	
WASH Principle	
Water access is a major concern in semi-arid and arid areas, where surface water availability is limited and supply may be dependent on groundwater reserves. In regions experiencing prolonged droughts or where water quality might be low, water harvesting by farmers must be conducted with the needs of others in mind. Monitoring of use is of particular importance when ground water is concerned, because aquifers often cover extensive areas, supplying numerous wells with water. As such, overuse can lower the water table, taking water out of reach of older wells that may not penetrate deep into the aquifer.	

This criterion is designed to promote the adoption of equitable water-distribution and allocation systems within catchments, based on water supplies from rainwater harvesting or groundwater extraction.

It is, of course, possible for water abstraction and harvesting to be legal (See criterion F40) but unsustainable. Licenses are not necessarily tied to aquifer levels or sustainable use. For a water supply to be sustainable:

- The abstraction/withdrawal quantities and aquifer levels must be maintainable in the long term; and
- Other water users' needs are not compromised. This includes respecting customary water rights of local people. Consultation and engagement with local communities is important for new projects, as local authorities do not always take these fully into account; communities should be aware of the impact of the proposal and input from communities should feed into the decision-making process.

Rainwater harvesting

Water harvesting can be important for providing a sustainable source of water and is often used in arid, semi-arid or semi-humid areas for supplementing rain-fed agriculture and animal husbandry; water can be harvested in four main ways:

- **Rooftop harvesting** – Rainwater is caught and stored directly from rooftops.
- **Micro-catchments and contour bunding** – The land is contoured to catch run-off adjacent to the cropping area and store it in the soil. These techniques aim to make the

most of rainwater that falls on the field and can provide a great deal of short-term water storage.

- **Macro-catchments** – Run-off collected from large catchment outside the cropping area, stored mostly in the soil;
- **Floodwater harvesting** – Water collected from major seasonal river channel, usually with a complex system of dams and distribution networks, stored in soil, ponds or reservoirs.

Sustainability principles are compromised where the rainwater harvesting operations for farming limit access to water for other legitimate water-users in the catchment (especially poor and marginalised groups of people).

Groundwater

Water may be pumped from underground sources. There are many documented cases of water being extracted for agricultural purposes lowering water tables (maybe to levels below where local wells can reach) or depleting underground water reserves to the extent that the water source becomes saline, like many locations around the Mediterranean or toxic (e.g. in Bangladesh).

Steps to take

Check if water is considered scarce in your catchment – you should be able to check with your local authority or

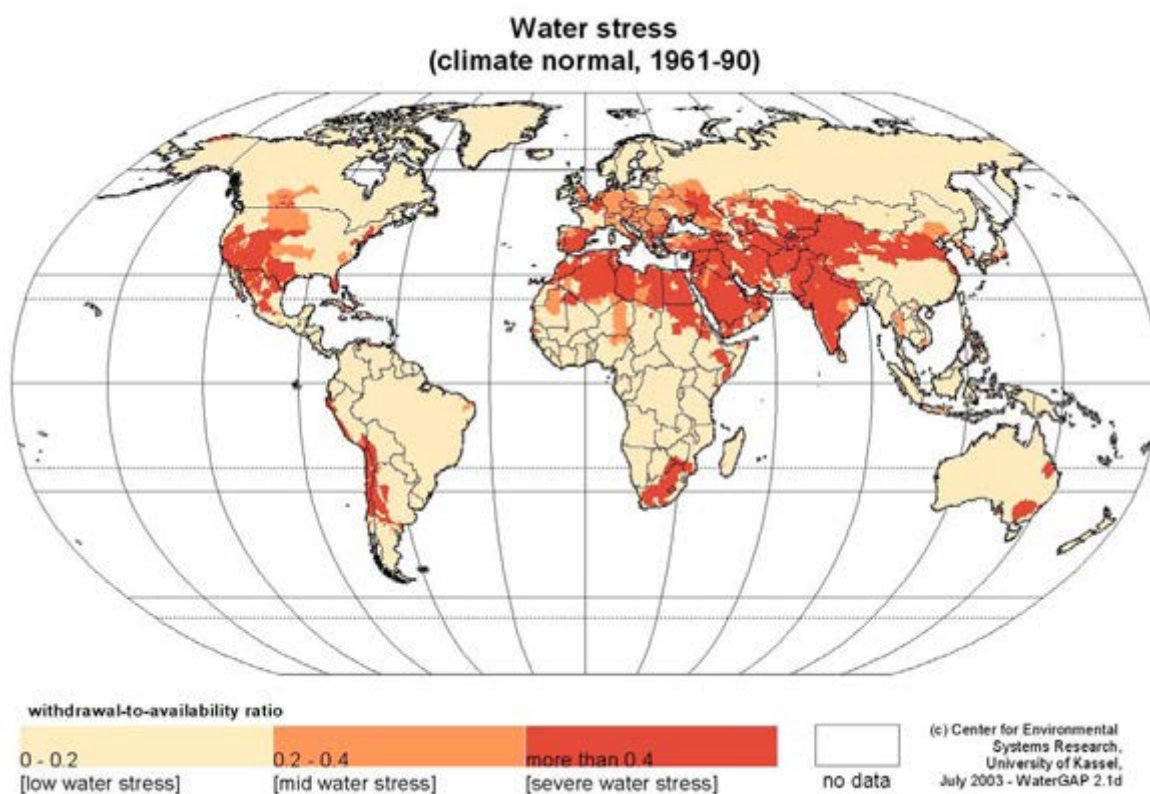


Figure 1: Withdrawal to availability ratio

water board. Another way of doing this is to look at the withdrawal to availability (w.t.a.) ratio. This gives a measure of water stress at catchment level. A map of global w.t.a. ratios can be seen in Figure 1.

Figure 1: Withdrawal to availability ratio

- If it is not stressed (i.e. if it is in 0-0.2 stress category), no specific procedure needs to be followed, but you should be aware of who other water users are, and the possible affects them;
- If it is mildly stressed (0.2-0.4) check if the legal structure is sufficient or if you need to do more to protect other water users. Care should be taken with water harvesting operations;
- If it is severely stressed (>0.4), again the legal structure needs to be checked, and the effect on downstream/ other users should be carefully monitored. Where there is competition for scarce water resources from other industrial or agricultural water users good practice is for all those involved to get together to develop and implement a catchment management plan. In areas of the world where the catchment includes smallholders and other un-empowered groups of people who need access to water (e.g.
 - Pastoralists and people with no land/squatters), these groups should be represented and supported to contribute to group decision-making; such groups should include women. Unilever SWIM principles² for managing community water initiatives are recommended as guidance for this approach, which requires the following:
 - Diversion systems in place to enable floodwater harvesting should not remove access to water needed by local people for drinking, hygiene and washing.
 - Water harvesting operations should also be monitored to check they do not adversely affect areas of high biodiversity value / High Conservation value (See also the **Biodiversity and Ecosystem Services chapter**). This includes checking that water extraction is not lowering water tables that otherwise maintain peat soils (criteria 32 and 33) and their associated natural ecosystems.

The FAO provides useful guidance on water harvesting techniques, and can be found [here](#).

Water shortages are likely to become more common as populations and expectations of people increase, and climate change leads to warmer growing conditions (with higher water requirements) in many parts of the world.

Even if the problems are not currently severe, it will often make sense to develop water users/catchment management group now as it will then be in place where problems do occur.

New infrastructure

New dams and weirs must be constructed in accordance with local rules, regulations and good practice guidelines. If water flows in local watercourses, or water table height is likely to be affected by the dam construction, there must be good evidence that biodiversity (See **Biodiversity and Ecosystem Services chapter**) and local communities will not be affected or that there are systems in place for compensation.

F42	Mandatory. No use of water bodies as waste dumps
Neither you nor your workers ever dispose of inappropriate materials (such as oil, CPPs, CPP packing or containers, medicines, animal manure) in rivers, streams or other surface or ground water.	
Climate Smart Agriculture	
Not applicable	
WASH Principle	
Water bodies serve multiple functions, often providing an array of ecosystem services like flood alleviation, habitat for aquatic organisms and fish stocks for fishing and areas for recreation. In addition, businesses and people residing in the area, rely on access to water for drinking and domestic use, irrigation of crops and industrial processes. Because they often serve such a wide spectrum of users, safeguarding water quality from contamination of waste becomes a critical issue, as this can pollute water making it unsafe for use, as well as destroy vital services these water bodies provide.	

This should be clear. Nothing, which poses a pollution risk, must be discharged to streams or rivers. Please refer to your national legislation for any discharge permits or water quality requirements.

² https://www.unilever.com/Images/2003-unilever-and-water-towards-sustainability_tcm244-409708_1_en.pdf

This includes disposal of a wide range of materials as well as those mentioned specifically in the criterion, including dead animals, slaughter-house waste, silage clamp effluent, effluent pond contents, dairy waste, etc. (sewage and animal water are covered in criterion F43, but other types of animal waste are covered by this criterion).

F43	Expected. Protecting water bodies from pollution by sewage, manure and wash water
Surface and ground water must be protected from direct and indirect pollution. Toilets, water used for cleaning milking parlors, and livestock yard washing-water must not discharge directly into watercourses but discharged at a sufficient distance to avoid any infiltration through soil into watercourses and water tables. If it is necessary for livestock to cross watercourses, the crossing points must be made of hard materials to minimise riverbank erosion into the water. Machinery must not be washed directly in streams or rivers.	
Climate Smart Agriculture	
By protecting water bodies from pollution, water availability for use is safeguarded and long-term impacts like regime shifts associated with pollution impacts are avoided, thus promoted a more resilient farm ecosystem.	
WASH Principle	
Water bodies are susceptible to exploitation, because they often extend across lengthy areas and may have no or only partial barriers preventing people or businesses from polluting them. This is of a particular concern in rural areas where networked infrastructure to manage sewage and sanitation has not been established. Education around the potential human health impacts of polluting water bodies may also be lacking, perpetuating existing uses that negatively impact on them. For regions with limited water, water bodies which serve in providing drinking and domestic water supply, are under greater risk to pollution.	

Sewage and wash-water from animal husbandry operations should not discharge directly into watercourses. They shall be discharged at a sufficient distance to avoid any infiltration through soil into watercourses and groundwater.

Sewerage water must be treated, using the locally available process, to the required water quality standard before discharge.

Protecting from human sewage

Pollution of waters from human sewage arises from seepage or drainage from toilet facilities and from areas where people do not have access to toilet facilities. Toilets in workplaces (e.g. processing factories, pack houses, farmyards, clinics etc.) and in farmhouses and farm worker accommodation should discharge into holding tanks/ cesspits, septic tanks, composting facilities, geological structures or sewers. These structures must be located and

managed in such a way that nutrient- and pathogen-rich sewage does not pollute ground or surface waters.

Discharge from toilets into surface waters (e.g. by placing them immediately above, draining into, or very close to streams) is clearly unacceptable.

Cesspits and holding tanks must not leak. A contractor licensed and competent to manage the wastes safely must empty them. Such facilities are relatively costly to maintain well and are usually inappropriate for farm worker accommodation or processing facilities.

Septic tanks are very common in many parts of the world and especially in farming areas; it is estimated that 25% of the population of North America are reliant on such systems. Septic tanks are small-scale sewage treatment facilities and have no connection to sewage drainage systems. They require a relatively large “drain field” outside the tank where microbial activity can destroy pathogens before they can be distributed to ground or surface water supplies. The location of septic tanks in relation to local soil characteristics and drainage systems is therefore crucial for avoiding water pollution. For large-scale farm accommodation or processing facilities, professional advice on the location and management of septic tanks should be sought.

Composting facilities are often an excellent option for avoiding water pollution, especially where water is scarce. Because of the relatively low water content of the urine/ faecal matter mix that is not flushed away using water, the heat produced as organic matter decomposes destroys pathogens. Of course, composting facilities (including “long drop” toilets used in many parts of Africa) do require maintenance, relocation or emptying when “full”, and must be located and designed so that they do not smell or attract flies, or flood at times of heavy rain.

Foul sewers should be maintained in good condition, and separate from surface water drainage.

The provision of **portable toilets** in or near fields is a requirement for many fresh fruit and vegetable supply chain Good Agricultural Practice systems. They should be cleaned and emptied regularly; this can often be arranged using reputable contractors. If contracting services are not used, the toilet contents must be discharged in a location far from housing and leisure facilities, and places where the discharge would contaminate fruit or vegetable growing areas, surface or ground water.

Protection from Waste Water

Waste water can arise from irrigation and rainfall, from yard and workshop washing and from basic processing operations that may take place on-farm. Risks of pollution arising from discharge of waste water must be assessed and managed accordingly on a case-by-case basis. Waste from milk parlours, for example, has a high pollution potential and generally requires full treatment in local sewage treatment plants, whereas water used for vegetable washing may be re-used (See criterion F38) and/or returned to the land.

Machinery should not be washed directly in streams or rivers; the dirty water should feed into soak-aways or appropriate drainage systems.

Protection from Livestock waste

When livestock have unrestricted access to watercourses, water can be contaminated by soil (due to bank erosion), nutrients (from manure and urine), bacteria and other microorganisms (from manure). The most stringent way of protecting watercourses is to fence off all watercourses on farm, and provide water for animals from a 'non-stream' source. However, complete exclusion of animals may not be necessary or practical in some cases, and other measures may be put in place to encourage animals not to spend too much time by the edge of the water. These include placing salt, minerals or supplemental feed away from the riparian area to attract livestock away, and providing shade away from the watercourse to stop them congregating in that area.

In some cases, farmers may allow access for animals to water only in particular areas where the risk of contamination is lower. Where animals must cross watercourses, arranging for well-defined crossing points with hard standing for the animals, can have significant impact.

Before any new livestock sheds are constructed, ensure that they are located at a safe distance from ground water (wells) or surface water sources – this is often dictated by legislation.

Manage animal holding areas and pastures to avoid effluent run-off, e.g. by storing and spreading farm manures in accordance to local requirements. Direct wastewater to manure storage areas.

Livestock Yard Management

Livestock yards (barnyards, holding areas, woodchip corals, standoff pads and feedlots) are concentrated areas of livestock, and hence their wastes, and are therefore vital to protection of water quality. These yards, especially when on permeable soils or near on-farm water sources, can cause nitrate and bacterial contamination in ground or surface water. To minimise the possibility of contaminants leaching to groundwater or running off to surface water, such yards should be located on concrete or fine-to-medium textured soils over 100 feet/30 metres from water sources such as wells, surface water, adjacent property, drainage ditches or other areas that could result in the run-off reaching water sources.

The best means to achieve this is to prevent flooding in livestock yards by diverting rain and/or floodwaters from the area. Having a roof over the yard or otherwise diverting water from the yard is the best way to prevent run-off. This is especially important if yards are on a slope. Other practices, such as keeping the yard clean, diverting run-off to manure storage areas or collecting and reusing run-off (e.g. as nutrients on fields), can prevent run-off and hence minimise potential pollution of water sources.

TABLE 9: MILK-HOUSE WASHINGS (DAIRY ONLY)

Water used to clean the milking parlor and milking equipment contains high levels of organic matter, nutrients, chemicals and microorganisms, and can contaminate water with ammonia, nitrate, phosphorus, detergents and disease-causing organisms if not disposed of properly. Milking parlor wastewater is made nutrient-rich by virtue of having high amounts of milk residues or being washed down the drain with manure and feed. This nutrient-rich water can lead to pollution if it is untreated before it reaches water supplies. To minimise this potential impact to water, wastewater should be diverted to manure storage areas (See the **Nutrient Management chapter**). Nutrient-rich first rinse water can also be reused by applying it directly to fields as fertiliser. If applying first rinse to fields, care should be taken to match field nutrient needs with nutrient content of first rinse. Cleaning the parlor of feed and excess manure prior to wash down will minimise the amount of this material that enters water and can also minimise the volume of water needed for cleaning.

The Washington State University Extension Services' Water Quality Risk Assessment Tool is useful for livestock systems and can be found [here](#).

More helpful guidance is available from the FAO website from where the "Control of water Pollution from Agriculture" can be downloaded [here](#).

F44	Expected. Protecting water bodies from pollution by agricultural activities
Losses of nutrients, CPPs and agricultural soil to water must be minimised, as must the over application of nutrients on land adjacent to, or draining into, watercourses	
Climate Smart Agriculture	
Irrigation and rainfall can both cause soil erosion, and transfer agrochemicals and heavy metals to nearby watercourses. Risk is highest where there are high intensity rainfall events, or where irrigation is poorly managed or inappropriate techniques used.	
WASH Principle	
Human health is undermined when water bodies are polluted by agricultural activities, especially for larger water bodies situated downstream, or rivers and streams that may pass through inhabited areas on their lower reaches.	

Protecting from Contaminated Run-off Waters

Irrigation and rainfall can both cause soil erosion, and transfer agrochemicals and heavy metals to nearby watercourses. Risk is highest where there are high intensity rainfall events, or where irrigation is poorly managed or inappropriate techniques used. Management practices include ensuring good soil structure to aid infiltration (See **Soil Management chapter**); the use of buffer strips, contour tillage, dividing long slopes, siltation pits/micro catchments to avoid or catch run-off; mulch and crop canopy cover and irrigation management. Linear or concentrated water runoff across fields, e.g. down train lines or talwegs, needs to be tackled as a first priority, since contamination from these sources is likely to runoff across buffers.

Direct spraying into ditches that is actively discharging into watercourses must be avoided wherever possible.

The size of **no-spray zones** at the edge of watercourses obviously depends on the types of material being applied, the height and method of the application, how well vegetation screens the watercourse from drift and drainage, and the weather conditions at the time (see the **Pest, Disease and Weed Management chapter** for more guidance).

Riparian strips

Strips of natural vegetation along streams and riverbanks (including wetlands, either “natural” or “artificial”) not only help protect watercourses from eroded soils and farmland nutrient and CPP pollution, but also help support riverbanks and make them more resistant to erosion (See also criterion F46).

Animal access to streams and rivers

Damage to riverbanks and pollution of river water is often caused by grazing livestock. In some parts of the world, livestock should be excluded from vulnerable areas. In others, stabilised areas can be constructed at stream crossings using concrete or (crushed) rocks. Both sides of the stream crossing should be fenced off so that cattle can only enter the stream in one central location.

Monitoring

If the farmland drains into a watercourse or water body (directly, or via a riparian strip etc.), the farmer should check the condition of the waterbody. Certain types of algal growth and plants (e.g. duckweed) indicate problems with nutrient loss to the water.

F45	Mandatory / Expected. Buffer zones
Buffer zones adjacent to streams, rivers, wetlands, ponds and other water bodies are planted, maintained or restored, preferably with native species.	
Please tick whichever applies, 45a or 45b.	
F45a If this is a legal requirement, compliance is mandatory.	
F45b If this is not a legal requirement, the size of such zones and their management must broadly conform to those specified in National and SAC implementation guidance.	
Climate Smart Agriculture	
Riparian strip buffer zones are often best managed by allowing native vegetation to regenerate next to watercourses. A mixed population of herbaceous, bush and tree species can be the best for reducing the risk of water pollution and may also have biodiversity value – especially if the riparian areas on adjacent properties link into each other, thereby creating a wildlife corridor across the landscape.	
Compliance with national guidelines on riparian buffer zone width, will serve in the protection of sensitive habitat, which will promote the ability of the ecosystem to cope with shocks and restore thereafter, as well as to maintain carbon stocks.	
WASH Principle	
Buffer zones are important in serving to filter water and provide associated habitat for aquatic ecosystems and the life which they support. In their capacity to treat water quality (through reed beds, uptake of nitrogen, etc., buffer zones promote the improvement of water quality for safer, cleaner water.	

Some guidance for the layout of riparian strips is as follows:

- Riparian strips should normally be at least 10m wide, and preferably wider. 15m of undisturbed vegetation is generally considered adequate for protecting watercourses from N and P ingress. Obviously, drains must not cross the strip; and
- Riparian strips should be of at least the same width as the stream or river they adjoin.

Riparian strip buffer zones are often best managed by allowing native vegetation to regenerate next to watercourses. A mixed population of herbaceous, bush and tree species can be the best for reducing the risk of water pollution and may have biodiversity value – especially if the riparian areas on adjacent properties link into each other, thereby creating a wildlife corridor across the landscape. It is important that they are not planted with non-native species (e.g. eucalyptus) that will abstract a lot of water (See the **Biodiversity and Ecosystem Services chapter**).

Considerable sensitivity may be needed to manage the situation where smallholders have encroached into riparian areas (perhaps illegally) to plant crops, graze animals or extract irrigation water. Where smallholders are illegally farming within a legally designated buffer zone, it is clear that the farm cannot comply directly with this criterion in the first instance.

4.2 IRRIGATION

Irrigated agriculture is estimated to use ~70% of the world's water supply. Diverting water into irrigation schemes has been responsible for destruction of large-scale ecosystems – such as the Aral Sea, and the loss of livelihood of people previously dependent on water supplies and fisheries elsewhere. Failure of irrigation schemes is thought to have brought down ancient civilisations. Improving the sustainability and resilience of irrigated agriculture is therefore a key component of agricultural sustainability.

Unilever businesses are dependent on irrigation, particularly for the production of field tomatoes and some other vegetables in water-scarce parts of the world.

The LERAPS scheme³ provides good guidance available on the size and management of riparian buffer zones to minimise water contamination.

F46	Request for information. Type of irrigation you use
	Please tell us which type of irrigation system you use (Tick whichever system is closest to your situation). <ul style="list-style-type: none"> • None • Drip • Under-canopy sprinklers or micro-sprinklers • Centre-pivot • Above-canopy sprinklers • Furrow • Flood • Irrigation is used in a nursery area only • others
	Climate Smart Agriculture
	Not applicable

No guidance provided for this criterion.

F47	Expected. Criteria for new irrigation systems
	The decision on which system to install must consider sustainability factors. Not applicable to smallholder farmers. Only applicable when irrigation systems are being installed or upgraded. Not applicable to smallholders as it is presumed that individual smallholders will have had little choice in the irrigation system to use.
	Climate Smart Agriculture
	There is no one irrigation system that is best for all situations. However, many local factors – like water use efficiency, return on investment, long-term water availability, maintenance and calibration and soil characteristics – need to be carefully considered justify the sustainability and benefit to CSA pillars.

3 <http://www.pesticides.gov.uk/guidance/industries/pesticides/topics/using-pesticides/spray-drift/leraps>

TABLE 10: ADVANTAGES AND DISADVANTAGES OF DIFFERENT IRRIGATION SYSTEMS				
Type	System	Pros	Cons	Comments
Surface	Furrow or flood	Minimal capital investment or energy costs. Less affected by climate or water quality factors. Easy to see the effectiveness of the system.	Tends to be less efficient, labour intensive. Difficult to engineer, especially on hummocky ground. Can lead to higher disease pressure [especially flood]	Drainage can also be a problem on some circumstances
Sprinkler	Portable or fixed sprinklers e.g. centre-pivot	Can work at low pressures, saving energy. Can achieve high uniformity. Can be water-efficient if combined with good scheduling. Easy to apply frequent light irrigation.	Higher capital cost than rain guns. Needs care in windy conditions as uniformity will be compromised.	Portable systems require high labour cost to move. Fixed systems cheaper to manage but less adaptable.
	Booms	High precision and uniformity. Low pressure so low energy requirements.	Not suitable for uneven topography or irregular-shaped fields. High application rates so risk of high runoff losses on low infiltration rate soils.	
	Rainguns	Robust. Versatile. Labour-efficient.	Can waste significant water and energy if not managed well. Soil splash can damage fragile crops. Application not uniform	Wastage can be reduced by appropriate pressure, placement and use in non-windy conditions.
Micro-irrigation (drip and micro-sprinklers)	General	Accurate. Energy- and water-efficient. Easily automated. Can increase yield and quality. Fewer weed problems. Often fewer fungal problems.	Can be expensive and difficult to maintain (but see box for low-cost options). Trust needed in flow meters, timers, pressure gauges and sensor technology.	Water can still be wasted in these systems, and management is still very important.
	Drip/trickle		Good management and maintenance to prevent blocked emitters	
	Micro-sprinklers	Good on sandy soils (emits water over a greater surface area than drip) or where water quality is a problem (blockages less likely)	More prone to physical damage than drip systems	Primarily used for tree and vine crops.

Most farms that irrigate will clearly already have a system installed and therefore the challenge is to manage that system as efficiently and sustainably as practical until it needs to be upgraded or replaced.

There is no one irrigation system that is best for all situations. For example, drip irrigation provides an opportunity for significant water savings and yield increases for certain crops in areas where irrigation is used throughout the season, but may not be suitable for crops that only need supplemental irrigation or in certain crop rotations. Compared to other well-managed systems, the water savings from conversion to drip may be marginal.

Irrigation systems, with their relative advantages and disadvantages are summarised in table 10.

A new system- or an upgrade – is an opportunity to take account of a wide range of factors. The “best” option will obviously depend on the type of farming system (perennial, annual, field crop, tree crop, pasture, need for crop rotation etc.), but many other factors can also be considered when making the decision on which system to invest in, including:

- **Water use efficiency.** Unilever considers this to be a priority issue that must always be taken into account. Even where there is currently no competition between irrigation requirements, local communities and ecosystem health for water resources, it is likely that competition will arise in the future;
- **Return on investment** (including factoring in likely increases in the cost of fuel for pumping and the charge made for the water);
- Long-term **water availability**;
- Ease of **maintenance and calibration**;

- Pump **fuel use efficiency**;
- Water and power **infrastructure** and reliability;
- **Adaptability** to different cropping and pasture systems (including farm geography, pest and disease management, crop rotations, and location of perennial crops);
- **Soil** characteristics; and
- Risk of **salinisation**,
 - In shallow saline ground water conditions, improvement in irrigation management, e.g. moving from furrow or sprinkler irrigation to drip irrigation, can allow seasonal water applications to be closely matched to the seasonal crop water use. This reduces drainage below the root zone, thus preventing the water table rising further and increasing soil salinity; and
 - If 'grey' water is being used for irrigation, or soils have relatively a high soluble mineral content, and there is no shallow saline groundwater it may be necessary to over-irrigate to reduce the risk of soil salinity or build-up of minerals, or the development of a hard pan within the soil.

New flood-irrigation (and water-inefficient centre-pivot) systems will be difficult to justify on a water-use-efficiency basis. Water-conserving options such as sprinkler and drip are likely to be more sustainable in the longer term as water conservation receives a higher priority in most parts of the world.

F48	Expected. Sustainable irrigation water supply
There must be good evidence that the water supply for the irrigation system is sustainable for the foreseeable future. Not applicable to smallholder farmers.	
Climate Smart Agriculture	
Demonstrating that the operations do not lead to any net loss in the existing water level, will secure long-term productivity of the farming practices and promote resilience to future change.	

It is, of course, possible for water abstraction and harvesting to be legal (See criterion F40) but unsustainable. This criterion is applicable to both surface and groundwater sources.

Farmers themselves must be assured, as far as possible, that their irrigation water will remain available for the foreseeable future. Whereas criterion F44 was designed to promote equitable water distribution in a catchment (i.e. The farm(s) do not appropriate available water at the expense of local communities and others with legitimate claims on the supply), this criterion is designed to enable the farming business to be sustainable in the longer term.

The RSB (Roundtable for Sustainable Biomaterials) has developed a useful set of guidelines on evaluating water stress⁴ including the use of drought index parameters and maps.

Where there are issues, farmers and suppliers (Criterion S1 below) must work together to understand the situation and develop a sustainable water supply.

S1	Leading. Sustainable irrigation water supply
If the farmers irrigate, suppliers should talk to farmers and understand any concerns about water harvesting and water distribution. Suppliers should take a supportive role by taking these concerns to irrigation scheme managers, and also to influence scheme managers to improve water conservation and water use efficiency, protect biodiversity and natural ecosystems and protect the irrigation water from pollution. Suppliers should also be engaging with irrigation management to ensure that extraction and distribution patterns do not compromise drinking water and sanitary needs of local communities, or remove water from natural ecosystems that require it for healthy functioning.	
Climate Smart Agriculture	
By taking an active role in supporting farmers, lobbying and negotiating for a sustainable supply of water for both farmers and the local community can be ensured.	

Individual farmers – unless there is a catchment management programme in which they are engaged, often find it difficult to engage with government- or privately organised irrigation scheme management systems.

We therefore ask Unilever suppliers (perhaps via a farmers committee, co-operative management team or similar organisation) to take an active role in supporting farmers and lobbying and negotiating for a sustainable supply of water for both farmers and the local community.

F49	Expected. Irrigate in relation to crop or pasture requirements
Timing and amount of water applied must be tailored to crop requirements. This includes putting systems in place to avoid over-irrigation where this has no yield or quality benefit (including taking account of weather forecasts), and preventing contamination of water bodies with soil nutrients, fertilisers and pesticides or soil. There must be no tail water discharge, unless arranged specifically for the benefit of local people or the environment.	
Climate Smart Agriculture	
By attributing irrigation practices with crop and pasture requirements, water use can be efficiently managed, to avoid wastage.	

⁴ <http://rsb.org/pdfs/guidelines/RSB-GUI-01-009-01%20-v2.1%20RSB%20Water%20Assessment%20Guidelines.pdf>

The expectation is that the farm will manage its irrigation needs, taking into account a range of factors. For large farms, this will normally be a documented management system.

Timing and amount of irrigation must be tailored to crop requirements to meet planned yield and quality levels under the local conditions. Proper irrigation scheduling involves the application of water to crops only when needed and only in the amounts needed; that is, determining when to irrigate and how much water to apply. With proper irrigation scheduling, water stress from droughts, and the waste of water will not limit crop yields and energy used in pumping will be minimised. Other benefits include reduced loss of nutrients from leaching because of excess water applications, and reduced pollution of groundwater or surface waters from the leaching of nutrients.

Scheduling should take account of the “planned yield and quality levels”, both of which are affected by water availability. Before a scheduling system is set up, the aim of the system should be defined. In some cases, the decision may be taken to use slightly less water and achieve a slightly lower yield or quality, in others maximising yield or quality will be the most important factor. Unsustainable abstraction of groundwater (See criteria F40 and F41) should also be one of the determinants of how much water can be used without damaging the aquifer water quality, water supplies to local communities or ecosystems. With groundwater, the concept of “average sustainable yield” (based on average annual recharge) is a useful way to think of sustainable supply and therefore an important parameter in decision-making.

Irrigation scheduling methods range from intuition and basic calendar methods, which rely on the farmer’s past experience, to more technical solutions that use objective measures of crop evapotranspiration (the actual amount of water used by the crop) or soil moisture content. Several of these methods can be automated, using computing and tele-communications technology to alert growers as to when the crop requires irrigation. There are many local and international companies providing such systems, e.g. Netafim and Dacom¹⁰.

Mechanisms must be in place to ensure irrigation water is not over-applied (i.e. Above field capacity level) unless deliberately done to avoid salinization. If there is currently tail water discharge that is being used by communities or

by natural environment then community needs should be considered in all planning.

If sprinkler and overhead irrigation is used, and 24-hours per day application is not required, the timing of application should vary in order to minimise unproductive losses at times of high evapotranspiration (ET), e.g. when high wind speeds occur.

See table 11 on the next page for different irrigation scheduling methods.

F50	Leading. Impacts of irrigation of local communities
The farm should check on impacts of irrigation systems on local communities or natural ecosystems (for example lowering water tables to the extent that wells dry up, or increasing water tables leading to salinity issue). If such impacts have been found, the farm should be actively addressing the issue.	
Climate Smart Agriculture	
Implementing this criterion will support local people in their access to water to meet their basic needs for drinking, hygiene, while irrigation systems will not undermine the rights of local people without their free prior and informed consent, fair compensation and grievance mechanisms being in place.	

Water use should be socially, economically and environmentally sustainable. Local people must have access to enough water to meet (at least) their basic needs for drinking and hygiene, and irrigation systems should not undermine the water rights (including traditional water rights) of local people without their Free Prior and Informed Consent (See criterion F177 in the **Unilever Responsible Sourcing Policy for Farmers chapter**), fair compensation and grievance mechanisms being in place.

Application of standards such as the Water Stewardship Standard⁵ provide a useful structure for identifying and addressing this type of problem.

F51	Expected. Maintaining irrigation equipment
Equipment must be maintained and kept in good working order.	
Climate Smart Agriculture	
Blocked emitters or sprinklers, or variation in height of distribution points can dramatically reduce the overall efficiency of use of energy and water resources, with consequences for yield and product quality. Drip irrigation systems are particularly sensitive to poor maintenance.	

Proper installation and maintenance of irrigation and irrigation scheduling equipment is of the utmost importance to its function. Blocked emitters or sprinklers, or

⁵ <http://www.allianceforwaterstewardship.org/>

TABLE 11: DIFFERENT IRRIGATION SCHEDULING SYSTEMS					
Method	Measured parameter	Equipment needed	Irrigation criterion	Advantages	Disadvantages
Hand feel and appearance of soil	Soil moisture content by feel	Soil auger or core sampler	Soil moisture content	Easy to use; simple; can improve accuracy with experience	Low accuracies; field work involved to take samples
Gravimetric soil moisture sample	Soil moisture content by taking samples	Auger, caps, oven	Soil moisture content	High accuracy, often used to calibrate other methods	Labour intensive including field work; time gap between sampling and results
Capacitance/TDR	Change in capacitance of the soil depending on the moisture level	Capacitance probe (in-situ)	Soil moisture content	Real-time assessment of irrigation practice. Very little maintenance required	Care in installation as air gaps dramatically alter response; difficult in drier soils; several probes needed for representative sampling
Neutron probe	Change in speed in neutrons which corresponds to soil moisture	Neutron probe and several aluminium access tubes	Soil moisture content	No cables required; total rootzone moisture profile produced; very accurate when well calibrated	Expensive and operator license needed; labour intensive; accuracy questionable for shallow rooting crops; uses radiation (health risk)
Tensiometers	Soil moisture tension	Tensiometers including vacuum gauge	Soil moisture tension	Good accuracy; instantaneous reading of soil moisture tension	Labour to read; careful installation and maintenance required; breaks at tensions above 0.7 atm. Difficult to use in clay soils.
Electric resistance blocks	Electric resistance of soil moisture	Resistance blocks AC bridge (Meter)	Soil moisture tension	Instantaneous reading; works over larger range of tensions; can be used for remote reading	Affected by soil salinity; not sensitive at low tensions; needs some maintenance and field reading, but less than for tensiometers. Difficult to use in clay soils.
Wetting Front Detectors	Depth of water in the soil	Funnel-shaped instrument buried in soil	Moisture content at a particular depth.	Easy to use, low cost. Also stores sample of water to measure salinity and nitrate level	Low accuracy, simply guides the irrigation decision. WFDs in early stage of use, not much experience of method.
Water balance (Budget) approach	Climatic parameters: temperature, radiation, wind, humidity and expected rainfall, depending on model used to predict ET	Weather station or available weather information	Estimation of moisture content	No field work required; flexible; can forecast irrigation needs in the future; with same equipment can schedule many fields	Needs calibration and periodic adjustments, since it is only an estimate; calculations cumbersome without computer.
Modified atmometer	Reference ET	Atmometer gauge	Estimation of moisture content	Relatively cheap; easy to use, direct reading of reference ET	Needs calibration; it is only an estimation; only provides reference ET, so late in the season crop coefficients are needed to get actual crop ET, cannot be allowed to freeze.

variation in height of distribution points can dramatically reduce the overall efficiency of use of energy and water resources, with consequences for yield and product quality. Drip irrigation systems are particularly sensitive to poor maintenance. Suppliers of irrigation and scheduling systems should provide you with manuals, which provide details on suitable maintenance schedules and procedures. If the manual cannot be located, ask your local dealer or equipment manufacturer for a replacement.

Different irrigation and irrigation scheduling systems need calibrating at different intervals. Please check with your supplier for suitable calibration and testing procedures.

Some of this guidance was taken from the 1994 FAO Guide "Water Quality for Agriculture" (Adapted from University of California Committee of Consultants 1974).

F52	Expected. Calibrated equipment
Equipment must be calibrated and tested regularly. Not applicable to smallholder farmers.	
Climate Smart Agriculture	
Many irrigation systems worldwide do not apply the volume of water that the farmer thinks they are applying – and it is rare for the distribution to be as uniform as the farmer hopes. This can result in wasted water, which may waterlog soils leading to reduced productivity.	

Many irrigation systems worldwide do not apply the volume of water that the farmer thinks they are applying – and it is rare for the distribution to be as uniform as the farmer hopes.

Some of the reasons for this are linked to a lack of understanding about how water pressure varies in different parts of the system (due to topography, or the piping/manifold systems in place) or at different time of year when river levels or water tables have fallen. High wind-speeds also affect water distribution from sprinkler systems.

Farmers should understand the variation in water supply and distribution in their systems, how that actual volume of water supplied relates to any meters in the system (or to the time for which water is available in many more traditional water distribution systems), and how the distribution of water varies in different parts of the field.

Methods to do this can be very simple, e.g. using cans to catch water from emitters or placed between crop plants or on pasture for sprinkler systems.

F53	Expected. Irrigation records
Irrigation records shall be kept for the Unilever crop showing at least: a) Time b) Date c) Land area irrigated d) Quantity of water used	
Not applicable to smallholder farmers.	
Climate Smart Agriculture	
The capturing of quantitative data, allows for analysis of multi-year trends in water consumption and behaviour. Interpretation can identify useful measures to improve further usage and target setting to drive continuous improvement over time.	

Ideally, irrigation should be scheduled based on evapotranspiration calculations /monitoring, combined with crop or pasture-specific criteria and in combination with weather forecasts – and records kept of these data as well.

Note that, where calibration of pressure gauges or flow times is required (See criterion F52) to determine the quantity of water used, then the calibration information should also be included in the records. Evaluating records is an important part of evaluating the potential for improvements.

F54	Expected. Irrigation water quality
Irrigation water quality must be monitored and managed where necessary to avoid crop or soil damage. Sources of water shall be regularly analysed for their microbiological, chemical and mineral content, and properly managed in accordance with the analysis results. Such analysis can be done for a group of farms that are using the same water source(s). Not applicable to smallholder farmers.	
Climate Smart Agriculture	
Knowledge of irrigation water quality is critical to understanding management for long-term productivity. In some regions, water quality can influence productivity more than soil fertility, crop variety, weed control and other factors.	

Irrigation water quality must be monitored and managed where necessary to avoid crop damage, crop or soil contamination or soil damage through contamination or erosion.

It is particularly important to be sure of high-quality irrigation water where there is a risk that irrigation will contaminate a crop (e.g. with heavy metals or CPP residues) that may make the product unsaleable.

Knowledge of irrigation water quality is critical to understanding management for long-term productivity. In some regions, water quality can influence productivity more than soil fertility, crop variety, weed control and other factors.

The main water quality related problems are:

- Salinity (causing reduction in water availability and reduction in yield);
- Sodicity (and resultant drop in infiltration rate);
- Specific ion toxicity (e.g. sodium, calcium, boron); and
- Other (e.g. excessive nutrients, anthropogenic pollutants).

Salinity

Salinity is the presence of soluble salts in or on soils, or in water applied to soils. Yield reductions occur when the salts accumulate in the root zone to such an extent that the crop is no longer able to extract sufficient water from the salty soil solution, resulting in a water stress for a significant period. In irrigated agriculture, salinity problems are exacerbated by shallow water tables.

The measure to monitor with respect to salinity is the EC (Electrical conductivity, deci-Siemens per metre (dS/m)) or TDS (total dissolved solids, reported in milligrams per litre (mg/l)). Guidelines for the EC and TDS of irrigation water are found in Table 12 below.

Sodicity

Sodicity, a high proportion of sodium in the soil or water relative to other cations, degrades soil properties by making the soil more dispersible and erodible, restricting water entry and reducing the ability of the soil to conduct water.

This reduces water availability and hence yield, but these factors limit leaching so that salt accumulates over long periods, giving rise to saline subsoils. Furthermore, a soil with increased dispersibility becomes more susceptible to erosion by water and wind.

The measure to monitor with respect to sodicity is the SAR (sodium adsorption ratio).

Toxic Ions

Toxicity problems can occur if certain constituents (ions) in the soil or water are taken up by the plant and accumulate to concentrations high enough to cause crop damage or reduced yields. The degree of damage depends on the uptake and the crop sensitivity, and often occurs at relatively low ion concentrations for sensitive crops. It is usually first evidenced by marginal leaf burn and chlorosis, but if accumulation is great enough, reduced yields result. The ions of importance are usually chloride, sodium and boron. Boron sometimes results from perborate, a bleaching agent, used in some household products. Units are commonly milli-equivalents/litre (me/l).

Other contaminants

Other irrigation water quality problems may arise from anthropogenic pollutants deriving from agriculture, industry or domestic use of chelating agents, heavy metals, biocides or CPPs, or from human and animal pathogens (including enteric bacteria). National and international guidelines exist for several such contaminants. Further information should be available from local water-testing facilities.

TABLE 12: DIFFERENT IRRIGATION SYSTEMS

Type	System	Pros	Cons	Comments
Surface	Furrow or flood	Minimal capital investment or energy costs, less affected by climatic and water quality factors. Easy to see the effectiveness of the system.	Tend to be less efficient than other systems, labour intensive and sometimes difficult to engineer. Can be higher disease pressure (especially flood).	Drainage can also be a problem in some circumstances.
Sprinkler	Portable or fixed sprinklers e.g. centre-pivot	Can work at low pressures, saving energy. Can achieve high uniformity of application, thus water efficient if combined with scheduling system. Easy to apply frequent light irrigation.	Higher capital costs than rainguns. Need to take care in windy conditions that uniformity is not distorted.	Portable systems require higher labour costs in moving them. Fixed systems cheaper to manage.
	Booms	High precision and uniformity. Low pressure so low energy requirements.	Not suitable for uneven topography or irregular shaped fields. High application rates, so may cause run-off losses on low infiltration rate soils.	
	Rainguns	Robust, versatile, labour efficient	Can waste significant water and energy if not managed well. Soil splash can damage fragile crops. Application not uniform.	Wastage can be reduced by appropriate pressure, placement and use in non-windy conditions
Micro-irrigation (drip and micro-sprinkler)	General points	Accurate, energy and water efficient, easily automated, can increase yields and quality, fewer weed problems.	Can be expensive and more difficult to maintain (but see Box 2 on low-cost options). Difficult to 'see' the effectiveness of the system, trust needed in sensor technology.	Water can still be wasted with micro-irrigation, management still very important.
	Drip/trickle	As above in 'General points'	Good management needed to prevent emitters blocking.	
	Micro-sprinklers	Good on sandy soils (emit water over a greater surface area) or where water quality is a concern (blockages less likely)	More prone to physical damage than drip systems.	Primarily used for tree and vine crops.

Monitoring Plan

Table 12 below shows guidelines for the common irrigation quality criteria.

TABLE 13: IRRIGATION WATER QUALITY GUIDELINES

Potential Irrigation Problem				Units	Degree of Restriction on Use		
					None	Slight to Moderate	Severe
Salinity(affects crop water availability) ²							
	EC _w			dS/m	< 0.7	0.7 – 3.0	> 3.0
	(or)						
	TDS			mg/l	< 450	450 – 2000	> 2000
Infiltration (affects infiltration rate of water into the soil. Evaluate using EC _w and SAR together) ³							
SAR	= 0 – 3	and EC _w	=		> 0.7	0.7 – 0.2	< 0.2
	= 3 – 6		=		> 1.2	1.2 – 0.3	< 0.3
	= 6 – 12		=		> 1.9	1.9 – 0.5	< 0.5
	= 12 – 20		=		> 2.9	2.9 – 1.3	< 1.3
	= 20 – 40		=		> 5.0	5.0 – 2.9	< 2.9
Specific Ion Toxicity (affects sensitive crops)							
	Sodium (Na) ⁴						
	surface irrigation			SAR	< 3	3 – 9	> 9
	sprinkler irrigation			me/l	< 3	> 3	
	Chloride (Cl) ⁴						
	surface irrigation			me/l	< 4	4 – 10	> 10
	sprinkler irrigation			me/l	< 3	> 3	
	Boron (B) ⁵			mg/l	< 0.7	0.7 – 3.0	> 3.0
Miscellaneous Effects (affects susceptible crops)							
	Nitrogen (NO ₃ - N) ⁶			mg/l	< 5	5 – 30	> 30
	Bicarbonate (HCO ₃)						
	(overhead sprinkling only)			me/l	< 1.5	1.5 – 8.5	> 8.5
	pH				Normal Range 6.5 – 8.4		

There are also many local factors to take into account in any monitoring plan, for example:

- Water sources contaminated with industrial effluent may be at high risk of contamination with certain industrial chemicals, heavy metals, CPPs, pathogens, algae or nutrients. If there are tanneries, dyeworks, pulp mills, chemical works, and plating plants that discharge now (or did so in the past) into ground or surface water locally, the particular pollutants associated with the process need to be checked;
- If 'grey' water or wastewater is used for irrigation, enteric pathogens, biocides, detergents and/or boron may be problematical. Wastewater can arise from irrigation and rainfall (see above), from yard and workshop washing and from basic processing operations that may take place on-farm. Risks of pollution arising from discharge of wastewater must be assessed and managed accordingly on a case-by-case basis. Waste from milk parlours, for example, has a high pollution potential and generally requires full treatment in local sewage treatment plants; Water used for vegetable washing may be recycled and/or returned to the land and may be appropriate for irrigation; and
- Geologically acquired pollutants such as arsenic (e.g. in parts of Bangladesh) may contaminate groundwater.

The following steps should be followed in putting together a monitoring plan:

- 1 Identify the likely problems in your local area or irrigation water source;
- 2 Identify the tolerance limits for the potential contaminant(s) – see above list but also local regulations;
- 3 Identify a suitable test methodology or local provider of water testing services (any provider should have some sort of quality accreditation);
- 4 Identify the necessary monitoring frequency and relevant timing (seasonality) for sampling – this will vary between contaminants;
- 5 Identify management actions required in the case of 'out-of-spec.' results; and
- 6 Ensure that the necessary monitoring takes place and ideally those records are kept. At a minimum, this would be a basic quality assessment (water analysis).

Lay out the monitoring programme as part of the irrigation management system

National water quality standards should be adhered to or if none, FAO or USDA standards should apply. Particular attention needs to be paid to prevention of salinisation and sodicity through use of poor quality water.

The expectation is that, for smallholder farmers or even larger farms that are part of an irrigation scheme, water quality risk management will take place at the level of the water supply to the group of farmers; this may mean that Unilever suppliers have to take responsibility for this criterion if individual farmers are unable to do so.

APPENDIX 4A: REFERENCES AND FURTHER INFORMATION

General

Environmental Agency (2007) "Waterwise on the farm – A simple guide to implementing a water management plan" (simple and clear guide to managing water use and water pollution on all farm types).

<http://adlib.eversite.co.uk/resources/000/030/426/water-wise.pdf>

Santa Clara Valley Water District Handbook for Agricultural Water Use Efficiency (excellent practical guide to implementation of irrigation scheduling and management).

<http://www.valleywater.org/programs/agriculture.aspx>

FAO Irrigation Water Management Training Manual no. 1 - Introduction to Irrigation (1985).

<http://www.fao.org/docrep/R4082E/r4082e00.HTM>

FAO Irrigation Water Management Training Manual no. 9 - Drainage of Irrigated Land (1996).

<ftp://ftp.fao.org/agl/aglw/fwm/Manual9.pdf>

Colorado State University Bulletin #XCM-173 (August 1994)

- Best Management Practices for Irrigation Management (short, practical best management guide for different types of irrigation systems and good introduction to basic concepts).

<http://www.ext.colostate.edu/Pubs/crops/xcm173.pdf>

Protecting Water Quality

Livestock

Water Quality Risk Assessment Tool for Animal Operations (Washington State University Extension Service).

<http://www.animalag.wsu.edu/water%20quality/riskas-sessw-contacts5105.pdf>

Ontario Ministry of Agriculture Food and Rural Affairs Factsheet on Livestock Access to Water – April 2008.

<http://www.omafr.gov.on.ca/english/livestock/beef/facts/08-013.htm>

Water Charging

FAO Water Reports 28 – Water Charging in Irrigated Agriculture – An analysis of international experience (2004). <ftp://ftp.fao.org/agl/aglw/docs/wr28e.pdf>

Climate Change and Water

IPCC Technical Paper VI – Climate Change and Water (June 2008). <http://ipcc.ch/pdf/technical-papers/climate-change-water-en.pdf>

Rainfall Effectiveness

FAO Irrigation and Drainage Papers 25 – Effective rainfall in irrigated agriculture (1978).

<http://www.fao.org/docrep/x5560e/x5560e00.htm>

Maintaining Soil Organic Matter

FAO Soils Bulletin 80 – The Importance of Soil Organic Matter (2005). <http://www.fao.org/3/a-a0100e.pdf>

USDA Soil Quality Technical Note No. 5 Managing Soil Organic Matter-The Key to Air and Water Quality (October 2003).

http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_050965.pdf

Water Harvesting

FAO Training Course "The basics of water harvesting" by the Natural Resource Management and Environment Department:

<http://www.fao.org/docrep/u3160e/u3160e03.htm>

Zhu, Q & Li, Y (2004) Rainwater harvesting – an alternative for securing food production under climate variability.

www.ncbi.nlm.nih.gov/pubmed/15195433

Choosing an irrigation system

FAO Irrigation Water Management Training Manual no. 5 – Irrigation Methods (1988).

<ftp://ftp.fao.org/agl/aglw/fwm/Manual5.pdf>

UK Irrigation Association booklet “Switching Irrigation Technologies” (2007).

<http://www.ukia.org/pdfs/switching%20technologies.pdf>

Irrigation Scheduling

Colorado State University Extension Service Fact Sheet no. 4.708.

<http://extension.colostate.edu/topic-areas/agriculture/irrigation-scheduling-the-water-balance-approach-4-707/>

Oregon State University Malheur Experiment Station – Efficient Irrigation Scheduling.

<http://ir.library.oregonstate.edu/xmlui/bitstream/handle/1957/37465/em8783.pdf>

FAO Water Reports 8 – Irrigation Scheduling from theory to practice (1999).

<http://www.fao.org/docrep/w4367e/w4367e00.htm>

Soil Water Monitoring and Management (Washington State University Extension Service).

<http://irrigation.wsu.edu/Content/Fact-Sheets/Soil-Monitoring-and-Measurement.pdf>

Water budget approach guide (from Irrigation Scheduling in Tomatoes – An Introduction, April 2008, Ontario Ministry for Agriculture, Food and Rural Affairs).

<http://www.omafr.gov.on.ca/english/crops/facts/08-011.htm>

Irrigation Water Quality Guidelines

FAO – Water Quality for Agriculture (1994).

<http://www.fao.org/DOCRp/003/T0234e/T0234e00.htm>

Colorado State University Extension Service Factsheet 0.506 - Irrigation Water Quality Criteria.

<http://irrigationtoolbox.com/ReferenceDocuments/Extension/Extension%20Document%20List.doc>

Australian and New Zealand Guidelines for Fresh and Marine Water Quality – Chapter 4 Primary Industries (2000).

<https://www.environment.gov.au/system/files/resources/53cda9ea-7ec2-49d4-af29-d1dde09e96ef/files/nwqms-guidelines-4-vol1.pdf>

Maintenance of Surface irrigation systems

North Carolina State University Cooperative Extension Service ‘Winterization and Maintenance of Sprinkler Irrigation Equipment’. <https://www.ces.ncsu.edu/>

Maintenance of drip irrigation systems

Kansas State University Agricultural Experiment Station and Cooperative Extension Service (April 1996) Maintaining Drip Irrigation Systems.

<https://www.bookstore.ksre.ksu.edu/pubs/MF2178.pdf>

Deficit Irrigation

FAO Water Reports 22 – Deficit irrigation Practices (2000).

<http://www.fao.org/docrep/004/y3655e/y3655e00.HTM>

Partial Root Drying (PRD)

Stikic, R. et al (2003) Partial Root Drying (PRD): A new technique for growing plants that saves water and improves the quality of fruit. Bulg. J. Plant Physiol., Special Issue, 164–171.

http://www.bio21.bas.bg/ipp/gapbfiles/essa-03/03_essa_164-171.pdf

Bacon, M. A. et al. Food crop production using partial root drying (PRD): the facts and the fiction. Abstract of a presentation from the WUEMED Workshop (Improving Water Use Efficiency in Mediterranean Agriculture: what limits the adoption of new technologies?) Rome, September 2005.

Spill water Recycling

Kamamma, N. et al. Spill-water recycling. Paper given at the 20th WEDC Conference, Colombo, Sri Lanka 1994

Wastewater use for irrigation

WASTEWATER REUSE – RISK ASSESSMENT: THE ISRAELI CASE STUDY Yosef Dreizin, PhD, Water Commission, ISRAEL

https://www.researchgate.net/publication/237314237_WASTEWATER_REUSE_-_RISK_ASSESSMENT_THE_ISRAELI_CASE_STUDY

Wastewater treatment and use in agriculture - FAO irrigation and drainage paper 47 (1992).

http://eprints.icrisat.ac.in/8638/1/RP_07946_wastewater_treatment.....pdf

APPENDIX 4B: IRRIGATION SYSTEMS

This section outlines the different irrigation systems in use, advantages/disadvantages and circumstances under which they may be suitable. See also the FAO 'Introduction to Irrigation' and 'Irrigation Methods' documents and the UK Irrigation Association booklet "Switching Irrigation Technologies" in [Appendix 4A of this document](#).

Table 3 provides a summary of pros and cons of the different systems.

B.1 Surface irrigation

Surface irrigation is the application of water to the fields at ground level. Either the entire field is flooded or the water is directed into furrows or borders. It is one of the most basic forms of irrigation and has been practiced for thousands of years. These systems require minimal capital investment and since gravity is used to move the water, energy costs are minimal. They are also less affected by climatic and water quality factors. However, these systems depend on soil characteristics for their function, and soil variability and variation in surface topography (whether the soil is 'bumpy' or not) creates difficulties both with design and management. Although not inevitable, surface systems tend to be less water efficient, and this is exacerbated by poor design and and/or irrigator judgement. They also tend to be labour intensive and applying light, frequent irrigation early and late in the season is very difficult.

Flood Irrigation

The application of irrigation water where the entire surface of the soil is covered by water.

Furrow irrigation

Furrows are narrow ditches dug on the field between the rows of crops. The water runs along them as it moves down the slope of the field.

Border irrigation

In border irrigation, the field to be irrigated is divided into strips (also called borders or borderstrips) by parallel dykes or border ridges. The water is released from the field ditch onto the border through gate structures called outlets.



University of Arizona. Credit: John C. Palumbo

Figure 3. Furrow irrigation

Basin irrigation

Basins are horizontal, flat plots of land, surrounded by small dykes or bunds. The banks prevent the water from flowing to the surrounding fields. A common system for rice paddies and certain trees.

Table 3. Different Irrigation systems

Type	System	Pros	Cons	Comments
Surface	Furrow or flood	Minimal capital investment or energy costs, less affected by climatic and water quality factors. Easy to see the effectiveness of the system.	Tend to be less efficient than other systems, labour intensive and sometimes difficult to engineer. Can be higher disease pressure (especially flood).	Drainage can also be a problem in some circumstances.
Sprinkler	Portable or fixed sprinklers e.g. centre-pivot	Can work at low pressures, saving energy. Can achieve high uniformity of application, thus water efficient if combined with scheduling system. Easy to apply frequent light irrigation.	Higher capital costs than rainguns. Need to take care in windy conditions that uniformity is not distorted.	Portable systems require higher labour costs in moving them. Fixed systems cheaper to manage.
	Booms	High precision and uniformity. Low pressure so low energy requirements.	Not suitable for uneven topography or irregular shaped fields. High application rates, so may cause run-off losses on low infiltration rate soils.	
	Rainguns	Robust, versatile, labour efficient	Can waste significant water and energy if not managed well. Soil splash can damage fragile crops. Application not uniform.	Wastage can be reduced by appropriate pressure, placement and use in non-windy conditions
Micro-irrigation (drip and micro-sprinkler)	General points	Accurate, energy and water efficient, easily automated, can increase yields and quality, fewer weed problems.	Can be expensive and more difficult to maintain (but see Box 2 on low-cost options). Difficult to 'see' the effectiveness of the system, trust needed in sensor technology.	Water can still be wasted with micro-irrigation, management still very important.
	Drip/trickle	As above in 'General points'	Good management needed to prevent emitters blocking.	
	Micro-sprinklers	Good on sandy soils (emit water over a greater surface area) or where water quality is a concern (blockages less likely)	More prone to physical damage than drip systems.	Primarily used for tree and vine crops.

B.2 Sprinkler irrigation

Irrigation systems that create 'artificial rain'. Includes rainguns, solid-set rotary sprinklers, portable rotary sprinklers, mobile booms.

Rainguns

Hose-reel rainguns are commonly used in Northern Europe and the North-eastern United States, providing a robust, versatile and labour efficient system. However they can be inefficient if not managed well, with some areas of the field receiving too much water, others not enough. Water pressure tends to be higher than other methods, so energy costs are also higher. Careful management of placement, pressure and time of use (i.e. not when it is windy) is required. With good management research has shown that wastage can be reduced to about 10%

Sprinklers

Sprinklers can be portable, or fixed in position (solid set). Both systems can give uniform and precise applications, and work under lower pressures than rainguns, hence saving energy. Fixed sprinklers reduce labour costs as they remain in place for the entire season (or longer in perennial crops). Care must be taken to avoid larger spacings in more sensitive crops, where prevailing winds could reduce uniformity. The most common form of sprinkler irrigation is the centre-pivot system, a self-propelled sprinkler irrigation system that rotates around a central point.

Booms

Mobile boom systems apply water precisely, especially when they spray water directly onto the crop canopy, avoiding problems associated with wind drift. Pressures are again lower than with rainguns, so energy requirements are lower. Recent design improvements produce fine sprays that avoid soil splash for more delicate crops. They are easy to set-up and manoeuvre and can cover wide strips. However, they are not well suited to uneven topography or irregularly-shaped fields. Application rates are high so care is required to avoid run-off on low infiltration rate soils.

B.3 Micro-irrigation

All micro-irrigation systems enable farmers to apply small quantities of water to crops at frequent intervals. Only part of the soil profile is wetted, so frequent irrigation is needed. Fertiliser can be added to the water, thus delivering an efficient nutrient supply. Low operating pressures (even lower than for sprinkler and booms) enable lower energy usage and easy automation means savings in labour. However, it is difficult to 'see' what is happening in the soil with micro-irrigation, so most farmers rely on instruments to monitor water applications (flow meters, timers and pressure gauges) and water movement and wetting (soil moisture probes).

Micro-irrigation is adaptable to a wide range of agroclimates, soils and crops, and is increasingly used for seasonal crops such as field-scale vegetables. It is used in many countries where water is scarce, but also where soil and water quality are poor and where labour is scarce or expensive.

Micro-irrigation is often seen as the high-tech irrigation option, involving high capital investment. In many cases this is true; however, cheaper, lower tech versions do exist (see Box 2 (below) on low cost drip solutions developed by International Development Enterprises and used by small farmers in India). Growers should therefore not necessarily see cost as a hurdle if micro-irrigation would seem to suit their situation.

It is also often assumed that micro-irrigation will necessarily save water. While this is often true, savings can be marginal in some circumstances. Crops still need a certain amount of water to grow, and this is determined by the crop and the evaporating conditions, not by the irrigation method.

Drip/Trickle irrigation

Two main types of drip irrigation exist - point-source and line-source.

Point-source systems consist of small diameter plastic pipes with specially designed emitters to deliver water to each plant.

Point-source emitters and supply lines may be installed on the ground surface or buried a few inches beneath the surface. For widely spaced crops such as tree crops, the emitter lines are usually buried to prevent physical damage to the system and to facilitate field operations such as spraying and harvesting.

Line-source drip systems consist of thin-walled polyethylene tape with discreet outlet points built in. The outlets may be anywhere between 10 cm and 60 cm apart, and the end result is a continuous wet strip that makes this product

ideal for watering rows of closely spaced crops or nursery plants. When used for growing vegetables or strawberries, drip tape is often used with a production practice known as *plasticulture*. The crops are planted on a raised bed covered with a plastic mulch. The drip irrigation tape is installed in the centre of the bed at the same time the plastic mulch is laid. The drip tape may be installed on top of the bed directly under the mulch or around 5 cm (~2 inches) beneath the soil surface to help prevent rodent damage. The drip irrigation tape is used to supply water underneath the mulch. Fertigation is also common with this system.

In all drip systems, emitters can block with dirty water, chemical precipitates, algae and bacterial slimes, but this can be prevented with filtration, chemical injection and good in-field management.



Box 2. Cheap Drip Irrigation¹⁴

KB drip (Krishak Bandhu/Farmer's friend) was developed by International Development Enterprises (IDE) in India as an alternative to expensive systems that were often poorly suited to their farm size or water infrastructure. KB systems consist of drip tape (UV-resistant plastic tube tape) with micro-tube emitters, connected to a tank, bucket or even a water bag. To date more than 85,000 kits have been sold to small farmers in India. The system frees them from the uncertainties of rainfed agriculture, and provides them with an alternative to high water-use irrigation alternatives such as flood irrigation.

Micro-sprinkler systems

Micro-sprinkler systems are very similar to drip irrigation systems except that, rather than discharging water at discreet points, the water is sprayed out through a small sprinkler device. These micro-sprinklers are typically made of plastic and are available in a multitude of flow rates and spray patterns. One advantage of the micro-sprinklers compared to drip irrigation is that they disperse the water over a larger surface area. This is especially advantageous on sandy soils where water applied from a drip emitter tends to move vertically downward, which can cause insufficient root volume being irrigated. Micro-sprinklers may also be advantageous over drip irrigation where water quality is a concern. Because they have larger orifices than drip emitters, micro-sprinklers tend to be less prone to clogging. Since the water is sprayed above ground, a farmer can more easily detect when he has a problem.

For more information see:

<http://www.ide-india.org/ide/aditi.shtml>

APPENDIX 4C: NATIONAL LEGISLATION

Brazil

Brazilian legislation covers several aspects; the main issue is when the growers ask for permission to exploit the water they have in their farm. In this case a group of experts check the reservoir around the margins. Specific legislation differs between states - some demand 20 metres of trees beside rivers (margins, or both sides of the river), others demand 50 or 100 metres. Usually the growers seek advice from specialised companies, e.g. to calculate the volume of water and the capacity of water storage. They need to detail inputs of the crops, equipment used and volume of water required.

Growers also need to apply for 3 or more licenses to operate: a water usage license, a license for the reservoir and a license for the equipment, plus the environmental license. A license is also required if growers want to dig a well for drinkable water. Obtaining these licenses is a slow process with high information demands.

In the state of Goiás, there is no charge for water, but water charging is used in some states, e.g. São Paulo and Minas Gerais. In the future it is likely that most states will charge for water. The main cost is incurred from electricity for pumping water. Several growers ask for a "green charge"; the tariff is lower per kilowatt, but they have to use the irrigation only at specific times, especially during the night.

Legislation:

- National Plan for Water Resources (Plano Nacional de Recursos Hídricos/PNRH); provided for in Law n.º 9433/97, which should be implemented together with other municipal, state and federal policies for the purpose of ensuring a true joint management of water resources and land use

Relevant agencies:

- Ministry of the Environment, Secretariat of Water Resources and Urban Environment (Made up of three departments: the Department of Water Resources, the Department for Revitalization of Hydrographic Basins, and the Department of the Urban Environment);
- National Water Agency (ANA);
- National Council for Water Resources (Conselho Nacional de Recursos Hídricos).

China

Legislation governing water was first introduced in 1988 and revised in 2002.

Compared to the old one, the new version is clearer in rights and responsibilities, and more practical in implementation. It now covers all key areas (8 chapters: 1. general regulation; 2. water resource planning; 3. water use; 4. water facility protection; 5. water ration system & water saving; 6. Disputes' handling & law enforcement, monitoring and inspection; 7. legal responsibility 8. Appendices).

Despite significant improvements with the new version, there are still big challenges to full implementation of the law. There are still some grey areas where rights and responsibilities are not so clear, but shortage of resources for law enforcement is another important reason.

Ghana

The major law that guides the regulation and management of water resources in Ghana is the Water Resources Commission (WRC) Act - Act 522 of 1996. Section 12 of the Act states that "the property in and control of all water resources is vested in the President on behalf of the people of Ghana". The Water Resources Commission (WRC) of Ghana is the regulatory and control agency responsible for use of water resources through granting of water rights and water use permits. The legal situation is thus clear for those who care to know and is practical.

In general, awareness of the law has been low but in recent times, workshops and newspaper publications of activities of the WRC are beginning to make some impact.

Enforcement has also been limited, but more recently there have been newspaper reports of significant water users albeit of good standing and warnings for those who do not have permits, to comply or be sanctioned.

The Commission has a website from which all the necessary information, including permit application forms, can be accessed.

Kenya

Control of water resources is covered by the **Water Act of 2002** - this sets out issues of ownership and control of water, water resource management e.g. requirements for permits, catchment area protection, preservation of underground water, national monitoring etc. This is read in conjunction with the **Environmental Management Co-ordination Act – 2006**, under which the Minister in charge has issued a legal notice on water with regulations for:

- protection of sources of water for domestic use;
- water for industrial use and effluent discharge;
- water for agricultural use.

The 2006 Act also has schedules on specific standards and quality monitoring for domestic water, industrial, irrigation, effluent, recreational water etc.

Regulatory authorities have in the recent past tried to enforce the law but this is yet to be fully effective.

The Netherlands

There are 2 pieces of legislation - the Nitrate Directive and the European Water Framework Directive (EWFD). These regulations focus on water quality aspects, mainly with respect to nitrogen and phosphate.

The legal situation for farmers is clear, although regulations (e.g. with respect to the use of artificial fertiliser and animal manure) are becoming increasingly strict. Farmers have serious concerns that the balanced fertilisation for phosphate has serious impacts on yield and quality

Both pieces of legislation are well implemented and enforced. For more information see: http://www.kaderrichtlijnwater.nl/service_functies/english/

Tanzania

Legislation that addresses water use in Tanzania includes the Environmental Management Act 2004, Water Utilization and Regulation Act 1974 and the Forest Act 2002. The issues addressed in the acts in regard to water are straightforward and include: prohibition of human activities in certain areas such as river banks, prohibition of water pollution and discharge of hazardous substances to water; water quality standards; water utilization rights and conservation of water catchment areas. The Acts cover a range of stakeholders, thus implementation and enforcement is ongoing.

USA

Two main pieces of legislation cover water regulation in the US:

- Clean Water Act;
- Safe Drinking Water Act;

In each one of these, there is very specific legislation outlining water quality, direct discharge, non-point source pollution and other relevant regulations. Each state has an option to make their own regulations as strict as or stricter than the Federal programmes. For example, storm-water discharge regulations fall under the Clean Water Act that are implemented on the state level, if a state chooses to enforce those laws and if they are funded to do so.

In general, water legislation is clear and enforced. In some areas of California, the regulation of ground-water pumping is still not clear but is being addressed as the water levels/availability go down.



5 BIODIVERSITY AND ECOSYSTEM SERVICES

We ask the farmers who supply our raw materials (and/or our suppliers, working with the farmers that supply them) to consult locally on the most appropriate actions to take and to **engage in programmes that link their farming activities with benefits to biodiversity and/or ecosystem service** provision. This shall be documented in the form of a Biodiversity Action Plan (BAP).

This chapter aims to provide growers and suppliers with some general principles for good biodiversity management on and around farmland, and practical advice on how to achieve the standards laid out in the Biodiversity and Ecosystem Services section of the Code. The underlying philosophy is to try to ensure that the farms that supply Unilever raw materials are not contributing to “net loss” of ecosystem services or wildlife habitat.

Farmland obviously has agricultural value – but is also valuable for biodiversity conservation and for the “ecosystem services” that it provides. Unilever recognises The Convention on Biological Diversity’s (1992) three fundamental objectives for biodiversity, where are the conservation of biodiversity, sustainable use of biological resources, and equitable sharing of biodiversity benefits.

The biodiversity value is particularly high in parts of the world where:

- Farming has played an important part in the landscape for thousands of years, and therefore plants and animals have evolved within a farmed landscape; or
- The land is adjacent or near to areas of high conservation value, and activities on farms can help enhance the conservation value; or
- Land use change has transformed or fragmented the landscape.

Ecosystem services provided by farmland (and sometimes of value within the farm as well as outside) include:

- Bees as pollinators;
- Raptors and other birds as pest-controllers (e.g. eating rats in tomato fields, or feeding on insect pests of cattle and vegetables);
- Wetlands and riparian strips as pollution-filters preventing toxic or polluting substances arising from farm practices entering rivers and water supplies. These areas may also have value as floodplains, thereby limiting flooding downstream; and
- Maintaining the underlying genetic diversity that plant and animal breeders take advantage of to improve yield, quality, enhance pest and disease resistance and extend the growing season.

Maintaining the “standing biomass” of farmland is one of the most important ecosystem services that farmers provide, as the soil, patches of forest, woodland and wetlands on farms, and crops (particularly perennial tree crops and pasture), “lock up” vast amounts of carbon worldwide. Around 15% of Greenhouse Gas (CO₂-equivalent) emissions – and therefore climate change impacts – are estimated to come from deforestation. This is why Unilever has committed to a “no net deforestation” commitment for our supply chains, and why *land conversion involving deforestation is not acceptable on farms that supply Unilever*.

Why is good biodiversity management important?

Good biodiversity and ecosystem services management is important for Unilever because:

Biodiversity enhances the resilience of agri-ecosystems, making them more resilient to stress and shocks

It “adds value” to farm products

Part of the value of Unilever branded products is the assurance to our customers and consumers that the products are of high quality and safety. Our brand reputation is dependent on care for people and the environment all along the supply chain, starting with the farms and farmers who produce our raw materials.

Whereas good soil management, pollution reduction measures and eco-efficiency have value for farms and other businesses along our supply chains, and many external stakeholders understand their wider value, good biodiversity and ecosystem service management is a little different. Good biodiversity management has the potential to create stories that actually enhance brand value. Conversely, of course, poor biodiversity management can severely damage the reputation of an ingredient in our products or of the brand as a whole.

Our minimum expectation of our suppliers are therefore that, worldwide, farming systems that produce Unilever raw materials should:

- Avoid polluting or destroying important areas for biodiversity both inside and outside farms; and
- Prevent illegal hunting (or hunting for rare or endangered species) from taking place on farms.

However, although these actions can, in some parts of the world, be difficult to achieve, they are not sufficiently pro-active to “add value” to a product. This is one of the reasons why we ask all our suppliers to also take positive action, and engage in some form of pro-active biodiversity work, closely linked into the local biodiversity issues and the farming communities and farmed landscape in the area.

Programs that link farming activities with biodiversity conservation contribute to the reduction or elimination of threats to biodiversity. This will result in better conservation of species (including rare species) and support a wide range of ecological processes that provide ecosystem services (such as the provision of clean water or carbon sequestration).

For farmers must be seen as responsible custodians of the land

Twenty-five years ago, many commercial farmers around the world saw themselves as producers; the farm was their “factory”. Wildlife or biodiversity was often only seen as part of the rural way of life if fishing, shooting or hunting on and around the farm was a traditional activity or provided an income in itself. Farmers argued that “We are not a nature reserve- we are a business!”

It is now understood by most farmers, even in areas where these views were most entrenched, that land is multifunctional and that, even where no land is specifically allocated to biodiversity conservation, farmland is an important landscape in which biodiversity and ecosystem services can take place. We therefore encourage farmers to be aware of the benefits their farms produce for local biodiversity and ecosystem services, and to recognise the value that this returns to the farm’s resilience and productivity.

WHAT HAS CHANGED SINCE SAC2010?

Aligning with Unilever’s “no deforestation” commitment in 2010 we envisaged SAC being used only for farms that already existed. We now realise that preventing biodiversity loss, declines in ecosystem services and minimising Greenhouse Gas emissions to the atmosphere, requires the addition of “no deforestation” criteria to SAC.

A stronger role for a Biodiversity Action Plan (BAP)

This chapter is now based more strongly around actions being taken on every farm, linking in to a Biodiversity Action Plan (BAP). Protecting ecosystems outside the farm boundaries from damage by farm activities is now a recognised part of BAP activities.

• Unilever suppliers have a [default] coordination role

Our experience in the past has been that Unilever Suppliers have often taken on the role of coordinating/developing the BAP (with their farmers) for the farms and the landscape from where they source their raw materials. This has many advantages – not least that actions that take place across the landscape may be more effective than those taken on individual farms. We have therefore made this a “default” Supplier role, although larger farms and plantations may still prefer to draw up their own BAP if this makes sense locally. However, we still expect actions to be taken on every farm.

- **A requirement for improvement over time**

It will no longer be possible for a farm to take an action in year 1 and thereafter claim compliance for years to come! This criterion has not been added to the system in order to gradually require more and more land be taken out of production. Nevertheless, we do recognise that maintaining habitats (e.g. forest patches) on-farm can take significant effort and leads to long-term improvements in habitat quality and standing biomass over time, so effort expended on maintenance of such areas will “count” as compliance.

- **A widening of the scope for the BAP to include a wider range of Ecosystem Services and improvements in Natural Capital**

Ecosystem Services are the valuable services provided by biodiversity, such as maintaining the local climate and water flow patterns, maintaining populations of predators that usually keep pests under control, or removing alien and invasive species. The Biodiversity and Ecosystem Services chapter now explicitly enables the BAP to be focussed on these issues where applicable; this has meant that we have been able to remove some specific criteria on Ecosystem Services from the chapter, as they were not applicable in many cases.

- **Metrics reporting has been moved to the Continuous Improvement chapter**

- **The “strategic commitment” criterion has been removed.**

Land use change – Biodiversity and Ecosystem Services aspects

The Responsible Sourcing Policy (see the **Unilever Responsible Sourcing Policy for Farmers chapter**) covers social aspects of land use change, including Free Prior and Informed Consent (FPIC) (See criterion F177) and a consideration for compliance with legal permits (I.e. Environmental Impact Assessment and Social Impact Assessment), required before land use change, and adopting the recommendations of such studies. The **Soil Management chapter** forbids the conversion of tropical peat soils to agriculture and covers peatland management on farm and peat use as potting compost and transplanting medium, whereas the sustainable sourcing of materials such as wood and peat by the farm is covered in the **Value Chain chapter**.

This chapter therefore concentrates on the aspects of Land Use Change that are relevant to Biodiversity, Ecosystem Services, and Eliminating Deforestation (which obviously has big implications for Greenhouse Gas emission reduction, which is discussed in more detail in the **Energy and Greenhouse Gas Emissions chapter**).

F55	Mandatory. No conversion of High Conservation Value areas
The conversion of High Conservation Value/High Ecological Value/high Carbon Stock areas (forests, grasslands or wetlands) on farms, or their conversion to farmland, is prohibited.	
Climate Smart Agriculture	
The prohibition for transformation of high value conservation land to farmland ensures that farmers within Unilever’s value chain are not responsible for conducting this activity. In securing ecological systems, which would sequester carbon, the protection of this land benefits the CSA pillar of lessening emissions.	

Unilever has committed to ensuring that there is no destruction of High Conservation Value or High Carbon Stock Forest in our supply chains, and no destruction of forest on tropical peat soils (See **Soil Management chapter**). The cut-off date for conversion of HCV areas is the date of implementation of this code, i.e. any damage that can be shown to have been done before the SAC was implemented is permitted.

What is a High Conservation Value area?

The HCV Network has formalised the idea that some aspects of a landscape have higher “Conservation Value” than others in such a way that High Conservation Value (HCV) areas can be mapped. The six types of HCV areas have been mapped for many parts of the world, and Unilever Supplier and farmers can therefore check the HCV website¹ to determine whether local mapping has taken place². Moreover, the HCV approach is an internationally recognised system – even where HCV areas have yet to be mapped – and applicable worldwide.

Note that some types of HCV (e.g. HCV5 and HCV6) do not necessarily preclude land use change, as long as the particular value can be maintained – for example, providing an alternative location for a religious site may be beneficial to all concerned.

HCVs have not yet been mapped worldwide, and we therefore recommend that the following types of ecosystems

1 <https://www.hcvnetwork.org/about-hcvf/the-six-high-conservation-values>

2 Note: Users will need to register an account

and designated areas should be treated as HCV-equivalent unless there is justification for removing them from this category.

- All forests, wetlands or grassland that are nationally- or locally- designated Nature Reserves, Sites of Special Scientific Interest, Reserves for Indigenous People, Conservation Parks, National Parks, and Protected areas;
- Areas designated by governments as having particular values for ecosystem services (e.g. floodplains, water catchments);
- Forest on tropical peat soil (See also **Agriculture – Soil Management chapter**); and
- Areas designated by NGOs and IGOs as of particular value including:
 - High Carbon Stock Forest as defined by REDD+ and
 - Ramsar sites

All land areas within areas classified as “Biodiversity Hotspots” should be checked particularly carefully as it is most likely to include HCVs (note that the WHOLE AREA is unlikely to be classified as HCV- but these designations should alert farmers and suppliers to the need for further investigation). The [National Geographic Society](#) has prepared a world map of the hotspots, which is available from Conservation International. These include those identified below:

- Critical Ecosystem Partnership Fund (CEPF) areas
- World Wildlife Fund’s “Global 200 Ecoregions”
- Alliance for Zero Extinction sites
- Birdlife International “Endemic Bird Areas” (EBAs)
- Plantlife International “Important Plant Areas”

As further guidance:

- The National and local Biodiversity Action Plan should be prepared with consultation of the CBD website³. This may indicate zones of different types of biodiversity or ecosystem services risk.
- The requirements of all Catchment Management agreements (usually involving maintaining forest to enable controlled water infiltration and runoff, maintenance of riparian areas, erosion control and lack of use of agro-chemicals) must be carefully checked to ensure that HCV4 is not implied in the designation of the area.

³ <http://www.cbd.int/>

TABLE 13: THERE ARE 6 TYPES OF HCV DESIGNATION⁴

HCV1 Concentrations of biological diversity including endemic species, and rare, threatened or endangered species, that are significant at global, regional or national levels. *E.g. The presence of several globally threatened bird species.*

HCV2 Large landscape-level ecosystems and ecosystem mosaics that are significant at global, regional or national levels, and that contain viable populations of the great majority of the naturally occurring species in natural patterns of distribution and abundance. *E.g. A large tract of Mesoamerican flooded grasslands and gallery forests with healthy populations of Hyacinth Macaw, Jaguar, Maned Wolf, and Giant Otter, as well as most smaller species.*

HCV3 Rare, threatened, or endangered ecosystems, habitats or refugia. *E.g. Patches of a regionally rare type of freshwater swamp.*

HCV4. Basic ecosystem services in critical situations, including protection of water catchments and control of erosion of vulnerable soils and slopes. *E.g. Forest on steep slopes with avalanche risk above a town.*

HCV5 Sites and resources fundamental for satisfying the necessities of local communities or indigenous peoples (for livelihoods, health, nutrition, water, etc.), identified through engagement with these communities or indigenous peoples. *E.g. Key hunting areas for communities living at subsistence level.*

HCV6 Sites, resources, habitats and landscapes of global or national cultural, archaeological or historical significance, and/or of critical cultural, ecological, economic or religious/sacred importance for the traditional cultures of local communities or indigenous peoples, identified through engagement with these local communities or indigenous peoples. *E.g. Sacred burial grounds within a forest management area or new agricultural plantation.*

Source: <https://www.hcvnetwork.org>

What is a High Carbon Stock forest?

High Carbon Stock forests have considerable value as carbon sinks, thereby limiting the rate of climate change in response to Greenhouse Gas emissions. However, a close link exists between deforestation in tropical regions and the depletion of HCSs because they are essentially the same thing. [Tropical forest on peat soil has a particularly high carbon Stock, and the conversion of such land to farmland has already been forbidden in Criterion F32.]

High Carbon Stock⁵ studies recognise that for developing countries like Malaysia and Indonesia, governments responsible for alleviating poverty in rural areas, often see the conversion of forest as a pathway to development. Researchers are therefore proposing the HCS+ methodology, to find ways to deliver palm oil (the most prevalent of materials farmed on converted lands) development on HCSs.

⁴ <https://www.hcvnetwork.org/about-hcvf/the-six-high-conservation-values>

⁵ <http://www.carbonstockstudy.com/carbonstockstudy/files/f7/f74843a5-2902-4e76-bf5b-0a75fce42a91.pdf>

The HCS Approach Toolkit⁶ provides methodology used by the HCS and explains further, what the science is regarding this working area. There is also a “competing” definition of HCS used by REDD+ based on above-ground biomass. When there is consensus on a HCS definition and process become available, we intend to update this guidance in line with the definition.

It is likely that HCS forest will eventually be integrated into the HCV approach (i.e. HCS will become a seventh type of HCV). The processes involved in defining and managing HCS are likely to be based on participatory approaches and to allow for removal of some forest when this is of benefit to local people.

Other “no-go” areas for land conversion

Clearly, the HCV/HCS approach, are not the only methodologies available for assigning Value or Conservation Status to parts of a landscape in order to exclude them from land conversion or land use change. Many Governments and International Governmental Organisations (E.g. IUCN) also designate areas of land with the hope of expectation that they become unavailable for development.

What does this mean for compliance with SAC2017?

Requirements for large land conversion projects

All land conversion activities must be legal. All the required authorisations must be in place from local, regional and national authorities.

If there are forest, grasslands or wetlands in the landscape of a **large potential land conversion project**, and there are plans to convert them to agricultural use, including semi-natural plantations, production facilities and associated infrastructure and amenities affiliated to the activity, we expect the farmer/supplier/land developer to employ properly-trained consultants. Contact [ProForest](#) to identify consultants with the appropriate qualifications to undertake HCV mapping of the area *before land conversion commences*.

The documented consultants’ report shall be made available to Unilever if requested. It must indicate that the plans for land conversion are highly unlikely to involve HCV or HCS destruction. If the Consultants’ report indicates any risk management, amelioration or remediation work is required, then this must be incorporated into the plans and actually carried out.

This requirement will be relevant if the land use change covers many small farms in the same landscape. This is likely to occur due to either:

- A large-scale change in land management affecting many farms, e.g. an irrigation scheme that may alter the water table and result in drainage or flooding of adjacent swamps or forests; or
- For many small projects on individual farms that can add up to a great deal of deforestation in the landscape.

The expectation is that the farm (or the Unilever Supplier on behalf of many smaller farms) will evaluate the potential for a project to remove trees, drain wetlands or relocate important cultural sites (See HCV1-6), and take further advice if there is a risk of non-compliance.

Requirements for small-scale projects

For smaller projects (E.g. Extending over a single small farm), farmers shall create a **documented justification** for any land conversion work, showing that they have researched the likelihood of the land planned for conversion being HCV. If smallholders are involved, then the Unilever supplier will probably need to coordinate the study for all the farms involved. Although, ideally, a consultant properly trained on HCV should be used to create such a document, we do understand that this is not always a practical option in many parts of the world or for small projects. However, a professional who understands the issues and is capable of making decisions about whether or not part or all of the proposed land conversion area is HCV must create the report. This could be the warden of a local Nature Reserve, a manager from a local Forest Project, or from a local farm or forestry project that is RSPO, RTRS, RA or FSC certified.

Requirements for medium-scale projects

We want to make the requirements proportionate to the risk and scale of any proposed land use change, so it is obvious that the requirements will be somewhere between those listed for a large-scale and small-scale project. If the local landscape has areas of HCV, HCS, Nature Reserves, Catchment Management agreements, Government or NGO assessments or similar that indicate a **high risk** of HCV/HCS, and then this will obviously shift the requirement in the direction of a formal study.

Continued efforts to conserve HCV/HCS areas and enhance their Conservation Value will definitely be acceptable as a major component of the Farm Biodiversity Action Plan (see later in this chapter).

⁶ http://highcarbonstock.org/wp-content/uploads/2014/12/HCS_TK_2015_SNG_AW1.pdf

5.1 GENERAL

F56	Expected. No deforestation
Unilever has a “zero-net -deforestation” commitment for our supply chains. Therefore, any destruction of forest – including secondary or production forest or fuelwood plantation – shall be compensated for by re-afforestation.	
Climate Smart Agriculture	
Forests harbor an estimated two thirds of all terrestrial species, and an intricate variety of ecological processes. Aside from their significant contribution to global biodiversity in plants and animals, forests also serve as carbon sinks, capturing massive quantities of carbon dioxide and retaining this in organic matter. In this regard, forests constitute the largest terrestrial store of carbon, deducing why deforestation ranks as the 3 rd largest source of greenhouse gas emissions globally (15%). This criterion applies to all land conversion involving deforestation, whatever the scale.	

This criterion applies to all land conversion involving deforestation, whatever the scale. For large-scale conversions, the Unilever RSP for farmers criteria on FPIC (F177) will clearly also apply. See the Unilever Position Statement⁷ on deforestation for further information.

This criterion has been classified as “expected” in the light of uncertainties on the finally-agreed definition of “zero deforestation” and “zero net deforestation”. When a good international consensus on these issues has emerged, we expect to be able to be able to make guidance that is more detailed available.

The following do not classify as “deforestation”:

- **Replacement of one tree crop by another** (e.g. commercial mono-crop pine /rubber / oil palm / citrus / olives / timber crop or crop planted to make tea chests (e.g. black wattle) / sun-cocoa , sun-coffee, or cocoa or coffee under-planted under coconuts or another tree crop (i.e. not under-planted under forest remnants);
- **Removal of trees on farms for government-required infrastructure development**, for example to build a road or an airport. Under these circumstances, there would normally be a government-sponsored compulsory purchase or compulsory annexation order;
- Farms where an ongoing programme of landscape management involves a mosaic of pasture (and/or crops) and naturally regenerating or replanted forests. **The landscape must be managed in such a way that the long-term forest cover and carbon storage is maintained.** E.g. The landscape in Finland where cattle graze on land con-

taining forest patches, and where farmers are engaged in both cattle and forestry businesses;

- **Normal harvesting of production and fuel wood plantations**, where forest cover/carbon storage is maintained by regrowth and replanting. Re-stocking must take place within a relatively short timescale, which is highly unlikely to be more than 5 years from felling.
- Removal of trees or tree crops from **agroforestry or home-garden production** systems;
- Removal of **individual trees from smallholder farms**; and
- **Shifting cultivation** by indigenous forest-dwellers using traditional agricultural methods.

Note that **conversion** of semi-natural mixed forest to plantation forestry would be classified as deforestation.

There are some situations that will need to be evaluated on a case-by-case basis. These include the removal of trees from agroforestry or “shade” growing systems where the trees form a dominant part of the cover and are the remains of native forest. In general, “*if it looks like a forest, it IS a forest*” is a good place to start an evaluation.

In all other cases where there are proposals for land conversion from forest to farmland or to farm infrastructure such as farm processing units or irrigation scheme development (and no HCV or HCS forest is involved), the UNEP concept of the “mitigation hierarchy” will be applied. The idea here is to apply “1” (avoid deforestation) wherever practical, and to only move to the next action down the hierarchy when the previous option has proved impractical.

- Avoid
- Reduce/moderate/minimise
- Rescue/relocate/translocate
- Repair/reinstate/restore
- Offset/compensate

The aim is to ensure that there is no net deforestation and the overall package of changes results in the ecological value of the original forest being exceeded. One approach that has been taken to this has to is the Business and Biodiversity offsets programme (BBOP – see Box), although this has yet to be implemented.

⁷ https://www.unilever.com/Images/eliminating-deforestation-position-statement_tcm244-423148_1_en.pdf

TABLE 14: BBOP1 PRINCIPLES ON BIODIVERSITY OFFSETS⁸

Biodiversity offsets are measurable conservation outcomes resulting from actions designed to compensate for significant residual adverse biodiversity impacts arising from project development after appropriate prevention and mitigation measures have been taken. The goal of biodiversity offsets is to achieve no net loss and preferably, a net gain of biodiversity on the ground with respect to species composition, habitat structure, ecosystem function and people's use and cultural values associated with biodiversity.

These principles establish a framework for designing and implementing biodiversity offsets and verifying their success. Biodiversity offsets should be designed to comply with all relevant national and international law, and planned and implemented in accordance with the Convention on Biological Diversity and its ecosystem approach, as articulated in National Biodiversity Strategies and Action Plans.

- 1 **Adherence to the mitigation hierarchy:** A biodiversity offset is a commitment to compensate for significant residual adverse impacts on biodiversity identified after appropriate avoidance, minimization and on-site rehabilitation measures have been taken according to the mitigation hierarchy;
- 2 **Limits to what can be offset:** There are situations where residual impacts cannot be fully compensated for by a biodiversity offset because of the irreplaceability or vulnerability of the biodiversity affected;
- 3 **Landscape Context:** A biodiversity offset should be designed and implemented in a landscape context to achieve the expected measurable conservation outcomes taking into account available information on the full range of biological, social and cultural values of biodiversity and supporting an ecosystem approach;
- 4 **No net loss:** A biodiversity offset should be designed and implemented to achieve in situ, measurable conservation outcomes that can reasonably be expected to result in no net loss and preferably a net gain of biodiversity;
- 5 **Additional conservation outcomes:** A biodiversity offset should achieve conservation outcomes above and beyond results that would have occurred if the offset had not taken place. Offset design and implementation should avoid displacing activities harmful to biodiversity to other locations;
- 6 **Stakeholder participation:** In areas affected by the project and by the biodiversity offset, the effective participation of stakeholders should be ensured in decision-making about biodiversity offsets, including their evaluation, selection, design, implementation and monitoring;
- 7 **Equity:** A biodiversity offset should be designed and implemented in an equitable manner, which means the sharing among stakeholders of the rights and responsibilities, risks and rewards associated with a project and offset in a fair and balanced way, respecting legal and customary arrangements. Special consideration should be given to respecting both internationally and nationally recognised rights of indigenous peoples and local communities;
- 8 **Long-term outcomes:** The design and implementation of a biodiversity offset should be based on an adaptive management approach, incorporating monitoring and evaluation, with the objective of securing outcomes that last at least as long as the project's impacts and preferably in perpetuity;
- 9 **Transparency:** The design and implementation of a biodiversity offset, and communication of its results to the public, should be undertaken in a transparent and timely manner;
- 10 **Science and traditional knowledge:** The design and implementation of a biodiversity offset should be a documented process informed by sound science, including an appropriate consideration of traditional knowledge.
 - To learn more about the Business and Biodiversity Offsets Programme (BBOP), see: <http://bbop.forest-trends.org/>
 - While biodiversity offsets are defined here in terms of specific development projects.

Source: http://bbop.forest-trends.org/documents/files/bbop_principles.pdf

What does this mean for compliance with SAC2017?

All land conversion activities must be legal. Beyond this, criterion F56 has the following consequences:

- If a land development involves removing woodland or forest, and the farmer/land developer is confident that they do not represent HCVA's (or HCS, once this has been well-defined), we expect the "mitigation hierarchy" to guide decision-making.
- If woodland or forest has to be removed, then serious discussions about how this can be mitigated, preferably within the local landscape, must take place, an action plan developed and followed. The action plan (which will usually be combined with the Biodiversity Action Plan – see below) may involve forest protection, conservation or restoration.

F57	Mandatory. No hunting, fishing or gathering of rare, threatened or endangered species
The hunting, fishing or gathering of rare, threatened or endangered species on the farm is prohibited. All farmers and workers shall be informed that destroying important habitats on-farm (or off-farm because of farming activities) is not allowed.	
Climate Smart Agriculture	
Not applicable	

Hunting on farmland is common in many parts of the world. Often an activity that is inextricably linked to the local rural culture. Hunting on farmland can be a means of getting rid of (real or perceived) vermin or predators that attack farm animals, can provide another income to landowners (if hunters pay for the privilege), can be part of important cultural milestones (such as rites-of-passage) and be a vital part of the lifestyle of cultural and ethnic groups.

⁸ http://bbop.forest-trends.org/documents/files/bbop_principles.pdf

The Unilever Code does not ban hunting per se. However, the hunting of threatened or endangered species is banned. If hunting on the farm does take place it is particularly important to communicate clearly with staff, workers, the local population and any hunters allowed to use the land about what is, and what is not allowed.

This involves:

- Posting signs near sensitive areas; and
- Re-educating hunters in the local community about which species must NOT be taken and any sensitive times of year (e.g. nesting season) when access to specific areas is banned.

Hunters often see themselves – or can be persuaded to see themselves – as people who enjoy wild places and wildlife and wish to preserve habitats and species so that future generations will also be able to hunt. They are often very knowledgeable about where species can be found and well aware of the different appearances and habits of different species. The practical way to ensure that rare and threatened species are not hunted is often to work in partnership with hunter groups and organisations to mutually agree on boundaries and species that can and cannot be hunted. The same approach works for other groups of people such as hang-gliders, 4-wheel-drive enthusiasts, tourists or rock climbers that use the farmland and may inadvertently damage important farm infrastructure or biodiversity.

TABLE 15: THE SAN FARM STANDARD CRITERIA ON HUNTING

The Sustainable Agriculture Network's Farm Standard⁹ has useful guidance on hunting by cultural and ethnic groups on farmland. We commend these guidelines for use for all hunting, fishing and wild-harvesting activities on farmland.

"Cultural or ethnic groups are allowed to hunt or collect fauna in a controlled manner and in areas designated for those purposes under the following conditions:

- A The activities do not involve species in danger of or threatened with extinction;
- B There are established laws that recognise the rights of these groups to hunt or collect wildlife;
- C Hunting and collection activities do not have negative impacts to the ecological processes or functions important for agricultural and local ecosystem sustainability;
- D The long-term viability of the species' populations is not affected;
- E These activities are not for commercial purposes."

Destroying the habitats that support rare or endangered species on farms, or collecting rare/endangered plant species on-farm are also not allowed. If there is a national or regional Biodiversity Action Plan¹⁰, this will typically include lists of species and habitats that are rare or endangered. Other sources of information include the IUCN Red List¹¹ and local conservation organizations and charities.

The Biodiversity Action Plan

The opportunities that farm businesses and farmers have to support biodiversity initiatives varies enormously by the:

- Type of farm;
- Farming system and its history;
- Landscape mosaic and location of farms within the landscape;
- Financial support that is available to farmers for biodiversity-support work; and
- Legal requirements

The opportunities to become involved in biodiversity work linked to "Unilever" crops or farms also vary with the raw material involved and how it links into the farming system (E.g. Is it always present on the farm, either as a perennial crop or as part of a rotation?), the local biodiversity issues and the receptivity of the farmers to the idea of different types of biodiversity work.

This is why we ask Unilever suppliers and farmers to develop and implement a locally applicable Biodiversity Action Plan (BAP). What we are expecting is that farmers, (usually in groups organised by processors or Unilever suppliers), will:

- Think about what biodiversity means for them;
- Take advice;
- Agree to **do something positive**;
- Write down the plan (the Biodiversity Action Plan); and
- Make progress, monitor it and document it.

Even if the farm is a "green desert" or crops are grown in warehouses (E.g. Mushrooms) or poly-tunnels, or if the local population has no interest in conservation, suppliers and farmers can still have a positive impact by, for example by:

- Taking advantage of the potential for bio-control of pests;
- Supporting educational programmes in local schools;
- Supporting visits by local schoolchildren to nature reserves;

⁹ <http://www.san.ag/biblioteca/biblioteca.php?cat=10>

¹⁰ Go to <https://www.cbd.int/> for further references.

¹¹ <http://www.iucnredlist.org/>

- Setting up nest-boxes (for birds, bats or insects) around their production sites;
- Identifying areas on the farm where crop production is usually uneconomic (E.g. Steep slopes, shallow soils or areas that often become waterlogged) and allowing these to revert to natural vegetation or planting trees in them;
- Creating a small reserve in the farm or factory grounds, for example a pond, that can be used for education;
- Using native species to make a picnic area where workers can enjoy meal-breaks; and
- If all else fails - Make a donation (e.g. time, money or loan of equipment such as diggers) to a local biodiversity-linked programme, charity or nature reserve.

At the other extreme, farms may be within or adjacent to areas of high biodiversity value. In these cases, the land managers of nature reserves, national or international conservation organisations can often provide useful advice on the most appropriate activities locally, and actions taken on farm can have huge positive impact.

S2	Expected. Grants and Government support
Where there is government support for biodiversity work, suppliers must ensure that farmers are aware of the support available and facilitate their access to such support.	
Climate Smart Agriculture	
Not applicable	

In some parts of the world there is government and/or NGO support for biodiversity work on farms. This may take the form of financial incentives (e.g. in parts of Europe) or advice. If funding is focussed on specific areas of conservation or ecosystem service provision, then it obviously makes sense for the funded activities to become the basis for the Biodiversity Action Plan.

For example, if rivers or streams run through farmland, it is highly likely that minimising pollution of the watercourse will prove to be an important part of any BAP. Many activities to minimise pollution are already part of the Unilever Code and can also be the first steps in any BAP. Examples of activities that would “qualify” for BAP work include preventing waterways and riverbanks from pollution and erosion by planting the riverbanks with native trees (or allowing them to regenerate naturally), and making such areas no-spray zones and designing farm drains to discharge into such areas rather than directly into rivers. If these “riparian strips” can be joined up across farm boundaries, and other “wildlife corridors” created within the farmed landscape, the biodiversity value can be very high.

Further examples can be found in the Unilever publication “A closer look at Biodiversity”.¹²

S3	Mandatory. Co-ordination of farmer’s Biodiversity Action Plans
Suppliers have a responsibility to ensure that there is documented evidence that every farm either has an individual Biodiversity Action Plan (BAP) - OR shall themselves co-ordinate farmers’ activities within a BAP that encompasses a range of activities across the farmed landscape from where raw materials are purchased.	
Climate Smart Agriculture	
Not applicable	

Who prepares the BAP?

In SAC2017 we have assigned a BAP co-ordination role for Unilever suppliers, because our experience of working with the Unilever Sustainable Agriculture Code (2010) has been that Unilever suppliers have usually taken on the role of developing and co-ordinating the BAP for the farmers who supply to them. However, if farmers prefer, or if another organisation, wishes to take on this role (E.g. A co-operative or NGO) then farmers may, of course, prepare their own BAP, in which case the supplier merely has to collate the evidence.

One advantage of Suppliers co-ordinating the BAP development, collation and reporting, is that this facilitates work on a landscape-scale. Farmers working in co-ordination have a greater capacity to:

- Arrange for riparian strips, boundary features and other wildlife corridors to join up across farm boundaries; and
- Meet and hold discussions with local wildlife protection officers, forestry departments, NGOs etc.

S4	Expected. BAP priorities
The BAP must include an assessment of the main biodiversity and ecosystem service issues associated with the farmed landscape from where Unilever raw materials are sourced. A map or other information on the presence or absence of (i) rare or endangered species and habitats (ii) parts of the landscape of High Conservation (iii) parts of the landscape with value for biodiversity and (iv) parts of the landscape providing valued ecosystem services (v) any known wildlife corridors within the landscape shall be included in the BAP.	
Climate Smart Agriculture	
Not applicable	

This criterion lists the background information that should form the basis for the individual Biodiversity Action Plan for

¹² https://www.unilever.com/Images/unilever-suppliers_a-closer-look-at-biodiversity_2015_tcm244-423993_en.pdf

each farm or the overall BAP coordinated by the Unilever supplier. The maps are only needed to design the interventions and enable monitoring to take place, but do not need to be of high quality and may be in the form of rough sketches or statements such as “the whole area has been classified by XXX (e.g. a government agency or NGO) as being important for YYY”.

Advice on how to design the BAP and identify priorities

Developing a Biodiversity Action Plan is well within the capabilities of a good farm manager or supplier management team, who are able to find appropriate advisors or advice. It is not our intention to make unreasonable demands on our suppliers; the processes we expect to be put in place to develop a BAP are relatively simple, inexpensive and do not require detailed technical knowledge of biodiversity.

There are many ways in which this can be done, all dependent on the scale of the operation and the availability of local knowledge. Often, farmers are the people who have the appropriate local knowledge or know where to find it. Farmers will know if wildlife is destroying their crops, if hunters or birdwatchers are trespassing (or just visiting) their land, and which of the species they see regularly they consider to be invasive weeds, vermin - or wild food or predators that reduce the numbers of vermin.

Step 1: Identify the local biodiversity issues and threats.

Evaluate the “Themes” listed below (Described in criterion F58) to understand the range of activities that can be encompassed within a BAP. Examples of actions taken by other Unilever suppliers can also be reviewed by checking the “Unilever suppliers: A closer look at Biodiversity” booklet¹³ to help understand the range of issues that may be covered by the BAP.

Note that important areas for conservation or ecosystem services may not all be on the farms themselves, but may be affected by farming communities (E.g. Wild harvesting / Collecting firewood) or farming activities (E.g. Water use).

Check out the National Biodiversity Action Plan

Article 6 of the Convention on Biological Diversity¹⁴ (CBD) calls on Parties to prepare National Biodiversity Strategies and Action Plans (NBSAPs) as the primary vehicle for implementing the Convention on Biological Diversity at the national level. Many countries have prepared their Strategies and Action Plans. Fewer countries have managed to implement these plans, and many of the resources available for biodiversity work are therefore designed to support governments and policy actions. As a result, few resources have been developed with businesses or farming in mind, and experts in the field sometimes have difficulties understanding how to advise businesses or how to work with farming-based businesses. However, sometimes the National BAPs are a brilliant resource to use for developing a local BAP.

Have discussions with local biodiversity professionals

Do these people know anything about the biodiversity value of the local farmland, or how farm management affects biodiversity or ecosystem service provision locally? What do they see as the biggest priorities? For example:

- Find out where the closest nature reserve is and talk to the reserve manager. Is there encroachment into the reserve by people collecting firewood, medicine or hunting? Could the habitats for some species be extended onto local farmland (E.g. By planting occasional trees for birds to use)? Are there actions that farmers can take that will help the situation?
- Is there a need to conserve natural vegetation in the catchment areas for farm water supply? If so, there may be a catchment manager who has knowledge of local biodiversity issues. Is water supply, or water pollution a particular problem for local water quality or provision? Are there actions that farmers can take that will help the situation?

Contact local or national wildlife or nature-protection NGOs

Sometimes NGOs already have a “needs list” available, or a local representative can state clearly what he/she sees as the most urgent local priorities. The WWF, for example, have branches in many countries around the world¹⁵.

¹³ https://www.unilever.com/Images/biodiversity-booklet-a5-final_tcm244-409216_en.pdf

¹⁴ <http://www.cbd.int/default.shtml>

¹⁵ http://www.panda.org/who_we_are/wwf_offices/

Contact national or local governmental offices with responsibilities for forests, wildlife, waterways or other aspects of biodiversity

Governmental Organisations and NGOs are often actively searching for partnerships in the local community with which to work on biodiversity. By asking them for information or support for farmers or farmers' organisations, you may find that you can immediately become part of a wider network, with greater potential for effective advice and/or reward for biodiversity work.

TABLE 16: MAXIMIZING USE OF LOCAL NETWORKS IN INDIA

One of the lessons learned from the Indian biodiversity strategy planning is that "It is vital to survey and make use of the locally available human resources and networks in order to maximise opportunities." It was observed that often the coordinating agency for the NBSAP process did not make use of existing networks to achieve their aims.

In Utar Kannada the network of spice growers association with 600 members was not tapped as a formal body despite the district being an important spice growing area which has implications to the state of the environment.

On the other hand in northern coastal Andhra good use of existing NGOs and Adivasi (tribal) networks, 'piggy backing' on ongoing meetings and mobilizing networks made it possible to get valuable micro-level information on biodiversity from remote areas.

Source: <http://pubs.iied.org/9521IIED.html>

Academics in zoology, botany, environmental science or forestry departments of local universities may also have useful information. Sometimes academics are on the lookout for subjects for student projects, and developing your BAP may be the type of project they wish to support.

An internet search focussing on the local area and "farm", "biodiversity", "wildlife", "ecology", "habitat" or "ecosystem" often produces useful information or contacts.

Ask Unilever and/or local NGOs, government services or Nature Reserve managers for help if this is too difficult to do otherwise. Note that important areas for conservation or ecosystem services may not all be on the farms themselves, but may be affected by farming communities (e.g. wild harvesting/ collecting firewood) or farming activities (e.g. water use).

Farmers should be involved in developing the plan, either singly or (more usually) as part of a supplier-group. This will ensure that the BAP makes sense to farmers and is practical to implement. Moreover, farmers are the experts on what is going on their own farms, and will often already be taking some actions to support biodiversity or ecosys-

tem services that may be more widely adopted on other farms. Even if this is not the case, the BAP should be underpinned by good consultation, planning and pilot-scale work (where appropriate) with the farmers involved.

Any documented plan, in any format is acceptable. This includes plans prepared by other organisations (e.g. governments or NGOs) to which individual farms are contributing.

The BAP may be at the supplier level or developed for each farm individually. The BAP should become a *"living document"* and therefore the background information collected may need to be updated every two years.

Creating a useful map

The map can be based on publicly available maps, satellite imagery (such as Google Earth) or even sketch maps of collection routes for farm produce to be delivered to the factory.

The map should contain (where these are present):

- Important wildlife habitats in the area, both on- and off-farm, like:
 - The location of water bodies, swamps, wetlands, rivers, streams and springs. Which of these do riparian areas or patches of indigenous vegetation protect? Is the flow rate or area very different at different times of year?
 - The location of other areas of natural vegetation within farms
 - Areas of woodland, forest, wetland etc. close by but outside the farm boundaries. This will include any nature reserves in the areas.
- Locations of frequent sightings of interesting plants and animals, (E.g. "This is where the pigs come out of the forest." "This is where the parrots roost at night." "This is where the owls nest.");
- Location of areas on farms that are not used for production (or are potentially uneconomic see criterion F60) and have the potential to become useful for wildlife, including buildings where nest-boxes might be housed;
- Boundary areas- for example between fields or at field edges or roadsides that may already be, or have the potential to become, wildlife corridors;
- Distance and direction of any nature reserves, protected wetland or forests (including HCVAs) in the vicinity or the same catchment; and
- Areas previously used for set-aside programs such as the Conservation Reserve Program (CRP) in the US and Legal Reserves in Brazil, including information on whether or not these areas are still preserved.

S5	Expected. Ensuring action and progress
The BAP must include a list of actions that farmers can take to support biodiversity. These must be related to the local biodiversity priorities, and issues on which farming has direct or indirect influence. These can include discussions with NGOs and governments or priorities, and awareness raising and training in the first year, but must thereafter move to pilot scale and actions on every farm. Progress over time must be shown, preferably by setting measurable goals on monitoring programme towards them.	
Climate Smart Agriculture	
Not applicable	

Step 2: When developing a BAP, identify actions that farmers can take on their farms

This requires an evaluation of the interrelationships between agriculture and local biodiversity or ecosystem service issues. Examples of these include:

- Is there conflict over water resources for irrigation or wetland maintenance?
- Is the farmland known to contain rare species or important habitats for wildlife? Is there a problem with trying to maintain these habitats?
- Are farmers, farm-workers or their families involved in local clubs or spiritual groups (e.g. churches, mosques, self-help societies) that have an interest in managing areas of land or educational programmes with a biodiversity component?
- Do farmers or farm-workers and their families hunt in the local area? Do farmers or farm-workers gather mushrooms, herbs, food or medicinal plants?
- Is firewood being taken from the local forest?
- Does fire from crop residue burning sometimes spread away from the intended area?
- Do farmers lose domestic stock to wild predators?
- Do field edges and other “wild” areas harbour pests and diseases that harm the crop?
- Does the local education system mean that local people know more about polar bears and penguins than the biodiversity on their doorstep? If so, the priority may be in education or in linking local traditional knowledge to biodiversity issues.

Once a list of potential actions has been made, they can then be presented in the BAP in various ways, for example:

- As part of the “issues map”, with farmers taking on actions related to the priorities within their part of the landscape [creating the map in a participatory way with farmers can be a useful way to promote engagement];
- As a portfolio of options, from which farmers choose those most appropriate for their farms;
- As a longer-term programme, involving selected farmers in Pilot Projects, which can be used as demonstration plots on-farm, or to help refine practices that can then be adopted elsewhere; and
- As commitments by farmers to involvement in externally organised programmes (e.g. by NGOs, a local Nature Reserve or National Park, a local landowners’ scheme) with significant biodiversity and/or ecosystem service benefits.

The BAP (usually the version collated and coordinated by the Unilever supplier) must **clearly show that action is taking place on every farm that supplies the Unilever raw material**.

The best choice to make for the first part of the BAP programme will usually be something that is both popular and pragmatic because people will be committed and involved and the improvements that are made are visible, easily monitored and provide positive feedback to the farmers that their efforts are worthwhile. Farmers are much more likely to implement plans and become enthusiastic advocates if they themselves have participated in the priority-setting process, and are able to see the results of their actions.

A social event for farmers, a farmer’s meeting, or a farmer’s excursion to the local Nature Reserve are all good opportunities for the “experts” views to be presented to farmers and for farmers themselves to dictate the priorities and pace for their own BAP.

It is worth remembering that, if there are important habitats on-farm, the continued protection of these will usually be the most important things that farmers can do for biodiversity conservation. **This may require no more resources other than documentation and ensuring that no deleterious changes in management are made**, although clearly improving the habitat (with expert advice) is even better, and would normally form part of the continuous improvement process.

If the risks to on-farm habitats are significant, and resources are needed, the contacts that have been made with NGOs and governments may well prove useful to help identify sources of funding.

Note

- We do not require or expect an expensive survey or inventory of species present in or around the area to be made.¹⁶
- It is particularly important not to embark on expensive rehabilitation work that may pose risks to current conservation areas without receiving advice from competent professionals. Otherwise more harm may be done than good.

The BAP must include a practical plan to make progress over time. In the first year, this may be focused on discussion with NGOs and governments or priorities and/or awareness raising and training. Thereafter, there must be a move to the pilot scale and actions on every farm. Progress over time must be shown, preferably by setting measurable goals on monitoring programme towards them.

The BAP must include a **practical plan** to make progress in at least one area of biodiversity conservation/protection/equitable use or education on every farm.

Obviously, it will be harder to fully implement a BAP on every farm in circumstances where a very large number of farmers are involved across a large geographically diverse area. However, as general guidance, the expectation is that discussions and consultations will take less than a year, pilots will then take one or two years, and full rollout to all farmers achieved within 4 years, even for the most difficult-to-manage supply situations.

The BAP should include information on how progress will be monitored. A requirement for improvement in performance is held by criterion F59, and the BAP should therefore be updated annually.

¹⁶ An inventory of species or habitats present in the landscape or on farms is a useful resource for a BAP. However, an inventory can be expensive to create and will not, in itself, improve the farmland biodiversity or ecosystem services. Therefore we do NOT require the production of an inventory. Where inventories already exist (e.g. prepared by governments, NGOs or academics), they can be important resources to use to guide action.

TABLE 17: CASE STUDY – SAID IS NOT ALWAYS DONE¹⁷

Said: A [Biodiversity] Protected Area manager is concerned about endangered flowers because farmers mow the grass for stock feed too early in the year for them to set seed. He prepares a leaflet to explain the need and background to mow on a specified later date in the year. The Protected Area Newsletter has a message that farmers can pick up this leaflet at the local mayor's office. However, the leaflets are not collected, as the farmers do not read the Protected Area Newsletter.

Heard: The Protected Area manager finds out his mistake from a local police officer. The next year a poster is displayed at the entrance to the local church, as all farmers go there on a Sunday. The poster explains the scientific facts about biodiversity and asks farmers to collect the leaflet at the mayor's office. Again, the leaflets are not collected, as the farmers did not realise the right date for mowing.

Understood: The Protected Area manager finds out that the expert language used in the poster is not understood. So the next year a new and simpler poster gives a clear message: only start mowing from 18 June onwards. Despite this effort, there is no result. The message is received and understood but not agreed upon. The farmers found it insulting to their religion that the poster suggests to start mowing on a Sunday.

Agreed: The next year, the mistake of choosing a Sunday is not made. However, the result is the same. The Protected Area manager finds out the reason. Mowing later means that the farmers lose on the quantity of hay that they can store for winter-feeding. This hurts their business. Without financial compensation – no matter what information is given through brochures and posters – people do not change their behavior.

Acted: A dialogue with opinion leaders from the farming communities results in an attractive proposition. Farmers who mow after the right date will receive a financial bonus with a minimum of bureaucracy. That year most farmers mow at the right time. The Protected Area manager is happy and satisfied.

Source: SAC 2010 Implementation Guide

¹⁷ Available from <https://www.cbd.int/cepa/toolkit/2008/cepa/index.htm>

F58	Expected. Biodiversity Action Plan
<p>The BAP should focus upon at least one of the following themes (A-G). Tick all those that apply for each farm separately.</p> <p>F58 – Theme A: Conservation of rare species and habitats</p> <p>F58 – Theme B: Enhancing local high conservation values</p> <p>F58 – Theme C: Development, maintenance or improvement of wildlife corridors</p> <p>F58 – Theme D: Enhancement of ecosystem service provision by the farmed landscape</p> <p>F58 – Theme E: General landscape improvement for wildlife</p> <p>F58 – Theme F: Work to eliminate alien and/or invasive species</p> <p>F58 – Theme G: Conserving genetic diversity of crops or animals</p>	
Climate Smart Agriculture	
Applicable to F58 – Themes F and G	
<p>Theme F: Work to eliminate alien and/or invasive species</p> <p>Alien and invasive species are estimated to cause huge losses to agriculture worldwide every year; the damage and control cost of invasive species in the U.S. alone amount to more than \$138 billion annually¹⁸. Moreover, alien and invasive species are considered one of the top 5 drivers of biodiversity loss and species extinction in the world. The risks and problems associated with alien and invasive species vary widely across different parts of the world. Climate change undermines resilience of ecosystems and broader socio-economic prosperity, by leading to fluctuations of weather patterns, which often benefit prolific invaders, typically hardy and dominant in altered conditions.</p>	
<p>Theme G: Conserving genetic diversity of crops or animals</p> <p>Genetic resources for food and agriculture serve as the foundation for sustainable agriculture and food security, yet over the past 100 years, 75% of crop genetic diversity has been lost. Increasing the resilience and efficiency of food systems, the conservation and sustainable use of genetic resources provide valuable options for adapting agricultural production to the effects of climate change¹⁹. This Code encourages suppliers and farmers to use crop and animal genetic diversity (where available – including resistances, tolerances, seasonality, yield, quality) to improve profitability and reduce environmental impacts.</p>	

Criterion 58 lists the possible areas where action will be recognised; in the reporting tool, and asks for the focus (or “theme”) for action(s) on each farm are identified.

Cool Farm Tool Biodiversity Module

If you have ticked theme B (Enhancing local high conservation values) or E (General landscape improvements for wildlife), and if your farm operation is in Western Europe, consider using the Biodiversity tool of Cool Farm Alliance to test the rigor and potential effectiveness of your BAP (<https://coolfarmtool.org/coolfarmtool/biodiversity/>).

This tool provides farmers with a 20-minute multiple-choice questionnaire, which scores four dimensions and eleven species groups using the responses provided

¹⁸ Pimentel, D.; R. Zuniga and D., Morrison (2005). “Update on the environmental and economic costs associated with alien-invasive species in the United States.”, *Ecological Economics* 52: 273–288.

¹⁹ <http://www.fao.org/3/a-i3817e.pdf>

in combination with conservation research on habitat and species in the Western Europe region. The result is an analysis that identifies which species groups and habitats benefit from existing management practices most, to inform how best to target future management interventions that support local biodiversity and ecosystem services accordingly. Future iterations of this tool will involve its expansion to other regions, making it available to farmers in a wider geographical area.

These options as listed as themes below:

Criterion 58 – Theme A: Conservation of rare species or habitats

If rare, threatened or endangered species or habitats exist locally, then the BAP must include an evaluation of the risks posed to the species or habitat, and commitment to maintaining/ enhancing the farmed landscape for their benefit. The BAP includes a monitoring programme to determine if the plan is being successful.

The preparation work for the BAP (See supplier criterion S3) should have identified the presence of rare species or habitats on or adjacent to local farmland; these may be species or habitats that are locally/regionally or internationally rare or under threat, and may be aquatic or terrestrial.

Protection of species or habitats normally requires a landscape approach, with BAPs on adjacent farms being aligned, for example by agreed spraying regimes to protect insect species, networks of connecting riparian strips and/ or hedgerows/living fences etc.

Aligned management of agricultural pollution, runoff and drainage modifications within catchments can be particularly important in relation to downstream ecosystems.

Criterion 58 – Theme B. Enhancing local High Conservation Values

If there are High Conservation Value forests, wetlands or other areas within or adjacent to the farmed landscape, on-farm BAP activities can be focused on enhancing these values.

The preparation work for the BAP (See supplier criterion S3) should have identified local HCV areas (See criterion F55 for discussion and definitions of HCVAs). A landscape approach, involving several farms, is likely to be most effective (See criterion F57).

Farms and farming communities can contribute significantly to enhancing the Conservation values of local HCV land. For purposes of this criterion, this includes local

Nature Reserves and other sites important for biodiversity even if these have not formally been designated as HCVs.

For example, HCVs 1, 2, and 3 might be enhanced by providing on-farm habitat (For example: Living fences, hedges, riparian areas, wetlands, isolated trees or nesting sites) that extends the geographical range for rare or endangered species beyond the official HCV “border”. Farms may also contribute to the ecosystem service provision by sympathetic management of drainage, irrigation or by minimising soil erosion.

Other options for the BAP include providing facilities for educational or scientific visitors, or by volunteering the use of labour, equipment or machinery for use to help manage the HCV area.

Criterion 58 – Theme C. Development, maintenance or improvement of wildlife corridors

Creating, maintaining and enhancing a network of natural vegetation (“wildlife corridors”) along live fences, hedges, ditches, riparian strips, roadside and yield margins across the landscape.

As many habitats become more fragmented (by buildings, roads, pipelines and other developments), they become less able to support viable populations of certain plants and animals. Creating a network of “wildlife corridors” across the landscape mosaic, preferably joining-up patches of natural vegetation, can help ameliorate the problem.

Wildlife corridors should, preferably, be designed with particular species or habitats in mind, as different species have different requirements.

Improvements over time (See criterion F59) may include:

- Gradual improvements to the length, connectivity and/or quality of habitat within the wildlife corridor system;
- Creating new wildlife corridors or adding to the corridor network by joining up strips of vegetation on adjacent farms;
- Actions to minimise disruption to wildlife corridors by farming activities (e.g. limiting access during migrations); and
- Enhancement of the landscape for wildlife to pass through or around farms (E.g. By introducing native trees to act as roosting sites along bird migratory routes or by joining up wildlife areas on adjacent farms).

Adjacent farms working on wildlife corridors will be expected to ensure that they systems connect with each other.

Criterion 58 – Theme D. Enhancement of ecosystem service provision by the farmed landscape

This may include actions such as: part of the farm being made available for river overflow (to prevent floods downstream), planting vegetation that encourages predators to help reduce pest-pressure, planting wild flowers to maintain pollinator populations, developing woodlots to reduce the pressure on local forests for firewood, maintaining sacred or archaeological sites etc.

This may include actions such as:

- Part of the farm being made available for river overflow (to prevent floods downstream);
- Planting vegetation that encourages predators to help reduce pest-pressure;
- Planting wild flowers or creating “bee hotels” etc. maintain pollinator populations, accompanied by appropriate agrochemical management to support the maintenance of the pollinator populations (See criterion F22);
- Developing woodlots to reduce the pressure on local forests for firewood;
- Maintaining sacred or archaeological sites; and
- Planting cover crops in rotation between cash crops to improve soil fertility and reduce runoff, etc.

Note that measures to enhance soil health - reduce erosion and increase soil carbon – are covered in the **Soil Management chapter**.

Criterion 58 – Theme E. general landscape improvement for wildlife

If there are no specific biodiversity or ecosystem service priorities, the BAP, or options within the BAP, may concentrate on making general improvements to the landscape that are considered to have a positive value for biodiversity.

A wide range of options for making general landscape improvements exist. It will not be necessary for all farms to make the same choices. For example, one farmer may wish to develop a pond that is useful for wildlife while another plants trees. Options include:

- Putting up nest boxes or roosting poles for owls or raptors that eat rats on the farm;
- Planting native trees along riverbanks to reduce erosion and provide windbreaks or “living fences” for improved cattle management;
- Planting or protecting native trees near housing and eating areas to make living and working on the farm more pleasant;
- Providing nest boxes for birds or bats;
- Making better provision for wildlife habitats and wildlife food sources by improving live fences, hedges, field margins, extensive pasture, Etc. On farm; and

- Delaying harvesting, ditch-clearing, pruning live fences etc. until young birds have flown the nest or flower seed has been set and dispersed.

Criterion 58 – Theme F. Work to eliminate alien and/or invasive species

If alien or invasive species are a problem, then the BAP must include an evaluation of the size of the problem and commitment and action to practical improvement and a monitoring programme to determine if the plan is being successful. *Note that this does NOT include routine weed control.*

Alien and invasive species are estimated to cause huge losses to agriculture worldwide every year; the damage and control cost of invasive species in the U.S. alone amount to more than \$138 billion annually²⁰ Moreover, alien and invasive species are considered one of the top 5 drivers of biodiversity loss and species extinction in the world. The risks and problems associated with alien and invasive species are very different in different parts of the world. Toxic invasive species are particular problems for livestock or if they contaminate human food crops.

Many weed species are accidental introductions with crop seeds and imported plant material. In the USA, Wikipedia states that “Many introduced weeds in pastures compete with native forage plants, are toxic (e.g., Leafy Spurge, *Euphorbia esula*) to young cattle (older animals will avoid them) or non-palatable because of thorns and spines (e.g., Yellow Starthistle, *Centaurea solstitialis*). Forage loss from invasive weeds on pastures amounts to nearly \$1 billion in the U.S. alone.[29] A decline in pollinator services and loss of fruit production has been observed to cause the infection of honeybees (*Apis mellifera* another invasive species to the Americas) by the invasive *varroa mite*. Introduced rodents (rats, *Rattus rattus* and *R. norvegicus*) have become serious pests on farms destroying stored grains.[29]” and are also vectors for many other pests and diseases.

Note that the BAP must include written justification for focusing on this theme, for example, a government order or recommendation to farmers to remove the problem species.

Although the first priority must be to ensure that farming, activities do not inadvertently promote the spread of aliens (e.g. in aquaculture), preventative action is insufficient for compliance with this criterion.

Some sources of information for the management of alien and invasive species include:

- National governments have a unit that can provide advice on managing aliens and invasive. The South African (WWF sponsored) Biodiversity and Wine Initiative has an excellent section on managing alien and invasive species in Southern Africa²¹;
- The Convention on Biological Diversity²² (CBD) website has links to work on alien and invasive species and their impacts on biodiversity worldwide; and
- The Invasive Species Compendium’s tool, ‘*A Toolkit of Best Prevention and Management Practices*’, provides guidance to manage invasive alien species effectively.

Criterion 58 – Theme G. conserving genetic diversity of crops or animals

If the Unilever crop or animal breed requires on-farm conservation of landraces, wild or rare varieties or rare animal breeds, the conservation programme may become the major component of any BAP. If this is the case, the BAP must include a description of the conservation goals and the programme in place to achieve these goals and monitoring data to show that progress is being made.

This Code encourages suppliers and farmers to use of crop and animal genetic diversity (where available – including resistances, tolerances, seasonality, yield, quality) to improve profitability and reduce environmental impacts.

For some intensively bred crops (E.g. Wheat), crop breeders have incorporated a wide diversity of ancestors into modern commercially available varieties.

For other crops, breeding has necessarily been less intense. When choosing varieties to plant, it is always wise to plant more than one variety, and preferably NOT closely related varieties (all other considerations being equal).

For tree crops, it is recommended to plant several clones (ramets), composites (stock/scion combinations) or provenances in order to minimise a wide range of risks.

For animal production systems, keeping rare breeds or active participation in programmes to improve animal welfare and productivity (unless they narrow the genetic base of the breed or variety) will ensure compliance.

20 Pimentel, D.; R. Zuniga and D., Morrison (2005). “Update on the environmental and economic costs associated with alien-invasive species in the United States.”. *Ecological Economics* 52: 273–288.

21 http://www.wwf.org.za/what_we_do/sustainable_agriculture/_conservation_and_wine/

22 <http://www.cbd.int/invasive>

Unilever has strict quality criteria for many of its raw materials, and required crop varieties may be part of the specification. The specification may have been written at a time when modern varieties were unavailable. When new varieties, with improved agronomic traits become available, Unilever suppliers should approach Unilever with the information, and any requests to update the specification.

F59	Expected. The BAP shall require year-on-year improvement in performance
There must be improvements in biodiversity and ecosystem services management over time. The BAP shall include a timeline and monitoring system showing how the biodiversity/ecosystem service value of the farmed landscape has been maintained and improved over time.	
Climate Smart Agriculture	
Not applicable	

Making improvements, and then monitoring them and providing feedback to farmers on their successes is an important part of the BAP process.

Keeping on-farm habitats in good condition, maintaining tree plantings, or continually having to keep alien invasive species at bay, can require considerable effort. This criterion is not designed just to demand more and more work each year, or that more and more farmland is managed for the benefit of wildlife. However, the expectation is that such regular work will gradually improve that *quality* of the habitat (or other BAP focus area), and therefore a farm will “pass” an assessment if such work is regularly undertaken. Simple monitoring plans should be put in place to be able to demonstrate improvements have been made.

Examples of the type of metrics and monitoring Unilever is looking for include (but are not limited to):

- For tree-planting programme, the % surviving should be assessed;
- For nest boxes, the % occupancy can be assessed;
- For education and awareness programmes, the number of people reached can be recorded (E.g. Children who have taken part in farm visits);
- Photographic records or documentation showing improvements in species richness, removal of alien species, or changes in provision for rare or endangered species over time; and
- Records demonstrating the installation of facilities to improve ecosystem services (e.g. Improved drainage).

Initially, the improvements may include moving from information gathering to pilot scale to rollout to 100% of farmers involved. Subsequently there is a requirement for year-on-year requirement to improve the quantity or quality of actions or managed habitats within the landscape. Long-term maintenance of particularly high quality habitats is sufficient to comply.

F60	Expected. Areas not used for production
Areas of the farm that are unlikely to provide an economic return, must be identified and taken out of production. Areas taken out of production, buffer zones around water bodies, and areas around offices and housing must be managed in a way that enhances biodiversity value or the provision of ecosystem services.	
Climate Smart Agriculture	
Not applicable	

Farmland has value not only for farmers but also for the local community (in terms of access, clean air and water, aesthetic and amenity value) and biodiversity. In many parts of the world, the desire for uniform easy-to-manage fields, especially where large machinery is used, has meant that parts of the farm and often parts of individual fields, unsuitable or uneconomic for certain crops or animal husbandry systems, have nevertheless been ploughed, planted, and fertilised. This is not only a drain on farm finances, but also reduces the potential biodiversity value of the land.

Our Code encourage farmers to identify such areas and to take them out of production, or convert them to other forms of production compatible with biodiversity value for two purposes – to improve farm profitability and to improve environmental performance. If practical, such areas should be managed in such a way that they have biodiversity value.

It is clear that applying fertiliser, irrigation water or pesticides to areas where crops do not grow well enough to provide an economic return is not only financially disadvantageous, but also polluting.

Typical problem areas are:

- Areas within fields with unusual soil characteristics, like “Hard Pans” or crusted soils that limit root growth or water drainage, or other compacted soils on roadways, headlands and pathways;
- Areas of shallow soils where rock outcrops or tree roots are too near the soil surface for crops to develop good root systems;
- High pH areas (E.g. “Hut sites” in tea fields, where generations of people have disposed of wood ash and raised the soil pH), or low pH areas (e.g. acid sulphate soils) within areas otherwise suitable for the crop;
- Pockets of saline soils (common in some Mediterranean and Australian farmed areas);
- Areas near shelterbelts or at the edges of woodland or forests where the land is heavily shaded (in many cases, low-lying bushes or softer vegetation can provide good habitat for wildlife in these areas by providing a “transition zone” at the edge of the trees);
- Low-lying areas, sometimes man-made, where traditional animal husbandry practices have encouraged ponds to develop and now tend to create waterlogged conditions for arable crops;
- Flood-prone areas, including areas where brackish water may enter at high tide (a particular problem for some oil palm growing areas in Asia)
- Areas of steep slopes, particularly vulnerable to erosion or where machinery cannot be used easily or effectively;
- Areas around the edges of fields;
- Where riverbanks, tree roots or shading (by buildings, fences or vegetation) make access difficult or yields low;
- Between fields and areas of other crops, housing, roads, rivers and streams where fertilisers or pesticides should not be applied because of the risks of pollution or contamination; and
- In many cases, growing crop up to rivers or housing is, in any case illegal; - In the absence of legal requirements for the width of riparian strips and other barrier zones (See criteria in the **Agriculture – Pest, Disease and Weed Management and Water Management** chapters).

Farmers and long-term farm workers often already know where these areas are within the farm. Once uneconomic areas (or other areas where crop should not be planted) have been identified, a decision needs to be made about what to do with that area.

The final decision will depend on:

- Legislation - In many countries, for example, there are regulatory requirements for how riparian areas should be managed;
- Risk – If pesticides are sprayed high in the air (e.g. in orchards), then planting tall vegetation along water-courses is obviously more important to protect the water;
- Practicality – How easy is it to access the area? Are suitable tree seedlings available locally?
- If there is any financial support available for particular types of management;
- If certain types of management provide value to the farmer? (E.g. Can the species planted be used to repel or dissuade insects or slugs or other problem species from entering the crop, or provide habitat for species that eat pests?) Marginal lands are sometimes suitable for low-input agriculture that can be conducive for biodiversity, such as low-intensity or sporadic grazing.
- Advice received from local biodiversity experts on the type of habitat of most value locally.

The suitability of different types of native tree or herbaceous species for creating areas on the farm of high biodiversity value will need to be balanced against the needs of the farm; much can be done without harming farm profitability.

In areas very close to crops, planting species with large root systems that spread near the surface, produce a great deal of shade at important times of year for crop growth, species that leaf fall may contaminate the crop or species that must be sprayed with insecticides (E.g. If they are secondary hosts for crop pests) should be avoided.

The expectation is that the economic assessment will be revisited every few years.

Such areas should be managed by planting or managing native species to create habitats of high biodiversity value, providing services such as water table management, flood control, nesting and foraging sites for insectivorous birds or plants used by species that predate on pests.

F61	Expected. Protecting habitats and ecosystem services from livestock
Farmers must protect natural ecosystems from livestock disturbance by establishing physical barriers.	
Climate Smart Agriculture	
The haphazard compaction of substrate and vegetation by livestock can result in impacts to soil structure and habitat quality, which when occurring extensively, may lead to a wider release of carbon emissions from the soil. When livestock are allowed into riparian areas, or areas of value for biodiversity, there is a risk of damage from overgrazing, soil compaction, soil erosion (e.g. on riverbanks) and over-nutrition of water bodies or other ecosystems by manure. Through the protection of natural ecosystems, the ability for renewal of ecological systems, improves resilience.	

When livestock are allowed into riparian areas, or areas of value for biodiversity, there is a risk of damage from overgrazing, soil compaction, soil erosion (E.g. On riverbanks) and over-nutrition of water bodies or other ecosystems by manure. Farmers are expected to put systems in place (E.g. Fences, hedges, ditches, etc.) to discourage livestock from entering sensitive areas.

Of course, livestock are allowed into natural ecosystems or other areas of high biodiversity value where low-intensity grazing is required to maintain the ecosystem, for example, some Alpine wildflower/hay meadows or heathlands, or Mediterranean low-intensity farmland, pseudo-steppes and dehesa grazing land.

APPENDIX 5A: REFERENCES AND FURTHER INFORMATION

Biodiversity Action Plans

<http://www.businessandbiodiversity.org/>
<http://www.wildfarmalliance.org/resources/BD%20Guide%20Organic%20Farmers%20.pdf>

Some National BAPs and related information

China: <https://www.cbd.int/doc/world/cn/cn-nbsap-v2-en.pdf>
India: <https://www.cbd.int/doc/world/in/in-nbsap-v3-en.pdf>
Republic of Korea: <https://www.cbd.int/doc/world/kr/kr-nbsap-v3-en.pdf>

Useful websites include:

- CBD: <https://www.cbd.int/>
- IUCN CEC: <https://www.iucn.org/about/union/commissions/cec/>
- UNFCCC: <http://newsroom.unfccc.int/>
- Ramsar: <http://www.ramsar.org/>
- CITES: <http://www.cites.org>.
- FAO: Teaching and learning materials on Education for Rural People on Biodiversity <http://www.fao.org/erp/erp-toolkit-en/en/>
- NAAEE: <http://www.naaee.org>
- Educational Development and Support Network Namibia: <http://dot-edu.edc.org/projects/namibia.htm>

Videos and presentations recommended by CEPA

Mainstreaming Biodiversity - video explaining and illustrating CEPA, prepared by IUCN CEC in partnership with SCBD

Tales of water - 3 minute video on the importance of water and a healthy environment for primary education, prepared by the IUCN Water and Nature Initiative, 2005 (video wmv).

Voices Beyond Boundaries" - a video shown in the introductory Symposium on communication and its role in protected areas, directed by CEC member Ricardo Carvalho (video wmv).

Aventure Biodiversité, Le Groupe Via le monde Inc., Montréal, Canada, French movie about Biodiversity (video wmv).

Presentations

Biodiversity and Development, IUCN presentation for 2005 G8 Ministers' Meeting on the links between biodiversity and poverty

Why is Biodiversity Important? Presentation prepared by M.F. Lavery and E.J. Sterling, American Museum of Natural History, 2003. A good introduction to technical issues with nice pictures.

Learning for sustainable development - Short presentation of Dutch 2004-2007 Interdepartmental ESD strategy and program, as vehicle for environmental education and CEPA.

Agriculture and biodiversity: interactions at the boundaries. By Jeffrey A. McNeely, Chief Scientist IUCN-The World Conservation Union, The Sperling Biodiversity Lecture, Salt Lake City, 6-8 November 2005

How to perform EIA is part of the following document (also includes other tools for "mainstreaming environmental management"):
[http://www.environmental-mainstreaming.org/documents/EM%20Profile%20No%201%20-%20EIA%20\(6%20Oct%2009\).pdf](http://www.environmental-mainstreaming.org/documents/EM%20Profile%20No%201%20-%20EIA%20(6%20Oct%2009).pdf)

Definition of High Conservation Value

Resources toolkit for biodiversity:
http://www.cepatoolkit.org/html/topic_EB4F6A65-6A05-419D-A5B2-C7EFA0C8734F_B6F868C6-C970-41DD-BEC3-377E1EF7916D_1.htm

Locating local biodiversity protected areas

Heading: Locate protected areas using the World Database on Protected Areas: <http://www.protectedplanet.net/>
<http://free-gis-data.blogspot.com/2009/04/world-spatial-database-on-protected.html>.



6 ENERGY AND GREENHOUSE (CARBON) GAS EMISSIONS

Improved energy efficiency on farms is generally good for farm profitability and reduces environmental impact, including the emission of greenhouse gases (GHGs – Sometimes referred to as “Carbon”) to the atmosphere.

Unilever is publically committed to halving Greenhouse Gas (GHG) emissions throughout its product life cycles, so we see huge value in measuring and monitoring how our suppliers and farmers manage their fertilisers, effluents and energy-intensive farm activities. Without this, we cannot monitor overall progress, and we are unable to focus our efforts on areas of the supply chain where there is most potential for improvement.

We therefore ask farms to use the “Cool Farm Tool” (or other equivalent national- or sector-specific GHG tools – such as those published by the Netherlands dairy industry or Palm GHG¹) to report on their energy use and GHG emissions. These tools are usually also helpful for understanding the costs and benefits of fuel, electricity, fertiliser and energy-intensive on-farm activities (such as ploughing) thereby providing farmers with insights into potential money-saving activities that also reduce GHG emissions. Reporting through the tool is required as part of the **Continuous Improvement chapter**, but taking action to improve energy efficiency and associated GHG emissions reductions are covered here.

This chapter is divided into two parts: **Energy efficiency; logistics, as well as atmospheric pollution and greenhouse gas emissions.**

Links with other chapters include the obtaining of permits for energy generation (See the **Unilever RSP chapter**), matters related to incineration (See the **Waste Management chapter**) and irrigation equipment energy efficiency (See the **Water Management chapter**). In addition, fertiliser management and associated GHG emissions (See the **Nutrient Management chapter**) and avoiding large-scale GHG emissions associated with land use change, including those associated with peat soils (See the **Soil Management chapter**) and deforestation (See the **Biodiversity and Ecosystem Services chapter**) are covered elsewhere.

6.1 ENERGY EFFICIENCY

Improving energy efficiency, and using renewable energy resources, are both important for improving profitability and reducing pollution. Improved energy efficiency by our suppliers and farmers will reduce the rate of depletion of fossil fuels, and minimise the emissions of greenhouse gases and other polluting gases.

F62	Expected. Energy Management Plan
An energy management plan (documented on large farms or on behalf of groups of smallholders) must be in place, designed to reduce energy consumption and improve energy efficiency.	
Climate Smart Agriculture	
Understanding the main uses of energy (electricity, fuels) used on a farm either directly (including for domestic purposes) or indirectly (e.g. through contracting agricultural services) is the first step towards reducing energy use and increasing energy efficiency. The conducting of basic energy accounting, documenting energy conservation practices, using appropriate machinery and equipment, and upgrading or replacing of energy inefficient machinery, would positively affect productivity, increase socio-ecological resilience and lower emissions.	

Understanding the main uses of energy (namely electricity and fuels) used on a farm either directly (including for domestic purposes) or indirectly (through contracting agricultural services) is the first step towards reducing energy use, increasing energy efficiency and lowering associated greenhouse gas emissions.

¹ <http://www.rspo.org/certification/palm-ghg-calculator>

This means that:

- The main uses of energy and energy sources have to be identified and quantified through estimation or measurement; and
- The consequences of their use in terms of direct and indirect emissions are understood.

For most agricultural systems, the life-cycle (“embodied”) energy used to create fertilisers, machinery, CPPs, seed and other farm inputs is 25-33% of overall farm energy use. Other major components of energy use include:

- Fuel use in transporting inputs to the farm;
- Fuel use for on-farm activities, such as ploughing/tillage, spraying, harvesting, pumping water, and the on-farm transport of product and people;
- Fuel use for post-harvest treatment and storage of products, such as for grain drying and milk refrigeration;
- Transport of products to the processing factory or depot; and
- Fuel for domestic use, feeding and housing of farmers, employees and families.

The first step to good energy management and increased energy efficiency is therefore **basic energy accounting** that asks how much energy and fuel are used where and for what activities (e.g. tillage, pumping, cooling, transport). The results from energy accounting may suggest some simple, low-cost changes that could save a significant amount of energy and money. As such, energy accounting data needs to be retained to show that energy efficiency is increasing over time.

Step 1a: Monitoring energy use

Electricity and fuel use are often only metered for the entire farm and is difficult to allocate to individual activities. However, this does not necessarily mean that useful estimations cannot be made, such as with the following:

- Tractor fuel use for individual operations can be measured by filling up the tank before starting and again after finishing the field operation, thus giving the amount re-filled equivalent to the amount consumed; and
- Electricity use can be measured with mobile power meters that are plugged in between socket and consumer. Such meters can often be hired from extension services, energy providers or energy consultants or NGOs.

Step 1b: Calculating energy use

In SAC2017 we are making the reporting of on-farm Greenhouse Gas emissions estimates MANDATORY (See criterion F152). The Unilever ‘Cool Farm Tool’ energy and greenhouse gas calculator² can be used to estimate farm energy consumption if real measurements are difficult to obtain.

Other greenhouse gas calculators may also be available and useful aids to improving energy efficiency and reducing emissions. A locally-developed calculator, or one developed specifically for the type of farming (e.g. the RSB biofuel calculator³ or a “dairy industry” calculator that may be available and adaptable to the situation), may be easier to use for farmers.

Step 1c: Calculate the energy efficiency

Divide the total amount of energy used for producing a crop or animal product by the yield. The ‘Cool Farm Tool’ produces this number in its standard output.

² <http://www.rspo.org/certification/palm-ghg-calculator>

³ <http://rsb.org/ghgcalc/>

Step 2a: Taking steps to reduce energy use

Practices that reduce energy use are mainly:

- Avoiding wasting energy;
- Avoiding unnecessary operations; and
- Upgrading or replacing energy inefficient plant or equipment.

Most developed countries run extensive energy conservation programmes for the farming sector, with advice and often subsidies for energy conserving practices or improvements. Consult your extension service if such schemes are available.

Step 2b: Avoiding wasting energy

- **Turn off equipment** (including lighting and tractor engines) when not needed, plan work to avoid constant starting and switching off of equipment;
- **Don't waste inputs/resources** (over-fertilising, over-high rates of seed application) as the energy "embodied" is wasted as well as the product itself;
- **Maintain machinery** in good condition and use as specified. Machinery that is badly maintained or produces sparking can be extremely wasteful. Tyres should be inflated to the correct pressure. Irrigation pumps should be tested every two to three years. Better systems for punctual and effective vehicle and machinery maintenance can reduce breakdowns as well as saving on running costs;
- **Replace inefficient lighting systems** with more modern systems, like moving towards the use of LEDs where appropriate;
- **Improve insulation and ventilation**
 - Improve building insulation and reduce draughts. Energy conservation measures can be particularly important for animal housing as described [here](#), and may include the planting and use of shelterbelts (See also the **Soil Management chapter**).
 - Have tight fitting windows and doors in your farm buildings, and seal windows that are not opened;
 - Where ventilation is necessary (E.g. In livestock barns or CPP stores), use natural ventilation wherever possible. If fans are used for ventilation, clean them regularly. Use heat exchangers for fresh/waste air in temperature controlled buildings; and
 - Insulate any hot water, steam or heating lines and pipes.

Avoiding unnecessary operations

- **Tillage** and other farm operations using machinery are energy-intensive. Avoid soil compaction that then requires sub-soiling (in addition to severely damaging the soil function and increasing the risk of N₂O emissions (See also the **Soil Management chapter**). Consider reduced tillage, shallower tillage and strip tillage with direct drilling systems, which are all less fuel-intensive than "conventional" tillage. In some systems (E.g. Cotton growing in Australia), it has been estimated that changing from conventional tillage regimes to minimum-tillage can save 10% of the farm's energy costs;
- **Guidance systems** reduce the overlap between machinery field passes and can reduce energy and time demand by around 5%;
- **Controlled Traffic Farming**⁴ combines the advantages of guidance systems, reduced tillage depth, lower tractor engine requirements and loose soil structure, delivering up to 50% fuel savings;
- **Combining field operations** on single field passes may also reduce energy demand; and
- **Good IPM systems** (See the **Agriculture – Pest, Disease and Weed Management chapter**) also often reduces the need for spraying.

Using appropriate machinery and equipment

- **Choose tractors with the right engine size** for the work demand on the farm, as this saves money and energy. Consider buying a smaller tractor and contracting heavy work out;
- **Heated or cooled storage** (E.g. For dairies) and **pumps** should be correctly sized and located. Most agricultural equipment is energy-inefficient if used inappropriately;
- **Replace standard efficiency motors with premium efficiency motors**. This can increase efficiency by 2-10%, while optimizing existing motors can result in energy savings approaching 50 percent.
 - The energy and cost savings involved if old machinery is replaced can often be very high, and needs to be checked when deciding whether to continue using older machinery or replace it. In some cases, the money saved can be so high that the new system pays for itself within a year;
- **Irrigation equipment** can be responsible for a large proportion of farm energy use, therefore the use of suitable machinery and equipment can be critical to avoiding energy wastage.

⁴ <http://www.controlledtrafficfarming.com>

- Consider replacing old irrigation pumps. Regular checking, repair or replacement of the impeller – the fan-like device found at the core of most irrigation **pumps** – is important. Adjusting or even replacing impellers can also be a good option for irrigation systems where pump power and pump demand are mismatched. Adding a smaller impeller to a system with an oversized motor, for example, minimises over-pumping – a problem that wastes energy and can lead to motor damage. Alternatively, adjusting the clearance between the impeller and the pump wall can sometimes result in significant improvements in energy efficiency. Irrigation pumps tend to be inefficient whenever overloaded or under-loaded. Try to match drive-size as closely as possible to expected loads. When dipping below a 50% load for any pump, efficiency generally plummets.
- If pump loads fluctuate widely or if pumps are often run at partial loads, adding a **variable speed drive** (VSD or frequency inverter) may be cost-effective since it closely matches output to actual demand. Variable speed drives can save between 15-40% on energy use. Likewise, VSD-based pumping systems tend to work best with time-of-use billing schedules and on deep wells with frequent stop-and-start pumping. A quality VSD can help cut down on motor noise, improve production efficiency and eliminate the “voltage sags” (often evident from temporarily dimmed lights) common to motor start-up, meaning that the benefits of VSDs extend well beyond just energy savings;
- Reducing the complexity of pumping systems** – such as having unnecessary elbow joints, bypasses and other joints creating friction – can limit redundant energy use. Slightly wider pipes can strongly reduce the energy demand, as a system with 3,000 metres (10,000 feet) of piping that pumps 2,750 litres (600 gallons) per minute using 15cm diameter (six-inch) pipes will cost about four times as much in energy bills as a system with 20cm diameter (eight-inch) pipes. Moreover, because pipe width affects pump load, accurately matching pipes to pumping loads can help extend the life of an irrigation pump.
- Pipe composition** can also affect operating costs and equipment lifespan. Rigid PVC pipes often improve suction and efficiency. Coated-steel pipes can reduce friction by more than 40% compared to uncoated pipes.
- Lighting** opportunities exist to establish more energy-efficient systems, like changing from incandescent to fluorescent or LED lighting, and using dimmers and motion sensors. Note that many countries are setting

up organised disposal systems for old fluorescent tube waste separately because of the mercury content (See the **Waste Management chapter**); and

- Well-maintained farm roads** can be cost-effective in terms of energy saving and cost saving on vehicle maintenance.

TABLE 18: ENERGY-SAVING ADVICE

Many state and national farming support programmes publish useful energy-saving advice that is available internationally. The following examples are from the UK, but good advice is available in many languages and from many sources.

FEC-Services⁵ publishes a range of guidance on energy efficiency in arable and grain operations, coverage areas of which is listed below:

- Energy Efficiency for Bulk Grain Drying
- Energy Efficiency in Dairy Farming
- Energy Efficiency in Horticulture
- Energy Efficiency in Potato Storage
- Energy Efficiency in Produce Storage
- Farm Lighting
- Farmhouse Energy Efficiency
- How to Survive a power failure
- Obtaining a new or reinforced energy supply
- Photovoltaics guide for farmers
- Renewable energy – How to decide if it’s for you
- Small scale hydro power
- Small scale wind generation
- Standby Electricity Generation for Farms
- Oilseed rape (conditions for drying) – TN 19
- Grass seed drying – TN 20
- Grain stirring for bulk stores – TN 28
- Low volume ventilation for bulk grain stores – TN 29
- Dehumidification for onion stores – TN 30
- Refrigerated egg storage – TN 39
- Air knives for drying potatoes – TN 40
- Potato chitting light safety – TN 41
- Humidification for potato stores – TN 42
- How to improve bulk grain dryer performance – TN 49
- Circular voided concrete floors for grain drying & vegetable store ventilation – TN 59
- Controlling condensation in potato stores – TN 69

- Reducing the use of materials with high “embodied” or “life cycle” energy** (i.e. materials that require a lot of energy to be produced), such as nitrate- or urea-based fertilisers, which often require a huge amount of energy to be produced and fine-tuning fertiliser application rates, timing and approach to reduce energy use, minimising N-bases GHG emissions and improve profitability.

Unilever suppliers can support the farmers that supply them to develop an energy management system and prioritise actions. Suppliers may also wish to co-ordinate bulk-purchase of more energy-efficient materials

⁵ <http://www.fecservices.co.uk>

(e.g. insulation or lightbulbs) that will benefit many supplying farms.

F63	Leading. Renewable energy
The use of renewable energy on farms should be increased, where it is available and affordable.	
Climate Smart Agriculture	
Farmers should increase the share of renewable energy in the energy mix used in farming operations, thus reducing dependency on off-site utilities that may be derived from fossil fuels. This may include using renewable fuels for farm operations as well as buying 'green power'. Renewable energy sources include wind and solar energy, hydropower, geothermal, biomass and tidal power.	

Farmers are encouraged to increase the share of renewable energy in the energy mix used in farming operations. This may include using renewable fuels for farm operations as well as buying 'green power'. Renewable energy sources include wind and solar energy, hydropower, geothermal, biomass and tidal power.

Farmers may have access to renewable and low carbon sources of electricity (E.g. 'Green energy' from the national grid and own power supplies using renewable fuels), vehicle fuel (E.g. Biodiesel or bioethanol) or boiler fuel (E.g. Fuel wood, straw, biomass pellets, etc.).

Unilever encourages shifting from non-renewable and high carbon energy sources. However, renewable energy does not always have a net positive environmental impact, since biofuels require energy to produce, and other options may have negative impacts.

Liquid biofuel use in farm machinery is not acceptable as evidence of compliance, as biodiesel and bioethanol from crops such as rape seed, palm oil, corn and wheat typically neither contribute to reducing energy consumption nor to reducing greenhouse gas emissions. This is because the production of the feedstock is energy intensive and typically relies on non-renewable sources; and there may be high greenhouse gas emissions associated with energy use, land cultivation and (sometimes) land use change. There are also other – more difficult to disentangle- secondary environmental impacts of biofuels, including competing for land with food crops; environmental impacts of agro-chemical and land use during feedstock production; water consumption of the feedstock; and higher noxious gas emissions than their fossil equivalents⁶.

The only biofuels that truly contribute to saving fossil energy and emissions tend to be those produced from genuine waste materials, such as spent cooking oils, however, sources of these tend to be limited. Many governments have set strong incentives for the aggressive expansion of biodiesel and bioethanol, and in such instances, prices may be attractive and justify their use in farming.

Small-scale hydropower projects as an option may also have negative environmental impacts, since good practice involves maintaining normal water flows in the affected watercourse to allow aquatic and associated terrestrial ecosystems to function optimally (E.g. Fish migrations), while maintaining related ecosystem services for local communities (E.g. Fishing and rafting).

Photovoltaics/solar panels can be cost-effective in the medium-term especially for lighting in remote parts of the farm.

⁶ [EEA Report 7/2006, available at http://www.eea.europa.eu/publications/eea_report_2006_7

6.2 LOGISTICS

Efficient transport of farm produce to the primary processing facility is usually – but not always – a supplier (rather than a farmer) responsibility.

S6	Expected. Transport between farm and factory
Suppliers are expected to have a documented plan for reducing energy use and waste when transporting produce between farm and factory, including organizing logistics so that produce is collected as soon as possible after harvest and minimizing the transport time between farmers' fields and factory receipt.	
Climate Smart Agriculture	
Suppliers are expected to plan and implement systems that minimise waste and inefficient use of energy during transport to the primary processing plant – preferably in partnership with farmers. In limiting wastage, more materials are useable in further production and productivity is increased, whilst not undermining the farmer and associated resilience of their business. Jointly agreed transport systems should include an element of risk sharing, so that farmers do not carry all the risks (crop loss, milk spoilage, loss of quality etc.) if transport vehicles or factory reception systems break down.	

Even where it is the farmer's responsibility to deliver to the factory, we expect this criterion to be something in which Unilever suppliers are involved. Suppliers are expected to plan and implement systems that minimise waste and inefficient use of energy during transport to the primary processing plant – preferably in partnership with farmers.

Jointly-agreed transport systems should include an element of risk-sharing, so that farmers do not carry all the risks, such as crop loss, milk spoilage and loss of quality, if transport vehicles or factory reception systems break down.

The final system implemented will obviously depend on many factors including:

- The nature of the harvested material;
- How the material is harvested, stored and the requirements for keeping produce cool between the farm and factory;
- The weather and climate at the time of harvest including considerations of air temperature and insolation during transport;
- The distance and speed of transport; and
- The road quality.

Travel routes between farm and factory should be organised carefully so as to minimise fuel use and keep product quality high. Drivers should be aware of alternative routes if there is a traffic problem.

Farmers must be made aware of the timing of the pick-up for crops from their farm or collection centre, and informed (E.g. By mobile phone), as soon as possible if the collection will be late.

Similarly, if farmers themselves deliver to a factory, they must be given good information on the best time for delivery. Long waits – especially in hot sun – not only cause the harvested product quality to decline, but also wastes a lot of the farmers' time.

Clearly, scheduling and optimal routing are important, but the speed of transport may also be important for maintaining quality.

S7	Expected. Local sourcing
Wherever practical, raw materials and employees should be from areas close to the factory in order to reduce emissions through transport.	
Climate Smart Agriculture	
This criterion is included to reduce energy use and also to help support the rural communities and rural infrastructure in the areas where our crops are grown. We encourage our suppliers to investigate local sourcing, encourage local farmers to produce the required raw materials and understand the benefits local sourcing can provide (such as greater flexibility when problems arise). In so doing, the transfer time of moving materials from farms to production facilities is lessened, energy-related emissions are reduced and the local economy is supported fostering a resilient and productive socio-ecological community.	

This criterion is included to reduce energy use and also to help support the rural communities and rural infrastructure in the areas where our crops are grown. We encourage our suppliers to investigate local sourcing, encourage local farmers to produce the required raw materials and understand the benefits local sourcing can provide, such as greater flexibility when problems arise.

We recognise that this is not always a practical proposition, and that (on occasion) the overall carbon footprint or energy use in the supply chain can be lower for more distant sourcing. Nevertheless, cost savings are likely to arise through local sourcing practices, which will in turn ensure that the local economy is integrated and more resilient.

S8	Expected. Scheduling harvest
Work with farmers to schedule harvesting as efficiently as possible and maximise yield and quality. Note that this criterion may be “not applicable” if the raw material can be stored for later processing without quality deterioration.	
Climate Smart Agriculture	
In many cases, several varieties, provenances or clones of planting material need to be used to spread yield more evenly throughout the year. For annual crops, processors often schedule sowing times to ensure a spread of harvesting dates.	

Planting and probable harvest dates must be planned and scheduled to match factory processing capacity, like in cases where:

- Several varieties, provenances or clones of planting material need to be used to spread yield more evenly throughout the year.
- For annual crops, processors often schedule sowing times to ensure a spread of harvesting dates.

Processors, preferably in partnership with farmers or farmers’ representatives, should devise fair systems for purchasing during times when the factory has insufficient capacity to process the crop or product available in order to maximise profitability for both factory and farm, whilst also to minimise waste.

Wasted production can be minimised by the use of different crop varieties (E.g. “Early” varieties, disease- or drought-resistant varieties), and varying sowing or transplanting dates throughout the growing area. For further suggestions on waste avoidance and re-use of agricultural wastes, see the **Waste Management chapter**.

S9	Expected. Transport conditions
The transport systems from field to factory must be designed to minimise quality loss in the harvested product. This may mean insulation, cooling and reducing crushing in the load. Specialized vehicles may be required.	
Climate Smart Agriculture	
By minimizing the risk of product contamination from previous loads or other materials stored or transported with the product, quality or loss of harvested products will not result.	

Transport systems must be designed to minimise quality loss. This might be through insulation, cooling and reducing crushing in the load. Specialised trailers and/or trailer inserts may be required. Systems must be in place to minimise the risk of product contamination from previous loads or other materials stored or transported with the product. To afford this, trailer inserts may be required.

6.3 ATMOSPHERIC POLLUTION AND GREENHOUSE GAS EMISSIONS

S10	Expected. Reduce Greenhouse Gas Emissions
Suppliers, in partnership with farmers, must develop and implement a plan to reduce on-farm Greenhouse gas emissions. This may be combined with the Energy Management Plan (F62)	
Climate Smart Agriculture	
“Climate Smart” agriculture requires that agricultural operations are profitable, efficient and resilient in the face of increasingly-frequent unusual weather events such as storms, heavy rain, droughts or prolonged periods of high temperature. Farming is a major emitter of nitrous oxide from inputs used, methane from livestock and carbon dioxide from the conversion of land. In adopting practices and plans that seek to reduce and minimise emissions, fewer emissions can be ensured.	

Farming is a serious emitter of GHGs. The main contributors are:

- **Nitrous oxide** (N₂O), mainly through nitrogen fertiliser use, soil tillage, manure management and peat land cultivation and energy use for producing inputs and carrying out field operations. N₂O is around 300 times more potent as a GHG than CO₂.
- **Methane** (CH₄), mainly from fermentation from the digestive system of livestock, paddy rice cultivation, manure management and energy use for producing inputs. CH₄ is over 20 times more potent as a GHG than CO₂.
- **Carbon dioxide** (CO₂), mainly through conversion of land, such as forest and savannah to crop land or grassland, but also via machinery use and transport

Efficient machinery, fertiliser and animal feed use, combined with minimal land conversion, therefore reduces the “flow” of GHGs to the atmosphere. Of course, farming can also “absorb” CO₂ from the atmosphere by storing carbon (C) in soils and standing biomass, such as trees – increasing the “flow” of C into long-term stores often referred to as “**carbon sequestration**”.

Flows (emissions and sequestration) of GHGs are much more variable and difficult to measure in agricultural systems than in industrial processes. There has however been an argument that difficulties in estimation and quantification make it impossible to manage and monitor impacts, but tools are now available that can give farmers the insights and support they need to make a positive impact in this area.

Unilever has with other partners, developed the “Cool Farm Tool”, an easy-to-use agricultural greenhouse gas

calculator⁷, that helps identify main sources of agricultural emissions as well as practical management options farmers can take to reduce them.

This requirement has been introduced to SAC2017 to ensure that farmers, preferably together with other farmers and Unilever suppliers, review the output of the “Cool Farm Tool” or other GHG assessment system and that opportunities for reducing emissions have been evaluated.

F64	Expected. Use of fire
Fire should not be used for land preparation or in-field disposal of harvest residues. If fire is used, there must be no practical alternative, and setting the fire must be on the documented recommendation or instruction of a recognised authority (e.g. for phyto-sanitary or public health reasons). All fires must be managed carefully to ensure minimal risk and damage to people, property and the environment, including minimizing smoke nuisance.	
Climate Smart Agriculture	
Unilever strongly discourages the use of fire in land preparation and post-harvest disposal of residues, as this is hazardous for workers and surrounding communities; difficult to manage and can engulf areas not originally planned for burning; and destroy soil organic matter, flora and fauna. The implications of fire are negative for all CSA themes.	

Unilever strongly discourages the use of fire in land preparation and post-harvest disposal of residues.

Using fire:

- Is hazardous for workers and surrounding communities;
- Is difficult to manage and can engulf areas not originally planned for burning; and
- Destroys soil organic matter, flora and fauna.

Where fire is used, it must be demonstrated that:

- There are no viable alternatives, like where in cases an authority has recommended such practices (e.g. for phyto-sanitary or public health reasons or elimination of invasive species/crop sanitation that eliminates a disease source);
- Burning has been done in accordance with the law and all relevant regulations (E.g. Health and safety, fire protection, environment and conservation, etc.);
- All people involved in the decision must be highly informed of the risks and consequences; and
- Supervisors (and preferably all workers involved) are trained on fire management.

If fire has to be used in land preparation, the smoke must be minimal and should not give rise to complaints from neighbours. Extreme care must be taken to ensure that the fire does not spread outside the planned area. Fire must never be used on organic soils (peat) that can catch fire.

For information on fire safety issues for buildings and stores see the **Social and Value Chain chapters**.

F65	Leading. On-farm generators, incinerators, biodigesters, etc.
On farm heat, energy generation and incineration systems must be suitable to requirements and should only be used with appropriate fuel mixes. Regular maintenance of equipment and pollution control technology should be made to ensure clean and efficient burning. All incinerators and burning sites must be in legal locations and sited to minimise problems and complaints from the local community.	
Climate Smart Agriculture	
The control and selection of appropriate heat generating systems manages related emissions and reduces the generation of pollution from source.	

Open burning of waste, or disposal in incinerators or boilers (with or without heat recovery) is common in rural areas and on farms all over the world, even where it is illegal. Illegal waste burning is unacceptable.

Generators, boilers, incinerators and burning sites must be in legal locations and fit for purpose. Where waste is burnt/incinerated on-farm, the smoke should be minimal and should not give rise to complaints from neighbours (including farmers and workers on the farm).

Incinerators must be designed and maintained to dispose of the wastes generated on-farm. Many general-use incinerators are not suitable for disposing of animal carcasses, medical waste or pesticide-contaminated waste. If a suitable incinerator is not available on-farm, one may be available within the local municipality or (for animal carcasses) at a veterinary surgeon or butcher's premises.

Ash from on-farm incineration of pig or poultry carcasses or from wood-burning or waste-burning boilers used to dry or process crops (E.g. Tea and palm oil) may be a useful soil amendment or addition to compost. Ash has a very high pH (i.e. it is very alkaline) and should be applied sparingly and not at all to crops requiring low pH soils, like tea.

⁷ <https://www.coolfarmtool.org/>.

Waste materials that must not be incinerated

Care must be taken to ensure that inappropriate materials are never burnt on open fires or in low-temperature incinerators.

The following must **not** be burnt on farm except in specialised facilities (which are highly unlikely to be found on farms):

- Unsorted plastic materials. For some plastics, incineration is a reasonable option, **but not for all kinds**.
- Plastics containing **organochloride-based substances** (E.g. PVC), as burning creates harmful dioxins. These are known to be highly toxic, carcinogenic and endocrine-disrupters.
- **Polystyrene** (E.g. Many foam cups, fruit trays, meat trays, egg and some dairy produce containers) as burning can release styrene gas.
- **Plastics contaminated with CPPs/pesticides**.

Care must be taken that old batteries (which contain heavy metals) and other potential sources of soil or crop contaminants are not incinerated, especially if the ash will be re-used. There is also a danger of explosion from some types of batteries.

Please see the **Waste Management chapter** guidance further guidance on waste disposal and bio-digesters and the **Value Chain chapter** for waste storage

APPENDIX 6A: RESOURCE LIST

Greenhouse Gas Emissions and Agriculture

General

Jessica Bellarby, Astley Hastings and Pete Smith (2008): Cool farming: Climate impacts of agriculture and mitigation potential. Published in January 2008 by Greenpeace International. Can be downloaded from the Greenpeace website: <http://www.greenpeace.org.uk/>

Helen C. Flynn and Pete Smith (2010): Greenhouse gas budgets of crop production – current and likely future trends. First edition, IFA, Paris, France, January 2010. Copyright 2010 IFA. All rights reserved. Can be downloaded from the IFA's website: <http://www.fertilizer.org>

Watch the Sustainable Food Lab website (<http://www.sustainablefoodlab.org>) for up-dates on the Global Agriculture and Climate Assessment (GACA), a multi-partner farmer focused project looking at farm-level management of greenhouse gases. Started in February 2010, first results expected late 2010.

Energy use and greenhouse gas emissions from dairy farming

Energy module of Caring Dairy™ (Ben & Jerry's and CONO): <http://www.benjerry.co.uk/values/how-we-do-business/caring-dairy#12timeline>

Energy module of the Dairy Stewardship Alliance (Ben & Jerry's, the University of Vermont's Center for Sustainable Agriculture, the St. Albans Cooperative Creamery and the State of Vermont Agency of Agriculture): <http://www.benandjerrys.com/activism/inside-the-pint/more-about-milk/dsa>

The Dairy Sustainability Initiative's website contains a growing list of best practice case studies: <http://www.dairy-sustainability-initiative.org/Public/>

Greenhouse gas and energy calculators

The Cool Farm Tool (produced by Unilever and the University of Aberdeen) is freely available: <https://www.coolfarmtool.org/>

Other calculators: there is an ever increasing list. Many are good but very local or systems specific. Examples are: C-Plan Carbon Calculator (designed for British Isles): <http://www.see360.org.uk/>

USDA – energy estimators. The user must enter a zip code to use the tools. Users outside the USA need to find a part of the USA with similar climate to their own, find a business there by using a web search, and then enter the appropriate zip code

- for Nitrogen: <http://nfat.sc.egov.usda.gov/>
- for tillage: <http://ecat.sc.egov.usda.gov/>
- for irrigation: <http://ipat.sc.egov.usda.gov/>
- for animal housing: <http://ahat.sc.egov.usda.gov>

Australian wineries:

<http://www.wfa.org.au/resources/carbon-calculator/>

Find out how to reduce energy consumption without sacrificing productivity:

Holos

A very neat tool for farming in Canada: <http://www.agr.gc.ca/eng/science-and-innovation/science-publications-and-resources/holos/?id=1349181297838>



7 WASTE MANAGEMENT

Waste is often a hidden cost on farms, and it is only when farmers understand the “true cost” of their waste that improvements are undertaken. In many cases, a small amount of training of the workforce (E.g. In waste segregation) can be very effective in reducing total waste or the cost of waste management. Waste management is important to improve profitability on-farm and to reduce risks to people and the environment.

Improving profitability by reducing waste or finding other uses for waste

Waste costs money, and farm waste is no exception.

Wasted production – when no buyer can be found for the crop or product – is the most obvious form of costly waste, but other forms of waste also represent missed opportunities. Proper waste disposal can also be costly, and it therefore makes sound business sense to use the “waste hierarchy” to reduce, re-use, and recycle waste wherever practical. The era when all types of farm waste could be conveniently disposed of together in holes in the ground on the farm has gone – this is no longer acceptable to governments, local communities (who may be harmed by leachates from waste dumps) and buyers such as Unilever.

Reducing risks to people and the environment

Wastes often pose risks to people and the environment, especially if stored or disposed of thoughtlessly. Typical farm waste includes both non-hazardous and hazardous solid and liquid waste streams. Suppliers and growers need to perform their own risk assessments based on knowledge of the wastes their own businesses produce and the environment in which they operate to determine the best course of action in order to reduce risks to people and the environment. Where there is no legal requirement for waste management locally, this implementation guide attempts to collate sources of information on good practices from a wide variety of sources, applicable worldwide.

Note that while this chapter deals with a number of waste management aspects, waste storage is covered under the **Value Chain chapter**.

7.1 GENERAL

F66	Expected. Waste Management Plan
	A waste management plan must be in place, designed to minimise waste, in particular, food loss and waste. This includes estimates of the major waste flows from the farm and/or the Unilever raw material production system (type of waste and estimate of how much is produced) and the waste prevention, minimisation, re-use, recycling, energy recovery and safe disposal operations that should be in place for each type of waste.
	Climate Smart Agriculture
	Waste minimisation is an appropriate option for non-hazardous agricultural wastes, such as machinery, plastic mulch, crop waste, un-harvested or unsold crops, and irrigation and water run-off. In combination with prevention, re-use, recycling and appropriate disposal options, impacts of waste on the socio-ecological resilience of the farm are minimised.

The Waste Management plan should be documented.

Suppliers may prepare the plan in partnership with/on behalf of smallholder farmers who supply them.

Templates for waste management plans are often available from local or national government organisations, for example [here](#). Such “standard” forms can be adapted by adding in notes on options for reductions, re-use or recycling under investigation.

Wherever possible, Unilever suppliers and farmers should design their systems together in order to reduce waste. Suppliers are often in a position to encourage farmers to group together to manage waste better. For example, recycling or composting agricultural waste may be impractical for individual farms, but a good option for a farmer group or collective. Because of its low value, waste is often less expensive to manage properly if it can be bulked together on larger farms, by farmer groups or by farmers in association with a processor or wholesaler. Waste disposal contractors, local authorities, or recycling businesses are more prepared to take waste materials from well-managed bulk stores than small on-farm stores of mixed materials.

In some parts of the world, the provision of good waste storage facilities is also an opportunity for the farmer group, the local community or local entrepreneurs to start a recycling business (E.g. Plastics and glass) or for hazardous waste (E.g. Batteries) to be managed correctly.

Step 1: Estimate of major waste streams

This means that:

- The main sources of waste; and
- The main types of waste have been identified.

Understanding the main types of waste created on the farm is the first step towards reducing waste and improving waste re-use, re-cycling and disposal.

Step 2: Use the “Waste Hierarchy” concept to identify the best option for management of each waste stream. The management plan must list the:

- Waste prevention;
- Waste reduction;
- Reuse; and
- Recycling options already in place and those under investigation, and
- Routes of energy recovery; or
- Disposal for other wastes.

Waste prevention and reduction

Options for on-farm waste reduction obviously vary considerably with the production system and region of the world.

- Farmers should evaluate market opportunities for the crops they plant and animals farmed before committing to decisions on farm priorities. Where suppliers have access to relevant market information that is difficult for farmers to access (E.g. International trends in prices), this information should be shared with the farmers that supply them;
- Farmers in the processors’ “catchment” should only plant/fertilise/harvest the amount of produce that can be transported to, and processed in, the primary processing factory. Where climatic conditions during the growing season influence the timing and amount of final yield, processors should inform farmers as soon as possible if their produce is unlikely to be required, to give them the maximum opportunity to find other buyers or to use the land for another crop or as grazing. Processors, preferably in partnership with farmers or farmers’ representatives, should devise fair systems for purchasing during times when the factory has insufficient capacity to process the crop or product available;
- Harvesting machinery and timing should be optimised to harvest as high proportion of the crop as practical, leaving as little as possible in the field as waste;
- Transport from farms to primary processing facilities should be efficient, and arrive at collection points and delivery points at agreed times in order to minimise losses in volume or quality before arrival or spoilage during storage;
- Collection and/or delivery should be phased to avoid long waits;
- Delays in collection of farm products (E.g. If the milk collection lorry has broken down) should be communicated to farmers as soon as possible;
- Systems should be designed to minimise the risk of spillage (with associated losses or contamination risks) at all points between harvesting and processing; and
- Transport from fields to primary processors should be in vehicles or trailers that do not result in damage to the crop. This may involve designing or modifying trailers, for example to allow airflow through the harvested product, or to insulate or cool the harvested product during transport. For many foods, it is important to design transport systems that limit the amount of crushing at the bottom of the stack.

Waste re-use and re-cycling

Waste re-use and re-cycling options are increasingly available in rural areas throughout the world, including oil-purifying services for old **engine oil**, and re-cycling **plastics**.

Energy recovery

If waste biomass is available in high volumes locally and composting is not an option, or if properly sorted plastic is available, then heat or power generation from the waste is a much better option than landfill disposal. In rural areas where there is no paper-recycling infrastructure, and local factories use wood or biomass as fuel, burning waste office paper or cardboard can be the best method for disposal. However, processing facilities or on-farm incinerators should not be used to burn 'waste biomass' inefficiently just to get rid of it; composting is often a better option.

F67	Expected. Improvement in Waste Management
There must be improvements in waste management over time. The plan shall include a timeline and monitoring system showing how waste management has been improved.	
Climate Smart Agriculture	
Not applicable	

This includes improvement programmes designed to decrease the proportion of unharvested crop left in the field or losses during transport, and also developing better options for waste management locally in partnership with others, and/or lobbying local governments or businesses to set up such systems.

Once "best in class" waste management practices have been adopted (and only minimal /necessary waste is created), maintenance of this exceptional level of performance will, of course, be desired.

F68	Leading. Constraints on improvement
There must be improvements in waste management over time. The plan shall include a timeline and monitoring system showing how waste management has been improved.	
Climate Smart Agriculture	
Not applicable	

The reasons for not adopting any reduction, reuse or recycling options available should be justified and documented in the waste management plan.

F69	Leading. Value creation from waste
Options for value creation from current waste streams should be investigated.	
Climate Smart Agriculture	
Actions like the use of waste biomass for composting, the use of factory effluent and vegetable washings for fertigation and the use of processing waste as soil conditioner are means for increasing productivity of the farm.	

Processors, farmers' groups or larger farms should identify which of their current waste streams might be able to generate value, rather than being a disposal problem.

Examples of this include:

- The use of waste **biomass** for composting, as soil amendment or for its calorific value. Waste biomass (e.g. Bagasse) should not be burnt inefficiently just to dispose of it, if it can be put to better use;
- Use of, for example, **factory effluent and vegetable washings**, for fertigation;
- Use of processing waste as **soil conditioner or animal feed** for local farms;
- Recovery of **soil** transported to the factory with vegetables, followed by re-using the soil for agriculture or gardens around the factory;
- Collection and sorting of **plastics** for recycling and, if safe to burn, for their calorific value (E.g. Polyethylene, polypropylene in low doses in wood-burning or bagasse-burning boilers); and
- **Building waste** after demolition can sometimes be crushed and used for road-repairs or making gabions to help with erosion control on farms.

Plans should be made to find uses for "**2nd grade**" **agricultural produce** if this is a significant problem, especially if this results in rejection for normal processing. Can the "waste" material become a raw material for a different product? On the other hand, can it be used to create compost or used as liquid fertiliser?

Biodigesters

The most common type of digester on farm is a “wet biodigester”, and is used to digest liquefied manure, compostable material and slaughterhouse waste on farms around the world in order to generate methane to power stoves. Biodigesters of this type can be relatively inexpensive and simple to build, although methane (a greenhouse gas) leaks from poorly managed simple systems can be significant, as evidenced [here](#). More sophisticated “dry” and “wet” biodigesters are found associated with many large animal husbandry operations, and can be an excellent way of creating value from waste materials. Such installations have particular health and safety risks, covered by criteria F99 and F152.

Composting

Some wastes provide excellent opportunities for reducing costs of fertiliser or soil amendment, or of waste transport, by spreading on the land, or by composting on-site or at a centralised facility. In some cases, combining wastes from different farms or farm processes provides a good basis for compost.

Care is needed to ensure that farm wastes containing biocides, or sterilising agents (E.g. Bleach) or plants treated with certain herbicides, or animal waste after the use of certain drugs, do not enter the compost. If household waste (“kitchen waste”) is used as an ingredient in compost, particular care needs to be taken that it is sorted carefully before composting to ensure that sources of heavy metals (E.g. Batteries) and dangerous shards of broken glass are excluded.

When composting, it is important to try to optimise the Nitrogen: Carbon ratio. This usually means that a high Nitrogen-containing waste (E.g. Chicken manure or other manures) should be combined with high Carbon wastes such as most crop residues, cardboard and paper. Potassium content can be enhanced by using the appropriate amount of wood ash, if this is available locally.

Examples of useful agricultural-waste-based compost ingredients include:

- Manures;
- Other biodegradable wastes from animal husbandry e.g. wood chippings, spoiled straw, wood or paper-based;
- Animal bedding;
- Processing-waste e.g. rejected fruit or vegetable materials;
- Unsold crop; and
- Wastes from polytunnel cultivation or other forms of intensive horticulture.

Substrate from bags can be re-used to make new bags.

Mycelium must be removed and substrate needs to be well pasteurized or converted into compost. Substrate bags can be converted into compost as follows:

- Break bags open and send plastic bags to be collected by municipality;
- Mix substrate with effective microorganism (EM) and sugar, and maintain humidity at 65-75%;
- Place in used rice bags for a period of approximately 30 days or on the ground under the shade; and
- Compost is then ready to be used in gardens, rice paddies or sold as organic fertiliser.

Organic matter can also be applied directly to the land, for example by spreading dredgings and plant material from ditches, or spoilt crops from stores onto the land. This may also include diluted waste milk.

FAO has published useful manuals for both small- and large-scale on-farm composting^{8,9}.

Guidelines for composting agricultural wastes may also often be available from local authorities.

Manure and slurry management

The management of manures and slurry is relevant to animal welfare, soils, nutrients, water and social aspects. The DEFRA Code of “Good Agricultural Practice” for farmers, growers and land managers “Protecting our Water, Soil and Air” has excellent sections on manure management. Other useful factsheets on manure and slurry management are available [here](#) including:

- The A to Z of farm waste - TN 31,
- Waste production - TN 32,
- The Venturi aerator - TN 33,
- Slurry treatment systems - TN 34,
- Slurry stirring - TN 35
- Separation of slurries - TN 36,
- Composting of separated animal wastes - TN 48.

Ash from on-farm incineration of pig or poultry carcasses or from wood-burning or waste-burning boilers used to dry or process crops (E.g. Tea and palm oil) may be a useful soil amendment or addition to compost. Ash has a very high pH (i.e. it is very alkaline) and should be applied sparingly and not at all to crops requiring low pH soils.

8 http://www.fao.org/ORGANICAG/doc/On_farm_comp_methods.pdf

9 ftp://ftp.fao.org/agl/agll/docs/lwdp2_e.pdf

F70	Mandatory (legal requirements) / Expected. Storage and disposal of hazardous waste
Tick whichever applies – F70a or F70b F70a. If there are national regulations for the safe storage and disposal of different types of hazardous waste, these shall be complied with; F70b. If there are no regulatory requirements, then guidance on the best available options available must be sought, and advice taken.	
Climate Smart Agriculture	
Not applicable	
WASH Principle	
Hazardous waste poses a major risk to contaminate water reserves. In semi-arid and arid regions where water supply is limited, communities face a potentially higher risk to exposure of contaminated water, if water used for drinking and domestic use becomes contaminated, especially if treatment of water does not take place. It is therefore in the interest of safe water, sanitation and hygiene that hazardous waste be disposed on to regulatory or best practice standards.	

Clearly, if there are national regulations for the safe storage and disposal of different types of hazardous waste, these shall be complied with. If there are no regulatory requirements, then guidance on the best available options available must be sought, and advice taken.

In the absence of local regulations and advice on disposal, please check for internationally applicable advice. The following gives some general advice for the types of hazardous waste you are likely to encounter on farm:

CPP Waste including CPP Containers

Recommendations for the safe disposal of CPPs and CPP-contaminated materials can be found in the CropLife International “Guidelines on the Safe and Effective use of Crop Protection Products”, the CropLife International “Guidelines for the avoidance, limitation and disposal of pesticide waste on the farm” and in the FAO “Pesticide Storage and Stock Control Manual” (See also Appendix 7D of this document for details). The manufacturer, dealer, and/or local regulatory authorities should also be able to provide information on the best method of disposal in your locality – in some parts of the world, for example, it is legal to dispose of triple-rinsed containers to landfill, while in others it may not be.

Many CPP companies are now reducing the need for rinsing and/or difficult decisions about disposal of used containers by packing products in containers such as mini-bulks, water-soluble bags and packets, or plastic jugs containing granular materials. Consider using these.

Triple-rinsing and Puncturing

Ideally, empty containers should be triple-rinsed (e.g. small pots diluted in backpacks) or pressure rinsed (e.g. if the spray tank has this facility) before disposal. The best way to do this is usually to use the rinsings to dilute the product in the tank mix – this way you also get to use ALL the CPP you paid for! In addition, the longer you leave them unrinsed, the harder it is to remove contaminating CPP from the container.

They should then be punctured and stored in a designated and secure storage facility for later disposal by return to a supplier or recycling agent.

Some CPP suppliers, who have the appropriate facilities, take away used containers when they supply new products. You should check if this option is available and use if possible.

Contractors

If suppliers are unable to take back used CPP containers, off-farm disposal should ideally only be via contractors registered for handling and disposing of CPP waste. See also F75.

To find out if such contractors exist in your country or region, contact CropLife International (<http://www.croplife.org>), the trade association for CPP manufacturers and distributors.

If contractors will only take a minimum volume of containers, discuss whether your local group of farmers (for example grouped depending on who you supply produce to or as part of a farmer- or rural- association) produce enough waste to be able to join together to justify a common store and joint contract for disposal.

Incineration

If contractors are not available, certain types of high-temperature incinerators (for example those used for disposing of medical and other hazardous waste) can be used to dispose of used CPP containers. Check if this is an option in your area. **Do not incinerate on farm** – farm and slaughter-house incinerators do not have the required specification.

CPP contaminated waste transport

If you transport used containers to a store or disposal site yourself, make sure the waste has secondary-containment and is clearly labelled as “hazardous waste” during the journey, in case of accidents.

Where disposal options are limited

Unfortunately, many farmers in the world – especially **smallholders** – do not have access to safe storage for used CPP containers and contractors for safe disposal.

On such farms, less-than-ideal methods must be used to dispose of containers and other CPP-contaminated waste.

Triple-rinsed CPP containers must be punctured or cut apart as soon as possible after use, in order to prevent re-use.

The best option, if local laws permit and only as a last resort, is to bury the containers in a location on-farm where:

- children and animals will not have access;
- there is no chance of directly contaminating ground or surface water with leachate or runoff.

In parts of the world where rural latrines are often deep holes in the ground (“long drops”), throwing the punctured/cut-apart container down the latrine is probably the best option.

In this case, immediate disposal is better than storage.

Under no circumstances should old CPP containers be burned on-farm. This practice is dangerous and is not recommended by either CropLife International or the Food and Agriculture Organisation.

There are several videos available on line to help understand what good CPP waste storage and disposal looks like, the following are a selection, but please search online for help in different languages relevant to different regions:

USA (University of New Hampshire) – Pesticide Storage and Disposal <https://www.youtube.com/watch?v=by2OYNQAXoE>

USA (Pesticide Stewardship Alliance) - how to clean caged CPP tanks for recycling - <https://tpsalliance.org/mini-bulk-ibc-mgmt/container-videos-training-materials/>

Latin America (CropLife) – How to perform triple-rinsing <https://www.youtube.com/watch?v=HAWbSIh0ZFI>

Occasions may arise when disposal of CPP containers containing left over product will become necessary, for reasons that may include stock becoming outdated, found to be unusable or because the product is no longer registered for its original purpose. Advice from pesticide suppliers or a

government authority should be sought if disposal of large quantities of pesticide is required.

The following table summarises the recommendations for different types of CPP-related waste.

TABLE 19: MANAGEMENT OF HAZARDOUS MATERIALS

Expired concentrate	Minimise occurrence through stock-control. Return to supplier or national authority, and if they will not accept it, find out if there is a licensed incinerator available that can safely dispose of the product. For large quantities, seek specialist advice from the national authority.
Sprayer washings	Add to the spraying liquid and apply to the field.
Containers	Triple rinse, puncture (except aerosols), recycle or recover (preferably, if facilities exist), dispose at licensed disposal facilities (if they exist), bury on-farm as last resort. Do not incinerate on-farm. If containers are not disposed of straight away, they should be labelled as ‘hazardous waste’ and placed in a secure (locked) area. This prevents them being taken and used for other purposes.
Coated seed	Minimise occurrence through stock-control and by using in the field as advised wherever possible. If this is not possible, contact supplier to see if unwanted seed can be returned for disposal.
Other CPP contaminated material	Hazardous material, which cannot be triple rinsed (e. g. paper, spillage residues) should be disposed of at a site licensed to accept hazardous waste. If such sites are not available, contaminated material should be buried on farm, but only as a last resort, and only when there is no risk of contaminating water supplies, dwellings or crops.

Small Quantities of Obsolete CPPs

For a guideline on the management of small quantities of unwanted and obsolete pesticides, visit this [link](#).

Waste from toilets and sanitary facilities

This waste carries risks of disease, and is covered specifically in criterion F73.

Medical Waste

Medical Waste from plantations and farms in relation to on- or off-site small clinics, first aid facilities, or health centres.

Improper handling of waste from health facilities can create major health risks for patients and their relatives, hospital staff and local populations. Medical waste disposal is a considerable problem for resource-constrained

countries. In particular, small, remote health centres often struggle, as do plantations and farms who run clinics and small hospitals as the amount of waste is small and does not allow for high investment.

Obviously, if specialised waste-disposal contractors are available, or if local hospitals can take the waste for proper incineration, these are the best options.

Otherwise, the best solution is to use a small but well-functioning incinerator.

If different waste streams are always separated at the time of use in clinics, hospitals or home-visits then the total volume of medical (hazardous) waste is much reduced.

Different colour-coded collection bins or vessels should be in place for the various types of waste in clinics and hospitals. While household-like waste (E.g. the packaging for a syringe) is normally filled into black bags, for infectious waste red bags are used. Sharps (E.g. The syringe needle after use) should be disposed of in standardised WHO-sharps container or any other clearly-labelled container made of glass or rigid plastic. Doctors or nurses, who are the people able to understand which wastes are infectious, need to segregate the waste immediately after production. Waste segregation reduces the overall cost of waste disposal since the total volume of infectious waste is reduced. Because the volume of contaminated material is relatively low, it should be much easier to autoclave/burn the contaminated material at high temperature, and then dispose of the residue carefully.

Mercury-containing waste

If mercury-containing waste is not disposed of correctly, mercury can travel from the soil to enter watercourses, making shellfish and fish unsafe to eat.

The main risks of mercury-containing waste on farms and in factories are mercury-in-glass thermometers and humidity sensors, and fluorescent lamps.

Mercury-in-glass instruments should not be used in any food factory or agricultural area, because of the risk of contamination (See also the **Value Chain chapter**). Modern alcohol-containing thermometers, or electronic instruments are of high quality and relatively inexpensive and should be bought to replace mercury-in-glass instruments.

Old or broken mercury-containing instruments must be stored safely and separately and disposed of in accordance with the law. Fluorescent lamps contain small quantities of mercury, cadmium and antimony. However, the risks of improper disposal have to be balanced against the benefits (in terms of energy saving) of switching from incandescent bulbs and it is generally considered much better to use fluorescent lamps (although LED technology is developing rapidly and in many cases now provides cost-effective lighting solutions without the associated disposal problems).

Governmental regulations in some countries require special disposal of fluorescent lamps separate from general and household wastes. In some areas, recycling is available to consumers and in others, only commercial or industrial users of fluorescent lights have a duty to recycle.

Asbestos

Only people wearing masks and gloves may handle old asbestos roofing and insulation. All waste should be double-bagged or double-wrapped in plastic sheeting, with the correct hazard warning signs attached. Licensed contractors for asbestos handling and disposal operate in most countries.

F71	Expected. Waste Disposal on-farm
	All on-farm landfills and discharge to drains, sewers, land or groundwater (including cesspits, soakaways, septic tanks and pit latrines) must be listed. Associated risks to human and environmental safety must be assessed, and actions undertaken to improve the situation where significant risks exist.
	Climate Smart Agriculture
	Not applicable

The listing or mapping of waste disposal sites on the farm will normally form part of the waste management plan. This includes cess pits, soakaways, septic tanks and pit latrines, as well as any landfill sites.

Risks that need to be considered include

- Contamination of ground or surface water with material that is
 - Toxic;
 - Carries biological hazards (pests, diseases);
 - High in Nitrogen (as this carries risks to drinking water quality and of eutrophication of surface waters);
 - Smells or tastes unpleasant; and
 - May lead to unacceptable contamination of irrigated crops (for example, runoff containing pesticide residues).

- Polluted irrigation water may contaminate crops or help spread diseases carrying bacteria, worms, protozoa, viruses or helminths; schistosomiasis, prevalent in some regions due to irrigated agriculture;
- Water may be polluted by discharge to drains, sewers etc. and also by leachate from landfill sites; and
- Disposal sites that are attractive for vermin and flies can lead to problems as vermin
 - Then transfer hazardous waste materials from safe to unsafe locations; and
 - Lead to increase in populations that cause nuisance or spread disease.

F72	Expected. Location of on-farm disposal sites
All on-farm waste disposal and composting areas (e.g. for domestic waste) must be at a safe distance from living areas and/or waterways.	
Climate Smart Agriculture	
Not applicable	

Disposal sites, composting areas and storage sites for waste awaiting energy recovery must not create a safety or health hazard. As a minimum, they must be at a safe distance from living areas and must not contaminate ground or surface waters.

The “safe distance” should be determined by a risk assessment, taking into account the design of the disposal/composting site and the characteristics of local soil, ground and surface water systems. Waste storage, disposal and composting sites, properly designed to discourage vermin, limit unpleasant odours, limit flies and contain leachate may be located closer to living areas than less well designed and managed sites.

The separation of manure storage areas or human sanitary waste from habitation or watercourses is especially important to ensure that sewage containing pathogens does not enter the food chain. Fish and shellfish grown in ponds or rivers carrying animal or human waste, or runoff from agricultural areas (as is very common in parts of Asia), risk contamination by pathogens (E.g. Hepatitis A) or CPPs.

Septic tanks are typically required to be at least 10m from a watercourse and 50m from water abstraction points in local building regulations. The “safe” distance locally should be legal and take into account the local soil characteristics and location of the watercourse and associated vegetation.

Landfill disposal sites on farms must be well away from watercourses and the volume of waste and containment (I.e. The geological structure or man-made structure used) sufficiently well-contained that leachate does not pollute ground or surface water. Ideally, only inert materials should be landfilled. Local or national authorities may provide useful information on management of on-farm landfills. A good example (for Lachlan County, Australia) is available [here](#).

F73	Expected. Location and construction of sanitary landfills
Toilets on the farm must never discharge, directly or indirectly into surface water. All sanitary landfills on the farm must have been designed and managed according to the requirements of applicable national legislation OR, in the absence of legislation, in accordance with the Guidance provided by this Code.	
Climate Smart Agriculture	
Not applicable	

Criterion F77 states that “Workers in or near buildings must have access to clean toilets, hand washing with soap, and food storage facilities”. Toilet provision should ideally be available for workers throughout the farm, and many Unilever suppliers of fruit and vegetables are now working to standards that require workers to have access to toilet and hand-washing facilities in the field. Unilever is committed to the aims of the WASH (Water, Sanitation and Hygiene) initiative to work towards eliminating open defecation, and encourages all farms to invest in toilet provision for workers.

For smaller operations, this will result in having to dispose of small amounts of sanitary waste (E.g. From one mobile toilet). Larger farms and plantations have to deal with relatively large amounts of sanitary waste from accommodation, offices, processing facilities, as well as in the field. In all cases, responsible disposal of sanitary waste is extremely important.

For small amounts of waste, such as that generated by mobile toilets, if disposal cannot be arranged via specialised contractors, burial is usually a good solution, with the site being chosen carefully to minimise risk to people, the environment and product quality (I.e. May involve a HACCP assessment, see also the **Value Chain chapter**). The disposal site clearly must be chosen to minimise the risk of discharge or leaching into watercourses.

In cases where septic tanks or composting toilets are used, their proper management should allow for emptying not more than once a year.

The World Health Organisation has an excellent and detailed book covering a wide range of sanitary options for use on-site. Many options (E.g. Composting toilets, pit latrines and septic tank systems) are applicable to rural areas and remote parts of farms where water supply and municipality sewage systems are not available, and are described [here](#).

Where legislation does not exist, sanitary landfills must comply with World Health Organization (WHO) guidelines.

TABLE 20: SAN STANDARD ON SANITARY LANDFILL MANAGEMENT

The **SAN Standard** provides a useful summary of WHO guidelines for larger-scale disposal:

- Key aspects of sanitary landfill management include:
- The landfill treatment capacity is in accordance with its aerial extension. For example, the World Health Organization (WHO) recommends an area of 1.25 hectares for the treatment of 250 tons of waste per day depending on the climate and type of waste;
- The landfill includes elements such as lining the bottom with clay or a synthetic liner when the soils are very permeable (sandy), the systematic covering of fresh waste with soil, drain construction, leachate treatment, the evacuation of gas, and final sealing, as established by best landfill design and management practices and by applicable laws.
- Waste classed as toxic or dangerous by applicable national and local laws or by the WHO is not deposited in the sanitary landfills.
- As part of the initial design, the final use of the site is defined and planned.

Source: <http://www.san.ag/biblioteca/biblioteca.php?cat=10>

The Centre for Alternative Technology (UK) has good information on small-scale toilet provision, including composting toilets and small-scale sewage treatment plants, which can be found [here](#).

Although sanitary waste must not be applied to Unilever food crops, recycling as fertiliser for E.g. Timber or bio-mass production may be possible locally.

F74	Expected. Litter
Measures must be in place to ensure that the farm is clean and tidy. Plastic waste and other litter must not be left in fields, field margins, around the farm or on roadsides. Farmers and workers must not throw litter and other general waste into ditches, stream-ways or holes that might flood (and thereby give rise to ground- or surface-water flow-blockage or contamination), but dispose of litter responsibly.	
Climate Smart Agriculture	
Not applicable	

Plastic waste and other litter should not be left in fields, field margins or around the farm and roadsides. Large farms and plantations should provide litter bins around the farm for workers to use, empty them regularly and train workers to use the bins.

The use of biodegradable plastics on farms, such as with poly-tunnels, is becoming an increasingly practical option for minimising agricultural plastic waste.

F75	Expected. Off-farm waste disposal
All waste-disposal contractors and services used must have the appropriate legal approvals to handle the types of waste involved. If no legal approval system is in place locally, farms must take steps to assure themselves that waste management contractors do not dispose of the waste illegally or in ways that are socially or environmentally damaging.	
Climate Smart Agriculture	
Not applicable	

Improper or insecure waste disposal is obviously a reputational risk for the farm, supplier and Unilever, and farmers (or suppliers on their behalf) are responsible to ask for assurance that the carriers and contractors they are using do indeed dispose of the materials they take responsibly.

Waste disposal off-farm should take place using contractors who have legal approvals to handle the types of waste involved. If you transfer your waste to a contractor or carrier, then they will usually need permits or authorisations to carry hazardous waste. You should always ensure that these permits are current and appropriate for the waste concerned.

If there is no local system for authorising waste disposal contractors, the farm still has a responsibility to take reasonable care to ensure that contractors who take their waste away recycle or dispose of it responsibly.

Baling, compacting, shredding or pulverising bulky waste at the point of production, using available agricultural machinery, can often reduce costs of transport or storage (E.g. Using a compactor bin to crush waste, baling plastic and crushing clean CPP containers).

F76	Leading. Documented waste disposal
Consignment notes or other documents are used to confirm transfer of wastes to contractors. Documentation includes the dates, volumes and types of wastes disposed of.	
Climate Smart Agriculture	
Not applicable	

Consignment notes or other documentation should be used to confirm transfer of wastes to contractors, and the dates, volumes and types of wastes disposed of.

Documentation must be kept and made available to auditors for at least 2 years and should preferably be stored for 5 years.

APPENDIX 7A: REFERENCES

General Guides to agriculture waste management

SAN Standard – waste sections of the general SAN Standard. 2005 version provides useful “indicators” which can be used as guidance.

Saving Money by reducing waste. Waste minimisation manual: a practical guide for farmers and growers. PB11674. DEFRA and the BOC foundation, April 2006: <https://www.gov.uk/government/publications/saving-money-by-reducing-waste-a-practical-guide-for-farmers-and-growers>

USDA Natural Resource Conservation Service’s Agricultural Waste Management Field Handbook: <http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/ecoscience/mnm/?cid=stelprdb1045935>

CropLife International Guide “Safe and effective disposal of empty crop protection product containers”: https://croplife.org/wp-content/uploads/pdf_files/Brochure-Container-Management-Safe-and-Effective-Disposal-of-Empty-Crop-Protection-Product-Containers.pdf

Stewardship Community Presentation on ‘Disposal of Empty Crop Protection Containers’: <http://www.stewardshipcommunity.com/best-spraying-practices/disposal-of-empty-pesticide-containers.html#270,14,Slide> **[NOTE: the section on incineration is out of date - no incineration is now recommended on-farm].**

APPENDIX 7B: OPTIONS FOR ON-FARM WASTE REDUCTION

Waste reduction is the most important step in a good Waste Management Plan, but is the most difficult to codify because the options vary so much with the farming system and location involved. Options for on-farm waste reduction obviously vary considerably with the production system and the part of the world. Although many of the suggestions for on-farm waste reduction, re-use and recycling below (many of these are from the DEFRA publication "Protecting Our Water, Soil and Air") focus on temperate systems, some will be applicable elsewhere.

Non-hazardous waste reduction

Processing waste

Processing often produces solid or liquid waste. Often the waste has a relatively high organic matter or soil content or a high BOD, and can be expensive to manage or process. More selective harvesting or better transport can reduce the total volume of such waste. See also Appendix 7C of this document (Composting).

Avoiding wasted production

Farmers should evaluate market opportunities for the crops they plant and animals on the farm before committing to decisions on farm priorities or crops to grow. Where suppliers have access to market information that is difficult for farmers to access (for example, international trends in prices), this information should be shared with the farmers that supply them.

Farmers in the processors' "catchment" should only plant/fertilise/harvest the amount of produce that can be transported to, and processed in, the primary processing factory. Where climatic conditions during the growing season influence the timing and amount of final yield, processors should inform farmers as soon as possible if their produce is unlikely to be required, to give them the maximum opportunity to find other buyers or to use the land for another crop or as grazing. Processors, preferably in partnership with farmers or farmers' representatives, should devise fair systems for purchasing in times when the factory has insufficient capacity to process the crop or product available (see also the Social and Human Capital Implementation Guide).

Harvesting machinery and timing should be optimised to harvest as high proportion of the crop as practical, leaving as little as possible in the field as waste.

Transport from farms to primary processing facilities should be efficient, and arrive at collection points and delivery points at agreed times in order to minimise losses in volume or quality before arrival or spoilage during storage. Collection and/or delivery should be phased to avoid long waits. Delays in collection of farm products (e.g. if the milk collection lorry has broken down) should be communicated to farmers as soon as possible.

Systems should be designed to minimise the risk of spillage (with associated losses or contamination risks) at all points between harvesting and processing.

Transport from fields to primary processors should be in vehicles or trailers that do not result in damage to the crop. This may involve designing or modifying trailers, for example to allow airflow through the harvested product, or to insulate or cool the harvested product during transport. For many foods, it is important to design transport systems that limit the amount of crushing at the bottom of the stack.

Avoiding wasted inputs

For any one crop in any one year, yield will be limited by climate, variety and crop management. Maximising profitability and reducing the risks of losses requires that inputs are used in such a way that the most expensive inputs are used most efficiently. It is no use applying the fertiliser that will result in the highest yield if the labour is not available at harvest-time.

Packaging

Packaging is usually important for maintaining product quality along supply chains, but nevertheless becomes waste at the point of delivery. The type of packaging and transport used for agricultural produce should be assessed to understand the manner in which it will be used and re-used throughout the process (including purchasing and storage) and to determine if there are other options available that will help reduce waste or make the waste more recyclable:

- Simpler packaging design can help to reduce the use of composites (mixed and laminated packaging materials) that are difficult and more costly to recycle.
- Farmers, processors and manufacturers together should evaluate options for using returnable trailer-liners, sacks or bottles for transit of products on-farm, from the farm to processing factory, or from processor to manufacturer.

Joint discussions may well reveal how packaging can be minimised or re-used. It may, for example be possible for certain types of packaging to be re-used at different stages along the supply chain or cleaned for re-use.

- Returning packaging, pallets and containers to suppliers should also be done whenever possible and must be done if at all practical in the case of CPP containers.

Waste re-use

Processors, farmers groups and/or larger farms should identify which of their current waste streams might be able to generate value in themselves, rather than being a disposal problem. Examples include:

- The use of waste biomass for composting (see Appendix 7B of this document), as soil amendment or for its calorific value. Waste biomass (e.g. bagasse) should NOT be burnt inefficiently just to dispose of it, if it can be put to better use (e.g. as a soil amendment).
- Use of factory effluent and vegetable washings etc. for fertigation.
- Recovery of soil transported to the factory with vegetables, followed by re-using the soil for agriculture or gardens around the factory.

Collection and sorting of plastics for recycling and/or (if safe to burn e.g. polyethylene, polypropylene in low doses in wood-burning or bagasse-burning boilers) for their calorific value.

Building waste after demolition can sometimes be crushed and used for road-repairs or making gabions to help with erosion control on farms.

Plans should be made to find uses for “2nd grade” agricultural produce if this is a significant problem, especially if this results in rejection for normal processing. Can the “waste” material become a raw material for a different product? Or can it be used to create compost or used as liquid fertiliser?

If the waste is created on-farm, is it better re-used or composted on-farm - or would it be better for farmers to group together to find an outlet for low-grade product of waste material – for example as animal feed ingredient or (for fruit) making bottled preserves?

APPENDIX 7C: COMPOSTABLE WASTE

Some wastes provide excellent opportunities for reducing costs of fertiliser or soil amendment, or of waste transport, by spreading on the land, or by composting on-site or at a centralised facility. In some cases, combining wastes from different farms or farm processes provides a good basis for compost.

Care is needed to ensure that farm wastes containing biocides, or sterilising agents (e.g. bleach), or plants treated with certain herbicides, or animal waste after the use of certain drugs, do not enter the compost. If household waste (=“kitchen waste”) is used as an ingredient in compost, particular care needs to be taken that it is sorted carefully before composting to ensure that sources of heavy metals (e.g. batteries) and dangerous shards of broken glass are excluded.

When composting, it is important to try to optimise the Nitrogen: Carbon ratio. This usually means that a high Nitrogen-containing waste (e.g. chicken manure or other manures) should be combined with high Carbon wastes such as most crop residues, cardboard and paper. Potassium content can be enhanced by using the appropriate amount of wood ash, if this is available locally.

Examples of useful agricultural-waste-based compost ingredients include:

- manure;
- other biodegradable wastes from animal husbandry e.g. wood chippings, spoiled straw, wood or paper-based animal bedding;
- processing-waste e.g. rejected fruit or vegetable materials;
- unsold crop;
- wastes from polytunnel cultivation or other forms of intensive horticulture: There is specific guidance on mushroom farm substrate (e.g. <http://www.fao.org/docrep/004/AB497E/ab497e07.htm#bm7.17>);
 - substrate from bags can be re-used to make new bags. Mycelium must be removed and substrate needs to be well pasteurized or converted into compost;
 - substrate bags can be converted into compost as follows:
 - break bags open and send plastic bags to be collected by municipality;
 - mix substrate with effective microorganism (EM) and sugar, and maintain humidity at 65-75 %;

- place in used rice bags for a period of approximately 30 days or on the ground under the shade;
- compost is then ready to be used in gardens, rice paddies or sold as organic fertilizer.

Organic matter can also be applied directly to the land, for example by spreading dredgings and plant material from ditches, or spoilt crops from stores onto the land. This may also include diluted waste milk.

FAO has published useful manuals for both small- and large-scale on-farm composting: http://www.fao.org/ORGANICAG/doc/On_farm_comp_methods.pdf ftp://ftp.fao.org/agl/agll/docs/lwdp2_e.pdf

Guidelines for composting agricultural wastes are also often available locally.

Manure and slurry management

The management of manures and slurries is relevant to animal welfare, soils, nutrients, water and social (annoyance to neighbours) & human capital (health and safety). The DEFRA Code of “Good Agricultural Practice” for farmers, growers and land managers “Protecting our Water, Soil and Air” has excellent sections on manure management. Other useful factsheets on manure and slurry management are available on: <http://www.fecservices.co.uk/publications-slurry-waste>, including The A to Z of farm waste - TN 31, Waste production - TN 32, The Venturi aerator - TN 33, Slurry treatment systems - TN 34, Slurry stirring - TN 35 Separation of slurries - TN 36, Composting of separated animal wastes - TN 48.



8 SOCIAL

Most of the social aspects of sustainable agriculture are covered either in this chapter or the **Responsible Sourcing Policy chapter**, where standardised Unilever requirements for suppliers are cascaded to the farm level; the RSP chapter is presented separately in order to ensure that a consistent approach is maintained across the supply chain.

This section of the code covers many of the “People” aspects of the People/Planet/Profit trifecta of sustainability, with particular focus to the following:

- Aspects of **Health and Safety** on farms
 - Farms are amongst the most dangerous workplaces worldwide. The RSP requirements are very general, as they must cover every type of activity undertaken within the Unilever supply chain. Compliance with the health and Safety aspects of this chapter will be deemed to be compliant with the RSP chapters’ criterion on Health and Safety.
- Building **positive relationships**
 - Sustainable farming businesses are supportive of their workers and local communities. Healthy, well-educated people and thriving local communities are assets to any enterprise.
 - Good relationships along the supply chain between business partners, between businesses and the local community and between managers and workers are invaluable. Building trust within a group or between business partners results in “reduced transaction costs” as less time and money then needs to be spent on lawyers, frequent audits or (in the case of farmed produce) expensive pesticide residue analysis.
- **Farmer groups**
 - Farmer groups already exist in many parts of the world. They may be built around co-operative, community or religious structures; farming clubs, water catchments or irrigation schemes; or built around groups of farmers delivering their produce to individual suppliers. The challenge of using natural resources sustainably is fundamentally a social one, requiring collective action, the sharing of new knowledge and continuous innovation; working with and employing people who understand and appreciate the benefits of a sustainable approach to agriculture, and who have the knowledge to implement it. When given the opportunity, group-based learning can be a powerful force to enact change.
- Farmer groups are also useful structures for negotiating with suppliers, customers and governments (obviously with due compliance to the prevailing competition and anti-trust laws). Groups of farmers are more able to input into government decision-making and to access useful information on subsidies, tax structures, and support available; than organisations or individuals working separately may be.
- Groups of farmers, management and workers together, or suppliers working with farmers, have a greater capacity for problem solving that would lead to greater buy-in and commitment from all of those involved.
- **Service provision** by large farms and plantations
 - In many countries, there is the expectation (and often-legal requirement) for large farms to provide housing, clinics and facilities that would be provided out of local taxation and by local government elsewhere.
- **Land rights and obligations**
 - Farming is a land-based activity, and farmers own or manage large areas of land. However, land is multifunctional and other people have legal or customary rights to the services that the land provides.
 - The RSP requirements in this area are very specific and cover “Free prior and Informed Consent” for changes in land use or access to services provided.

Additionally information regarding social and human capital is included in the **Unilever RSP chapter**.

8.1 HEALTH AND SAFETY

F77	Mandatory. Potable water and hygiene provision
Workers will have free access to potable water, hand-washing facilities and shelter for breaks and mealtimes. Farm workers in remote or temporary locations must be able to bring potable water, washing water and soap (in order to wash hands before eating) to work, or the farm must provide these (e.g. when bringing food into the field, or collecting harvested material). Workers in or near buildings must have access to clean toilets, hand washing with soap, and food storage facilities. Not applicable to individual smallholder farmers.	
Climate Smart Agriculture	
Good sanitation and hygiene for farm workers will benefit the business by reducing the risk of illness and absenteeism of workers from the farm, attributed to water-borne disease, or viruses/bacteria spread through human contact or contaminated surfaces. In so doing, this improves resilience of the farm against incidences effecting worker health and wellbeing.	

Clean drinking water must be available and easily accessible to workers. Farmers need to be sure that the water is clean enough for drinking; if drinking-quality water is not provided by the local municipal or water authority, but extracted on-farm or locally, the water source must be protected from pollution and periodically tested to ensure it is safe. If regular testing is not a practical option, the water must be boiled before drinking.

We expect all farmers- including smallholders – to do their best to ensure that all workers have access to potable water whilst at work. However, we do recognise that many of the provisions in this criterion require recourses that many smallholders will not have access to themselves; we have therefore made this criterion “not applicable to individual smallholder farmers”.

WHO guidance on drinking water quality, and suggested testing frequency, is available in the SAN Standard as follows:

TABLE 21: SAN STANDARD GUIDANCE ON DRINKING WATER QUALITY	
Parameter	Value
Faecal Coliforms	Zero
Chlorine residue or residue from other treatment disinfectants	0.2 to 0.5 mg/L
Nitrates	<50 mg/L as nitrates
pH	6.5 to 8.5
Sodium	<20 mg/L
Sulphates	<250 mg/L
Turbidity	Less than or equal to 5 NTU

Shelter and accommodation for breaks in agricultural work is really only needed if workers would otherwise be subject to unpleasant weather (heat, cold, high winds and heavy rain) or hazards from spray drift. Trees or vehicles often provide the shelter needed, but if they do not, moveable shelters or windbreaks may be required. In areas where lightning is a frequent occurrence, the working pattern and/or shelters, should be located and designed to reduce the risk of lightning strike.

Before eating, and after going to the toilet, workers need to be able to wash their hands; the minimum requirement for practical purposes on farms, is that a jug with clean water and some soap is made available.

Wherever possible, workers should have access to sanitary facilities. The provision of portable toilets in or near fields is a requirement for many fresh fruit and vegetable supply chains implementing sustainable agricultural practices. Where this is not practical (for example in fields a long way from farm buildings), or required for the crop in question (See also F133 of the **Value Chain chapter**), workers should not go to the toilet within the food crop, but in an area well away from the rest area and water supplies. Men and women should have separate locations available. Where appropriate, adequate facilities should also be made available to enable female workers to manage menstrual hygiene safely and with dignity.

When working close to farm buildings or in on-farm facilities such as packing sheds, adequate toilet and washing facilities must be provided, either separated by gender or comprising individual private cubicles. Toilets must at all times be kept clean to avoid the spread of disease and infection between users. Hand washing facilities must be available at toilet locations with soap provided for after use handwashing.

F78	Expected. First Aid
All workers must have access to First Aid and medical services during working hours, sufficient to respond to emergencies. Not applicable to individual smallholder farmers.	
Climate Smart Agriculture	
Not applicable	

As guidance, this means that there should always be a trained first-aider on duty in a packing room or processing facility. Where harvesting or agricultural work is carried out in groups or where many people work under one supervisor (E.g. In plantations), the supervisor would normally

be a trained first-aider. Farm workers need to know who is trained in first aid and where they (and First Aid kits) can be found.

Many countries have systems in place for first-aid training, including “First Aid at Work”. Where formal training courses are available, tuned to the type of working conditions locally, these are preferable. However, if such training is not available locally, the following sources should be checked to find which is the most appropriate and available:

- The Red Crescent or Red Cross (voluntary/charity NGO) provides first-aid training in many countries.
- The local doctor’s surgery or hospital should be able to provide someone who can do training.

For large organisations, external training organisations should be able to “train the trainers” who can then pass on their knowledge to more people within the organisation. Often first-aid training is something that is of considerable interest to farmers, and therefore group training of farmers will be well received.

A useful training leaflet on First Aid is available from the UK Government Health and Safety Executive¹⁰ and a specific publication on “First Aid at Work”¹¹.

Everybody needs to be made aware that they should assess the hazards and risk when providing first aid to others, and not put themselves in danger (E.g. Avoiding fire, electric shock or falling debris), and protecting themselves from body fluids such as blood by using gloves and other barriers).

First-Aid Kits

Sufficient first-aid kits should be available in suitable locations, for all workers to have access to.

This includes provision for workers in isolated locations such as maintenance teams and groups of people working together while harvesting:

- A The kit should be clearly marked and easily available;
- B It should be protected from contamination by dust and moisture;
- C The kit should contain only materials for first aid and emergencies;
- D The kits should contain simple and clear instructions to be followed and kept in the charge by a responsible person qualified to render first aid;
- E The kits must be regularly inspected and kept fully stocked; and
- F There is no mandatory list of contents for first-aid boxes. Deciding what to include should be based on the employer’s assessment of first-aid needs. A suggested list of contents, where there is no special risk in the workplace, is given in the leaflet: “First Aid at work: your questions answered”¹². A suggested list of contents is:
 - Twenty individually-wrapped, sterile, adhesive dressings (assorted sizes);
 - Two sterile eye pads;
 - Four individually-wrapped, triangular bandages (preferably sterile);
 - Six safety pins;
 - Six medium-sized (approximately 12 cm x 12 cm), individually-wrapped, sterile, un-medicated wound dressings;
 - Two large (approximately 18 cm x 18 cm), sterile, individually-wrapped, un-medicated wound dressings;
 - One pair of disposable gloves;
 - You should not keep tablets or medicines in the first-aid box;
 - Scissors, moist wipes and an antiseptic; and
 - In hazardous environments E.g. Near workshops or CCP stores), the first aid kit, or building, must include an eyewash facility such as a wash-bottle or a way to direct clean water from a tap towards the eye.

¹⁰ <http://www.hse.gov.uk/pubns/indg347.pdf>

¹¹ <http://www.hse.gov.uk/pubns/indg214.pdf>

¹² <http://www.hse.gov.uk/pubns/indg214.pdf>

Access to medical services

This means that:

- A Someone close by (and preferably all management and workers) clearly understands what to do if there is an accident;
- B Transport is available for the sick and injured to the first aid point, local doctors surgery or hospital (as appropriate); and
- C Workers can take reasonable time off during working hours for clinic, doctor or hospital appointments for themselves and their immediate family.

F79	Leading. Healthy lifestyles
Farms will promote a healthy lifestyle, and raise awareness of wider issues of health and safety (e.g. HIV/aids). These may extend into the wider community. Not applicable to individual smallholder farmers.	
Climate Smart Agriculture	
Not applicable	

Leading a healthy life is important to reduce the risk of developing illness, to promote mental and physical wellbeing and to improve quality of life. A healthy lifestyle consists of many factors such as eating a well-balanced diet, regular exercise, tobacco use prevention, mental health, HIV/AIDS prevention and safety. In developing countries, awareness should also be provided on basic sanitation, hygiene (e.g. hand washing) etc.

F80	Expected. Health Advice
Workers who do hazardous work (e.g. handling pesticides, handling animals, driving) or perform strenuous physical activity (such as regularly carrying heavy loads) must be offered risk-based health checks. Not applicable to individual smallholder farmers.	
Climate Smart Agriculture	
Not applicable	

Some jobs are unsuitable for some workers because of underlying medical conditions, or the job must be modified to take account thereof. This can be a sensitive subject, because workers will not necessarily wish to disclose personal medical information to their employer, especially if this limits their employability. Good practice involves:

- Ensuring that all people who do hazardous work are not only properly trained, but also medically fit to do the work. This is especially of concern when working with CPPs and fertilisers, but is clearly applicable elsewhere. “Medically Fit” involves an assessment to ensure that the worker is capable of understanding and implementing all safety and emergency procedures.
- Providing appropriate medical examinations of workers in hazardous environments (e.g., Areas where there may be hearing loss because of noise);
- Health and Safety procedures and provisions for pregnant female workers;
- Recording of allergies of workers (E.g. To bee stings) and medication used or carried by employees that will help in an accident or emergency. Examples include noting if a worker is taking warfarin¹³, because they will bleed freely, or noting that someone who has severe allergies may carry anti-histamine or adrenaline (Epinephrine) on their person or in their vehicle. This information should be readily available in case of accidents and in a form that can be taken with a worker to hospital. The UK Health and Safety Executive, suggesting farm workers carry a “Health Carry Card” for use in such circumstances, provide one example of a form for use¹⁴;
- It is recommended that agricultural workers are protected from tetanus;
- There need to be contingency plans for evacuating sick and injured people from farms and transporting them to the nearest appropriate hospital or medical facility;
- Recording of injuries and accidents; and
- Larger farms, plantations and processing facilities will normally have a medical room, or medical centre for workers.

¹³ Warfarin is an anticoagulant, prescribed for certain medical conditions to stop blood from clotting.

¹⁴ <http://www.hse.gov.uk/pubns/iacl102.pdf>

F81	Expected. Time off for medical care
Workers must have the right to time off work, for medical appointments and counselling for themselves and their dependents.	
Climate Smart Agriculture	
Not applicable	

In many countries, employers are not required by law to allow workers to attend medical appointments in work time. This means that an employer is legally within their rights to take the time for attending medical appointments out of an employee's holiday allowance, or to classify the time as "unpaid leave". This is true of hospital appointments, doctors' appointments and the like. However, even if it is legal, it is unreasonable for an employer to deny an employee the right to attend a necessary medical appointment, just because it occurs during normal working hours. Women employees also have the right for time off for maternity leave and this does not depend upon how long they have worked for the employers.

F82	Mandatory. Hazard reduction: WH01a CPPs
Active ingredients classified as WHO 1a, or listed in Montreal Protocol (this includes methyl bromide) or the Stockholm Convention on Persistent Organic Pollutants are NEVER used on the farm. Exceptions are for extremely small volumes used in pheromone traps, rat baits and insecticides used in animal husbandry (in parts of the world where there is no effective alternative).	
Climate Smart Agriculture	
Not applicable	

The World Health Organisation (WHO) classifies the toxicity of pesticides according to their active ingredients and known effects determined through scientific studies¹⁵. Pesticides which are listed as Class 1(a) are considered the

be extremely hazardous, due to a high acute toxicity with known chronic toxic effects even at very low exposure levels, thus posing a threat to human health and the environment. Also with a focus on toxicity, the Montreal Protocol, an international treaty that serves to protect the ozone layer, lists substances that deplete the ozone layer (including some active ingredients that may be found in certain pesticides), banned from use by all treaty states and the European Union. Further to this, the Stockholm Convention on Persistent Organic Pollutants (POPs) seeks to eliminate the production and use of intentionally produced POPs. Pesticides with active ingredients listed on all three of these lists are not to be used in any circumstances.

Exceptions

Exceptions exist for very low doses in use of traps for vermin or as bait for small pests like rats. For livestock production, pests that disturb or pose a health risk to livestock (e.g. ticks and other virus-carrying insects) may require control by use of insecticides, which contain low doses of such toxic ingredients. In all exceptions, caution needs to be taken in selecting control that do not lead to unintended health impacts when applied to target animals, any which may come into contact with this (other than the intended vermin), or humans. Alternative applications with a lower toxicity, which may be as effective, should always be sought out and used, where appropriate.

Storage

The storage of extremely hazardous pesticides must be in accordance with those specified in requirements F140-F143.

Table 22 details WHO Class 1a pesticides.

TABLE 22: WHO CLASS 1A PESTICIDES			
Aldicarb	Brodifacoum	Bromadiolone	Bromethalin
Calcium cyanide	Captafol	Chlorethoxyfos	Chlormephos
Chlorophacinone	Difenacoum	Difethialone	Diphacinone
Disulfoton	EPN	Ethoprophos	Flocoumafen
Hexachlorobenzene	Mercuric chloride	Mevinphos	Parathion
Parathion-methyl	Phenylmercury acetate	Phorate	Phosphamidon
Sodium fluoroacetate	Sulfotep	Tebupirimfos	Terbufos

¹⁵ http://www.who.int/ipcs/publications/pesticides_hazard_2009.pdf?ua=1

TABLE 23: WHO CLASS 1A PESTICIDES			
Acrolein	Allyl alcohol	Azinphos-ethyl	Azinphos-methyl
Blasticidin-S	Butocarboxim	Butoxycarboxim	Cadusafos
Calcium arsenate	Carbofuran	Chlorfenvinphos	3-Chloro-1,2-propanediol
Coumaphos	Coumatetralyl	Cyfluthrin	beta- cyfluthrin
Zeta-cypermethrin	Demeton-S-methyl	Dichlorvos	Dicrotophos
Dinoterb	DNOC	Edifenphos	Ethiofencarb
Famphur	Fenamiphos	Flucythrinate	Fluoroacetamide
Formetanate	Furathiocarb	Heptenophos	Isoxathion
Lead arsenate	Mecarbam	Mercuric oxide	Methamidophos
Methidathion	Methiocarb	Methomyl	Monocrotophos
Nicotine	Omethoate	Oxamyl	Oxydemeton-methyl
Paris green	Pentachlorophenol	Propetamphos	Sodium arsenite
Sodium cyanide	Strychnine	Tefluthrin	Thallium sulfate
Thiofanox	Thiometon	Triazophos	Vamidothion
Warfarin	Zinc phosphide		

F83	Mandatory. Hazard reduction: WHO1b CPPs
Active ingredients classified as WHO1b or the Basel or Rotterdam Conventions shall be phased out of use within 3 years, after date of implementation. In each of the 3 years, there must be documented evidence of research into alternatives, a phase out plan or actual reduction in use.	
Climate Smart Agriculture	
Not applicable	

Unilever is aware of the impending adoption of the GHS (CLP) system for classifying agrochemicals in many parts of the world (e.g. EU in June 2015). This will eventually become a better, and better-understood global classification system, and should then supersede the WHO classification system as the basis for phasing out the most hazardous agrochemicals from Unilever supply chains: <http://echa.europa.eu/web/guest/clp-2015>. The WHO is also developing a Highly Hazardous Pesticide (HHP) list.

However, until these systems have been finalised, Unilever will use the WHO database and the Basel and Rotterdam convention classification to eliminate hazardous CPPs from farms where our raw materials are produced. We will also put in place systems to halt the use of WHO1b agrochemicals on Unilever crops after 3 years from the date of implementation of SAC2017, except under exceptional circumstances.

These are:

- A Veterinary use;
- B Extremely small volumes in pheromone traps or similar;
- C The unexpected appearance of a new pest for which there is no legal alternative; and
- D A formal agreement with Unilever that there is no practical alternative to the use of the active ingredient. In this case, a research programme to find or develop alternative methods of control must accompany the continued use.

Table 23 details WHO Class 1b pesticides¹⁶.

F84	Expected. Hazard reduction: Choice of CPP
Where there is a choice of which CPP to use, the hazards to human health (e.g. the option with the least hazardous WHO or EPA rating) and the local environment must be taken into account unless a programme of active ingredient rotation is in place in order to reduce the risk of resistance developing. Not applicable to individual smallholder farmers.	
Climate Smart Agriculture	
Not applicable	

¹⁶ http://www.who.int/ipcs/publications/pesticides_hazard_2009.pdf?ua=1

There are several possible levels of detail for decision-making:

- A At its most basic, the decision should be based on the information available on the Material Safety Data Sheet (MSDS), which should be available for all chemicals used, and include basic human health and environmental toxicity data;
- B A more comprehensive and risk-based, comparison can be made using information collated by the IPM Institute in the U.S.A and applicable worldwide. The IPM tool “PRIME” has incorporated, and built on risk assessments Unilever made in the past using PRoMPT tool - developed by Unilever with input from Syngenta¹⁷;
- C A full risk-assessment could also be carried out for each active ingredient, although this is not necessary to fulfil the criterion requirement; and
- D If possible, information on the effect on natural enemies of pests (predators and parasites) and bees should also be taken into account. Tables of toxicity are available from various sources, including the UC Davies IPM, and the IPM Institute website (this risk assessment will contribute to conformance with Criterion F22, and will not be assessed here).

F85	Mandatory. CPP Exposure Reduction: Protecting the most vulnerable
Young people (under 18 years old), pregnant and nursing mothers shall NEVER handle or apply CPPs as part of their job, or be exposed to CPP contaminated PPE.	
Climate Smart Agriculture	
Not applicable	

The prohibitions around who cannot handle and apply CPPs should be self-explanatory. For the Crop Life International training recommendations, see the Guideline document ‘Guidelines for the safe and effective use of crop protection products’¹⁸. Useful information can be found [here](#) regarding young children and hazardous materials.

CPP-contaminated PPE must be washed separately from other materials and must never be taken into living, eating or sleeping places by workers to be washed or repaired. Pregnant or breastfeeding women, or children under 18, shall not handle CPP-contaminated PPE. Contaminated PPE must never be taken into living, sleeping or cooking areas.

Areas where CPPs are handled and where application equipment and PPE is washed must be designed so that spillages are confined or disperse through properly designed soakaways. Such areas must not be accessible to children. (See also the **Agriculture – Pest, Disease and Weed Management chapter**).

Unilever does however accept that in some cases, young people (under 18 years old) may handle or apply CPPs during training, but only under strict supervision.

F86	Mandatory. CPP Exposure Reduction: Trained operators
Operators shall only handle or apply CPPs if they have received basic training in how to protect themselves, their family, bystanders, the local community and the environment from harm. All operators must be provided with appropriate PPE, free of charge.	
Climate Smart Agriculture	
Not applicable	

Please note that in tropical climates, CPPs that require the use of PPE that is uncomfortable, expensive or not readily available should be avoided, especially in the case of small-scale users, as advised in the 2003 FAO International Code of Conduct on the Distribution and Use of Pesticides¹⁹.

Different CPPs pose different levels of risk, and the same PPE may not be appropriate for all products; requirements are usually made explicit on the label or MSDS sheet. If these are not available, the manufacturer or distributor must be contacted to determine what is appropriate.

The cost of PPE, particularly rubber boots, gloves and masks, is often cited as the reason for workers or small-holder farmers not using the appropriate PPE. This is not acceptable. Lightweight, liquid-repellent clothing or clothing-kits are increasingly available in all parts of the world. For further details on training, see requirements in **Continuous Improvement chapter**.

¹⁷ <https://www.ipmprime.com/about.aspx>

¹⁸ https://croplife.org/wp-content/uploads/pdf_files/Guidelines-for-the-safe-and-effective-use-of-crop-protection-products.pdf

¹⁹ <http://www.fao.org/ag/agp/agpp/pesticide/Code/Download/protect.doc>

F87	Mandatory. CPP Exposure Reduction: Banning reusing containers
Reusing CPP containers for any purpose (other than professional re-filling of proprietary containers) is banned. This obviously includes re-use for human or animal food or water.	
Climate Smart Agriculture	
Not applicable	

Empty pesticide containers should never be used for purposes other than their intended use, and particularly should never be used to store water and/or food or feeding animals. An empty pesticide container can never be cleaned completely of residue and should be disposed of in a way prevents reuse for other purposes. Please see F70b in the Waste Management Chapter for detailed guidance on the storage and disposal of CPP containers.

Refilling or disposal of containers may only be conducted in a specified area, by a designated authority or person with specialised skills who has been adequately trained and is using the required PPE.

F88	Expected. CPP Exposure Reduction: Avoiding pollution (spills and equipment cleaning)
Procedures are in place to; minimise the likelihood of spillage of CPPs, to confine spills and contaminated wash-water to areas where they will be confined or dispersed safely, and to clean up spills if they occur.	
Climate Smart Agriculture	
Not applicable	

In general, for spillages, the following guidelines should be followed²⁰:

- A Spills must be cleaned up immediately. Always have two people working when handling severe spills;
- B Liquid spills should not be hosed down as this disperses the CPP over a wider area. A supply of absorbent sawdust, sand or dry soil should be kept in a container in the store, and scattered over the spill and left for a few minutes to soak up the chemical. It should then be shovelled up and placed in a marked container for disposal. Nitrile rubber protective gloves and facemask should be worn;
- C Solid spills can create dust when swept up without the use of an absorbent material. A supply of absorbent sawdust, sand or dry soil should be available in the store, and applied (dampened) with a shovel over the

area of the spill, before being placed in a marked container for disposal. Nitrile rubber protective gloves and facemask should be worn.

Avoidance includes adopting procedures that minimise human exposure (e.g. when decanting, mixing and applying), and ensuring that correct PPE is available and is used. Areas where agrochemicals (CPPs, fertilisers, manure etc.) are handled and where application equipment and PPE is washed must be designed so that spillages are confined or disperse through properly-designed soakaways. Such areas must not be accessible to children. Note that discharge to ground or surface water from areas where CPP handling equipment is.

For information on the use of personal protective equipment (PPE), view criterion F86.

F89	Expected. CPP Exposure Reduction: Equipment storage and handling
CPP application equipment and measuring/weighing equipment must be stored and handled as specified by the CPP manufacturers. Equipment must be kept in a secure location separated from living quarters, food or feed.	
Climate Smart Agriculture	
Not applicable	

Any equipment associated with CPPs, including application, measuring and PPE, must be treated with care, since there is a high potential for contamination with harmful chemicals. Contaminated PPE is also mentioned in the guidance for F85.

For information on store construction and location, including stores for PPE, please refer to F140 and F141 in Chapter 10 (Value Chain).

F90	Expected. Management of hazardous materials other than CPPs
All hazardous materials other than CPPs (including rat bait, veterinary medicines, fuels and lubricants, bleach and cleaning chemicals, fertilisers, manure, composts and sewage and all associated waste) must be stored, handled safely and disposed of safely.	
Climate Smart Agriculture	
Not applicable	

Useful background information on hazards and risks often encountered on farms is available on the website of the International Labour Organisation here (specifically on farm and field crop workers) and on the UK Health and Safety Executive website here (including a wide range of

²⁰ For more information, see the FAO Pesticide Storage and Stock Control Manual (1996): <http://www.fao.org/docrep/V8966E/V8966e05.htm#1>

leaflets and training materials for many areas of agriculture).

Health and Safety training for general workers and those involved in hazardous work is covered in the guidance for F154 in Chapter 11 (Continuous Improvement). Wherever practical, the risk management systems put in place should reduce contact between hazards and people, and so reduce the need for Personal Protective Equipment (PPE). However, if the Health and Safety risk assessment indicates that PPE is required, employers need to ensure that:

- Suitable PPE is issued free of charge to workers (i.e. it must be fit for purpose – for example cotton masks are not suitable protection from solvent fumes);
- Sufficient PPE is issued for all workers;
- PPE is worn in hazardous environments;
- PPE is maintained properly;
- Workers are trained in safe use of PPE;
- PPE is stored and washed safely

Advice on general chemical handling, storage and procedures is similar to that described in the guidance for F88 and F89. The Material Safety Data Sheets for individual chemicals should be consulted for any specific requirements to ensure there are adequate provisions for safe handling of hazardous chemicals. It is therefore vital that MSDS for all chemicals used are available.

Disposal

See F70 in Chapter 7 (Waste Management).

F91	Expected. Machinery
There must be systems in place to minimise the risk of workers sustaining injuries from machinery.	
Climate Smart Agriculture	
Not applicable	

Tractors without roll-over protection structures, power take-off shafts, chainsaws, augers, motorbikes and machinery with unguarded moving parts are the most common causes of injury by machinery on farms in most of the world.

Many accidents occur on farms because people misuse equipment – for example by trying to remove twine from around rotating pumps or drive-shafts while these are still moving, or because other people start up machinery while it is being cleaned.

The ways in which all equipment is designed, used, maintained, modified (or features of the design) should be assessed for dangers to life or health. Management systems should be put in place to minimise risks:

- Appropriate guarding should be present and used on machinery to minimise risk. Wherever possible, the machine should not operate if the guarding is not in place (e.g. belt guards);
- If guarding is not practical, then all workers who come into contact with the machinery should be informed of the correct operating procedures and how to avoid the dangers.
- All machinery should be regularly maintained by appropriately trained personnel, with particular emphasis on machines which are a potential danger to life or health;
- A noise assessment should be made for all noisy machinery and appropriate PPE provided if the noise level is high;
- Vehicles should be fitted with warning signals to alert surrounding users to their movements;
- Long hours spent on tractors with insufficient vibration-protection for the driver should be avoided; and
- All PPE required must be supplied to workers free of charge.

F92	Expected. Working with animals and animal wastes (animal husbandry only)
There must be systems in place to minimise the risk of workers sustaining injuries from animals, or being infected by zoonosis.	
Climate Smart Agriculture	
Not applicable	

Injuries inflicted by animals can include bites, kicks, crushing, ramming, trampling, and transmission of certain infectious diseases such as *giardia*, *salmonella*, ringworm and *leptospirosis*.

- Animals should be handled with due care and within a control environment with which the animal is familiar.
- Protective clothing should be worn when handling infectious animal to limit exposure to the disease.
- If coming into exposure with animal bodily fluids, workers must have access to washing facilities in order to remove the affected garment and clean to effected area.
- If an animal exhibits symptoms of infection or abnormal behaviour, the individual must be separated from the herd (where applicable) and these characteristics documented. A veterinary doctor must inspect the animal to determine the cause and treat it.

Note that dehorning and other mutilations designed to reduce risks to workers may not be acceptable on animal welfare grounds (See the **Animal Husbandry chapter** for further guidance).

F93	Expected. Working at height and carrying heavy loads.
The farm must evaluate how risks can be reduced (e.g. by placing barriers next to ponds or steep slopes) and take steps to ensure appropriate provisions are made to reduce risk.	
Climate Smart Agriculture	
Not applicable	

Farming is an industry where death and serious injury from working at height, lifting heavy and awkward objects, falling from height in or out of vehicles) or into water bodies are all too common. Falls from ladders, rooftops, silos and windmills are major causes of death and injury on farms.

Working at height

The Health and Safety Executive²¹ give the following advice before working from height s preventative measures:

- Avoid work at height when practical alternatives are available;
- Prevent falls using either an already safe existing place of work or the correct kind of equipment; and
- Minimise the distance and consequences of a fall, using appropriate equipment when the risk cannot be eliminated.

The following Dos and Don'ts must be adopted:

Do...

- As much work as possible from the ground;
- Ensure safe access to and from where workers work at height can be ensured;
- Make sure equipment is appropriate, stable and strong enough for the job, maintained and checked frequently;
- Take precautions when working on or near fragile surfaces;
- Offer protection from falling objects; and
- Consider emergency evacuation and rescue measures.

Don't...

- Overload ladders with undue weight from materials and equipment – check ladder specifications;
- Overextend on ladders or stepladders;
- Rest a ladder against weak support structures, such as a gutter;
- Use ladders or stepladders for strenuous tasks, but only for light work; and
- Let any who does not have the adequate skills, knowledge and experience to do the job, work at height.

Carrying heavy loads

Manual handling of heavy loads poses a risk not only to a worker's health and well-being, but their ability to continue engaging in day-to-day labour. Strain and injury can derive from numerous movements like lifting, lowering, pushing, pulling and carrying, all with the potential to cause potentially life-long musculoskeletal disorders and impairment.

The Health and Safety Executive²² provides guidance on helping prevent injuries in cases when lifting manually and with equipment. Some points to account for before any lifting activity are the individual's capability (E.g. Their physical state, level of fitness, knowledge of any existing injuries or

²¹ <http://www.hse.gov.uk/toolbox/height.htm>

²² <http://www.hse.gov.uk/toolbox/manual.htm>

weaknesses), the nature of the load, environmental conditions, training, and work organisation.

Some guidance on lifting manually:

- Limit any twisting, stopping and reaching;
- Avoid lifting from the floor level or above shoulder height;
- Reorganise storage areas to limit the need for heavy lifting;
- Consider how to minimise carrying distances;
- Assess the weight of the load before handling, to establish whether assistance is needed.

Good handling techniques for lifting, before and during the lift are to:

- Remove obstacles from the route;
- Rest the load midway for long loads;
- Keep the load close to the waist;
- Keep the heavy side of the load next to the body; and
- Adopt a stable and balanced position, with feet placed apart.

For further information, excellent sources on working at height are available [here](#).

Information on appropriate equipment and training for safe handling of loads and other resources can be found [here](#).

These include “Manual handling solutions for farms” ([here](#)) and “Making the best use of handling aids” ([here](#)).

F94	Expected. Transport
During the transport of materials, animals and workers (on the farm and to-and-from the farm), vehicles must be roadworthy and be suitable for the use to which they are put (E.g. Carrying large numbers of people on a tractor is not safe). Not applicable to individual smallholder farmers.	
Climate Smart Agriculture	
Not applicable	

Transport-related accidents can occur during reversing manoeuvres, vehicle overturning and when people use ATVs. Vehicles used on farms must always be fit for use, given the particular conditions, surfaces, and uses they are put and under which they operate. Hence, roadworthiness is of critical importance.

Roadworthiness of a vehicle is typically authorised by a person of authority working under the auspices of presiding legislation. A vehicle can be considered roadworthy, if it can achieve a suitable operating condition that meets criteria laid down by the law for safe driving and transport.

According to Vic Roads' Vehicle Standards Information, general inspection standards for ordinary passenger vehicles cover wheels and tyres; steering and suspension; brakes; seats and seat belts; lamps, signals, reflectors, etc.; exhaust and emission controls; windscreen and windows; windscreen wipers, washers, etc.; body and chassis; and the engine and driveline.

For farm vehicles like tractors, the EU Commission's proposal called the 'Roadworthiness Package', suggests that an increase in the use of agricultural vehicles not exceeding a maximum design speed of 40 km/h to the same effect as trucks, means these should be treated in the same way as trucks regarding roadworthiness testing²³. Although this is not a legal requirement, it is in the interest of best practice in health and safety to have all vehicles used to transport people, animals and materials roadworthy.

Furthermore, the use of vehicles must ensure that all loads carried are stable and secure, to prevent injury or death from objects. Material handlers and loaders must also have adequate protection clothing and equipment, whilst appropriate and suitable vehicles and trailers must be equipped with brakes adequate to withstand maximum loads and speeds at which they will operate.

The UK Health and Safety Executive has useful guidance on:

- A “Fatal Traction – practical advice on avoiding agricultural transport accidents”²⁴, and
- B “Carriage of passengers on farm trailers”²⁵.

F95	Expected. Buildings
Workshops, worker accommodation, stores and other buildings and structures must be structurally sound, reasonably ventilated and fit for the purpose that they are now being used for. Not applicable to individual smallholder farmers.	
Climate Smart Agriculture	
Not applicable	

²³ <http://www.nfuonline.com/about-us/our-offices/brussels/hot-topics/eu-roadworthiness-proposals/>

²⁴ <http://www.hse.gov.uk/pubns/indg279.pdf>

²⁵ <http://www.hse.gov.uk/pubns/ais36.pdf>

Buildings

Farm buildings are often old, and have been used for different purposes at different times over their lifespan. Old fertiliser stores (particularly those used to store urea) made of concrete should be checked carefully to ensure that emissions have not made them dangerous.

In all cases:

- A Buildings and places of work need to be structurally safe;
- B Lighting needs to be adequate to perform tasks safely; · this is particularly important in hazardous areas;
- C Heating, ventilation and air conditioning – if in place – need to be well-maintained;
- D The facility has all the permits and certificates needed; and
- E Workers need to be warned of slippery surfaces and (if these are regularly present) have appropriate footwear.

Workshops

Workshops and work areas should be tidy. Surfaces should be kept dry and slip free wherever practical.

Accommodation

Worker on-site accommodation should be as below:

- Structurally safe;
- Not used to store any hazardous materials;
- Separate from working/production areas;
- Meet legal and industrial minimum standards, and specifically:
 - Each individual should have their own sleeping mat/bed;
 - Each individual should have secure storage for their personal effects;
 - Men and women should have separate personal sleeping areas;
 - Living and sleeping conditions must be clean and hygienic;
 - All appliances must be electrical safe;
 - There should be adequate laundry facilities;
 - Include provision for hygienic food storage and preparation; and
 - Toilets and washing facilities should be clean, sufficient for the number of workers (often stated by law) and separated by gender to give privacy (often stated in law).

Minimum standards for worker accommodation will normally be regulated locally. As guidance for developing countries, we give the example of the SAN standard (below):

TABLE 24: SAN STANDARD ON WORKER ACCOMMODATION

Housing provided by the farm for permanent or temporary workers living there must be well-designed, built, and maintained to foster good hygienic, health and safety conditions. Living quarters must be separated from production areas. The farm must seek alternatives for relocating housing or camps that are currently within production areas. Workers and their families living on the farm must have access to recreation areas according to the composition of inhabitants. The design, size and construction of dormitories, barracks and other housing, type and quantity of furniture, and number and location of sanitary facilities, showers, and washing and cooking areas must comply with applicable laws. In absence of applicable laws the following elements and characteristics apply:

- A The dormitories must be constructed with wooden floors above the ground or floors made from asphalt or concrete, roofs in good condition without leaks, and with appropriate ventilation and lighting;
- B The ceiling must not be lower than 2.5 meters at any point;
- C Five square meters of space per person in sleeping areas;
- D Heating for cold climates;
- E Bed, hammock or other dignified infrastructure for sleeping according to the workers' cultural needs, at least 20 centimeters above the ground. The space in between bunk beds is greater than or equal to 120 centimeters and 90 centimeters between each bed;
- F Basic furniture must comply with the following characteristics: one toilet for every 15 persons; one urinal for every 25 men; sufficient supply of toilet paper; a minimum distance of 30 meters from dormitories, eating areas and kitchens; one washbasin for every six persons, or per family.
- G One shower per 10 persons, separated by gender;
- H One large laundry sink for every 30 persons; and
- I In the absence of a kitchen service (kitchen and dining hall provided by the farm), there must be installations outside the living areas for preparing and eating food and for washing kitchen utensils. There must be one cooking installation per 10 persons or for every two families.

Stores and stores management

Stores are a crosscutting issue and are covered in more detail in the **Value Chain chapter**. General Health and Safety considerations include:

- Hazardous chemicals need safe storage and disposal facilities;
- The contents of stores need to be labelled;
- Store workers need to be trained; and
- Spill kits should be available for hazardous chemicals and used whenever spills occur.

F96	Expected. Electrical
Risks of shocks and fire, caused by poor electrical installations, must be minimized. Care should also be taken to avoid collision with power lines. Not applicable to individual smallholder farmers.	
Climate Smart Agriculture	
Not applicable	

Buildings and machinery should be assessed for electrical safety. The two major risks are fire, (See below) and electrical shock. In many older farms and food-processing areas (especially in developing countries):

- A Wiring and switches may be old, and the insulation may have degraded or been damaged by insects or rodents. Cables should be inspected regularly for damage to ensure that wiring is adequately encased or secured;
- B New circuits may have been added to existing wiring, causing overload and risk of overheating and fire. Care needs to be taken to ensure that electrical installations are not overloaded, as this is a frequent cause of fire;
- C Redundant wiring may not have been removed and therefore may accidentally remain “live”;
- D Repairs and joints have often been made by twisting wires together. This practice tends to result in overheating which not only increases the fire risk, but also wears out joints and machinery quickly and uses up a lot of energy (making the electricity costs very high); and
- E Earthing arrangements may be non-existent or inadequate, leading to risk of electric shock.

Guidance is provided by the UK government’s Health and Safety Executive.²⁶

Collisions with power-lines must be avoided. This may involve developing more limited transport routes within and between farms for high vehicles, standing instructions to lower equipment during transport in order to achieve a safe clearance height, and fencing off areas around pylons and power line supports. In cases where electricity is generated on the farm, an engineer is to determine the appropriate delineation of routes. Any rerouting of power lines must be done in consultation with the government authority managing electrical distribution infrastructure.

F97	Expected. Fire, noise and dust
Fire hazards (especially linked to fuel stores, inflammable material stores and refueling practices), noise and dust nuisance must be minimised.	
Climate Smart Agriculture	
Not applicable	

Workers should be aware of the action they need to take in case of fire, and machinery and buildings organised to reduce the risk of fire and risks to people and the environment in case of fire. For pack-houses, for example, this would normally mean:

- Fire exits available to all workers at all times. These must not be locked or blocked (E.g. By using the area as a convenient place to store rubbish). Fire escape doors should be clearly marked and maintained, and signage used inside any facility showing where the nearest fire exit is;
- Workers should all know the evacuation procedures in case of fire and where their fire assembly point is outside the building. Fire evacuation drills should take place at least annually;
- There should be fire extinguishers/fire-fighting equipment on site and people who know how to use it should be available at all times. Fire extinguishers must be appropriate for the location and local hazards, kept up to date, and located at the correct height and along escape routes (specific guidance on fire extinguishers in agrochemical stores is provided in the Agrochemical and Fuel Implementation Guide);
- There should be fire alarms, with regular tests, audible throughout the workplace; and
- Emergency lighting should be available to enable workers to find the fire exits in the case of electrical failure.

F98	Expected. Explosion risk
A specialised safety plan is required for any farm with a covered pond or other digester, or stores of ammonium nitrate (or other explosive fertiliser), owing to the risks of gas ignition and explosion.	
Climate Smart Agriculture	
Not applicable	

In areas where there is a risk of explosion (E.g. Fertiliser stores, paint stores and other areas where fuel vapour may accumulate, gas use and storage areas, hunting-amunition stores), procedures and equipment (ventilation, non-sparking tools, suitable electrical installation, shielded lights) should be put in place to minimise the risk. The risk of dust explosions should be considered for dry produce (e.g. tea, corn (maize) dust, flour) handling areas (See also the criteria on machinery and electrical safety above).

26 <http://www.hse.gov.uk/electricity/information/agriculture.htm>

F99 New	Expected. Danger of death from effluent ponds, grain silos, manure and silage pits.
All processing plants and farms that have effluent ponds, silage clamps and manure pits must have these areas fenced/locked to ensure that access is limited to trained personnel, and that tractors cannot be driven close to the edge of ponds. Manure pits must not be entered without a respirator and an emergency plan. An observer who understands safe rescue procedures must supervise any work on manure pits and grain silos, or in other confined spaces. Smoking, welding, grinding or use of open flames in poorly ventilated areas and confined spaces is forbidden.	
Climate Smart Agriculture	
Not applicable	

Too many farmers and farm workers die every year from exposure to toxic, suffocating or explosive gases in confined spaces, or from falling into silos or effluent ponds. This is a new criterion for SAC and therefore inappropriate to immediately move it to a “Mandatory” requirement - but it is equally clear that excellent safety management in these area should be a priority on all farms with such facilities.

Preventing Drowning: Liquid tanks and ponds should be protected by **limiting access** to the area around the tank or pond to untrained visitors, employees, contractors, family members and animals. Floats or ring buoys, ropes, or ladders need to be readily available for rescue. Many accidents take place because of:

- Insufficient care when equipment is being serviced;
- Vehicles overturning when being driven close to ponds; and
- If people slip on synthetic liners or
- Walk on crusted manure storage.

Death by drowning is the most common cause of child deaths on farms in many countries.

Working with confined spaces

Confined spaces – such as tanks, milk vats, pits, silos, underground vaults, storage bins (including woodchip storage), and manholes are dangerous. It is important to remember that even a few gallons of manure or other organic material in a tank or confined space can pose a serious health risk under the right conditions. The build-up of “biogas” can create a high risk of noxious fumes, asphyxiation, fire or explosion. Other dangers may include flooding/drowning. Asphyxiation may also occur from some other source such as dust, grain, manure or other contaminant. There may be no problem one day, but a serious risk on the next.

Whenever possible, these risks should be avoided by the work taking place outside the confined space, but if it is necessary for people to enter such spaces then the risks should first be reduced, for example by ventilation or by locking valves shut for the duration of the work, before entry.

Confined space entry

Too many people have died on farms in confined spaces, often trying to rescue other people.

When a person needs to enter a confined space, a “buddy system” should be used, in which any person entering is monitored from a safe distance by a second person. The person entering the confined space then wears a harness attached to a retraction device that the second person can activate to pull the individual to safety in an emergency. Larger facilities (such as anaerobic digesters) should develop and practice rescue procedures for emergency situations.

To find out more, see [HSE’s confined spaces website here](#).

Preventing engulfment and suffocation in grain bins and silos

Suffocation can occur when a worker enters a bin and is engulfed by grain, or when bins develop hazardous atmospheres or do not have enough oxygen. A worker can be engulfed or suffocated if the worker enters the bin and stands on moving/flowing grain and the moving grain acts like “quicksand” and buries the worker in seconds.

Anaerobic digesters

It makes sense to have risk assessments, risk management procedures, training organised separately, and specifically for people who work with **anaerobic digesters**, as these systems have many safety risks that are unusual or heightened compared with typical farms. As well as the risk above, there are increased risks of falls, burns or explosion associated with anaerobic digesters:

- **Falls.** Where workers need to work at height (as in silos or for some biodigester work), appropriate risk assessments need to be made and guardrails, safety harnesses (self-retracting or with a competent person lifelining), enclosed fixed ladders and guardrails must be used.
- **Burns.** When possible, hot surfaces should be identified as burn hazards and all pipes should be clearly labelled to indicate the contents, flow direction, temperature, and pressure. Insulation should be used to encase the pipe where practical

- **Explosions and fires.** Biogas generated during anaerobic digestion is flammable. All equipment used in manure or slurry pits, biodigesters, etc. where biogas might occur (including torches, tools, ventilation blowers) must be explosion proof

PPE

Workers must be provided with gloves, safety glasses, overalls, rubber boots and hearing protection as appropriate to the working conditions.

F100	Expected. Personal Protective Equipment (PPE)
Workers will be provided with (and use) free PPE when necessary for reducing risks to an acceptable level.	
Climate Smart Agriculture	
The provision of PPE will benefit the health and safety of workers, thus securing their occupation and workforce of the farm.	

A provision of appropriate Personal Protective Equipment for the workers is advised (and ensuring the workers understand how to use it properly and how important it is to their health to use it).

Maintenance, checking and spot-checks is recommended to ensure that procedures and PPE are being used correctly.

The tasks for which PPE is required usually include (but are not confined to):

- Handling CPPs;
- Handling fertilisers and manures;
- Building work (e.g. hard hats, overalls, gloves, footwear with protective toecaps);
- Workshops; and
- Clinics and first aid on farm (protection from bodily fluids).

CPP-contaminated PPE must be washed separately from other materials and must never be taken into living, eating or sleeping places by workers to be washed or repaired. Pregnant or breastfeeding women, or children under 18, shall not handle CPP-contaminated PPE. Contaminated PPE must never be taken into living, sleeping or cooking areas.

We need to provide guidance on how to do washing away from family areas. Note that CPP choice and use is covered by criteria 77-79. ACTION to Follow up on sourcing PPE in the guidance--- e.g. from PAN "Fairtrade have recently introduced in some countries some lightweight, liquid-repellent clothing kits, which can be used up to 20 times.

These PPE kits seem to be comfortable, practical, lowish cost and help address some of the issues around why PPE compliance often poor, both among smallholders and farm workers. Not a panacea but worth promoting in situations where your suppliers may have concerns about exposure." Also follow up on outcomes from PPE provision via Rainforest Alliance on tea in Kenya.

Note that PPE for CPP management is assessed under criterion F89; this criterion is to capture the use of PPE for other jobs on the farm. For guidance on PPE provisions see Appendix 8B.

F101	Mandatory. Risk management and safety culture, residual risk assessment
Once the major risk reduction measures above (criteria F90-100) have been put in place, there will still be opportunities to reduce further the risks to farmers, workers and visitors on the farm. The priorities will vary depending on the farming system. Farmers shall evaluate the situation on their farm and take practical and reasonable measures to reduce hazards and risks. The aim must be to minimise workplace fatalities, injuries and disease and also impacts on bystanders and local community.	
Climate Smart Agriculture	
In taking precautionary measures to address residual risk and to adopt a culture of safety, the likelihood of risks occurring is reduced. This enhances the resilience of the social setting of the farm.	

A list of standard risk management solutions for the major risks on any farm will not necessarily have been covered by criteria 77-100. Compliance with the criterion requires that farmers have been able to identify any other risks to farmers, workers, visitors, family members and the local community posed by the farm management system, geography (e.g. open water bodies, floods, cliffs, landslides, wild animals) and/or social context. Once a risk has been identified, if practical, risk reduction measures must be planned and – if of sufficient priority – implemented.

Risks that are important in some circumstances include:

- The appropriate handling and storage of animal manure, ensuring safety precautions are taken when working with animal manure (E.g. Oxygen masks) and that no access for unauthorized people are allowed access to storage areas; and
- On all farms, farmers and workers must be able to understand how to assess and minimise risks in their normal day to day work.

Please see **Appendix 1** for risk assessment guidance.

F102	Expected. Worker input
Workers or worker representatives (E.g. Unions and/or women's groups) must be involved in identifying safety and security risks and setting priorities for action. Not applicable to individual smallholder farmers.	
Climate Smart Agriculture	
By including workers or their representatives, the recognition and justification of safety and security risks can be made, based on a diversity of contributing viewpoints.	

A Health and Safety representatives and/ or a committee would normally determine priorities for action and risk management. A multi-disciplinary team with experience of the agricultural work environment will normally be needed to serve suppliers, larger farms or farmer groups, in order to understand the hazards and risks involved in farming, transport and other activities and prepare the Risk Assessment and Management priorities required.

Some health and safety issues that would benefit from worker inputs might be:

- The safety of women travelling to and from work, and on company-related business;
- Developing practical systems to reduce hazard exposure of workers to CPP's
- Identifying hazardous working conditions/situations, towards establishing safety practices; and
- Arranging transportation (number of trips to town and back to safely transport individuals) of workers and their families, who may also reside on the farm.

See criterion F170 'Reporting Concerns and Non-retaliation' in the **RSP chapter** for guidance on channels through which workers can raise concerns.

8.2 BUILDING POSITIVE RELATIONSHIPS

F103	Expected. Worker suggestions
Farms must have mechanisms in place to take up ideas and suggestions from the workers and provide regular opportunities for two-way dialogue. Farms or plantations employing a large workforce are expected to have women's committees that work with management, to resolve gender or other group-specific issues. Not applicable to individual smallholder farmers. See criterion F168 for similar guidance.	
Climate Smart Agriculture	
Not applicable	

Systems must be in place to enable all workers (including temporary and migrant labour, and labour employed by contractors) on the farm (and all farmers in smallholder groups) to raise suggestions with the farm or group management. This should not be inhibited by language, literacy or cultural barriers, and the participation of women and youth - groups often recognised as being vulnerable or marginalised - is to be encouraged by creating appropriate channels through which to communicate concerns to persons of authority.

For small farms and farms with seasonal workers who may not write in the local language, the key aspects to address are to do with efficient verbal communications. This can be assessed and audited by interviewing workers. A written, more formal mechanism must be organised and defined for large farms and plantations employing many people; as well as women committees, it may be appropriate to set up systems for different language-speakers or other groups to ensure that all voices can be heard.

On large farms and plantations, and for management of large groups of smallholders

Suggestions would normally be communicated as part of worker and management joint committees, but other approaches include:

- Union/management meetings;
- As meetings between management and local community groups;
- 1-on-1 meetings between individual workers and managers; and
- Suggestion boxes and competitions for good ideas. If suggestion boxes are used, make sure they are located in discreet spots where complainants have some privacy when using the box.

Where farm workers occupy large groups who maintain different characteristics (E.g. Speak different languages, come from different regions, practice different faiths, etc.), a diverse selection of workers should be engaged with to obtain a varied and inclusive set of suggestions. Large farms and plantations employing many women will be expected to have a women's committee that is in dialogue with management.

In cases where disputes exist between individuals and factions have formed within the worker unit, all parties attributing to the disagreement should be afforded the opportunity to provide their opinion. Engagement should be conducted on a 1-on-1 basis with the individuals implicated and where exaggerated, an external party may participate or guide the resolution process (see F176 on fair procedures and remedies).

Where workers cannot communicate in written form proficiently in the dominantly-spoken language, measures to effectively engage must be sought, such as the services of an interpreter.

Furthermore, suggestions for improvement in health and safety are not included here as they are covered by criterion 102. See criterion F170 'Reporting Concerns and Non-retaliation' in the **RSP chapter** for guidance on channels through which workers can raise concerns.

F104	Leading. Multiculturalism
Where the workforce is of mixed ethnicity/religion/origin, efforts/opportunities are made to ensure that different groups mix in an environment that promotes harmony in diversity. This includes discussions and briefing between local communities and migrant labour to support mutual understanding, avoid giving offense and promote good relationships. Not applicable to individual smallholder farmers or where the workforce all have similar backgrounds.	
Climate Smart Agriculture	
Not applicable	

Unilever farmers and suppliers should not create or exacerbate racial, religious or other types of conflict. This is whether the conflict takes place on the farm or out of working hours in the local community. If workers are not local, employers should ensure that workers are aware of local dress and behavioural codes, including how to avoid giving offence. In turn, migrant workers should not be responsible for inciting such behaviours and be made aware that such attitudes are unacceptable.

Where workers come from different groups with significantly different cultural norms, management must put systems in place that minimise conflict and promote harmony. Verbal abuse and other signs of intolerance towards marginal groups or individuals should be addressed by management and interventions taken to hinder further incidences from taking place.

Employers should not pressurise workers to put aside their own cultures by demanding that visiting or minority workers adopt certain habits which they may find unacceptable (e.g. having to adopt and wear traditional clothing and religious practices), or work on religious holidays.

There should be no restriction in allowing workers to perform religious obligations. Where this requires restructuring of work patterns (such as break times) and/or facilities (such as making a room available for prayer) the requests should be accommodated.

F105	Leading. Remissions
Farmers should provide support for workers who wish to remit money to their family (e.g. time off during banking hours, access to translators). Not applicable to individual smallholder farmers.	
Climate Smart Agriculture	
Not applicable	

Employment rules should not make it impossible for workers to support their families. An enabling situation would support workers in accessing banks during operating hours at least once a month. This is necessitated, because many farm workers live away from their family, and require access to banking or money-transfer facilities when they are open.

S11	Mandatory. Co-ordination of farmer meetings
Suppliers must ensure that there are regular meetings for farmers and/or farmer groups to discuss not only quality, price and delivery dates, but also to promote more sustainable farming practices and understand how any problems the farmers are facing might be overcome. Not applicable to individual smallholder farmers.	
Climate Smart Agriculture	
Farmers who work together in groups often have opportunities to reduce costs, share experiences and jointly benefit from training, jointly develop "offshoot" small businesses and access loans. In so doing, collective efforts would benefit the resilience of the multiple farming businesses through structures of support.	

Farmer groups

Farmers who work together in groups often have opportunities to:

- Reduce costs, for example by buying farm inputs in bulk;
- Share experiences, and jointly benefit from training;
- Jointly develop “offshoot” small businesses that would not be viable for a single farm (E.g. In composting, waste recycling, transport, or purchasing expensive equipment);
- Access loans; and
- Particularly in developing countries, the cultural or community security afforded by groups can be important.

Thus groups that do not always have an explicit economic role still can provide welfare or economic benefits (such as with religious groups, community groups, women’s groups)²⁷. Women’s groups tend to add a particularly enriching narrative to discussion forums, because when they earn more, they tend to invest more in the health of their families. Women are also concerned with education for their family and the well-being of their communities.

Groups may be formed as farmer associations, farmer field schools, factory-supplier associations, or suppliers or farmers may link into other pre-existing groups (e.g. religious groups, fishing clubs, self-help organisations) in order to promote Sustainable Agriculture. Some of the characteristics that contribute to the formation and successful sustaining of farmer groups are as follows:

- Small groups of less than 20 persons usually work best because members get to know and trust each other more quickly and tend to work more closely and in a more informal manner. This, as a result, encourages them to analyse problems together and also to plan together.
- The group should have:
 - Clear objectives, and plans to achieve these objectives;
 - A written constitution that members agree to obey;
 - Members with common interests, close economic and social affinity, and a desire to participate actively in all the group’s activities (this is sometimes referred to as the “sharing and caring bonding element”);
 - A democratically-elected committee (i.e., chairperson, secretary, treasurer, etc.);
 - Leadership that is committed, honest, transparent and accountable, and encourages active participation on the part of all its members;
 - Simple record-keeping of finances, attendance, minutes of meetings, etc.;

- A set of rules in place, as well as a willingness to enforce punishments (fines, suspension, expulsion, etc.) for deviant behaviour (such as lack of attendance at meetings, not completing responsibilities associated with activities of the group, etc.); and
- A savings system so that membership dues, funds resulting from fines, and a small proportion of funds from income-earning functions can be ploughed back into future activities, etc.

The group should have regular, structured meetings:

- A With a previously prepared agenda that includes dealing with unfinished issues arising out of earlier meetings, but also has the flexibility to have new topics added;
- B At which attendance of all members is expected;
- C At which active participation of members is encouraged and expected;
- D At which decision-making is transparent and democratic; and
- E That are recorded in writing (and a copy should be kept in an accessible location).

**F106/
S12**

**Leading. Local initiatives
(farm and supplier level)**

F106 - Large farms and plantations should support local farming initiatives, festivals and competitions and/or social or environmental programmes.

S12 - Suppliers should support local farming initiatives, festivals and competitions and/or social or environmental programmes.

Not applicable to individual smallholder farmers.

Climate Smart Agriculture

The leverage of capacity by larger groups in support of more local initiatives would benefit local resilience of farm businesses.

Social events, which may have a training component, help build relationships and a sense of community.

F107

Expected. Informing community of planned activities

Neighbours and local communities must be informed of planned activities that affect them in a timely manner. This means that the right people to tell, and effective communications channels to the local community, are identified in advance. Disturbance of local communities must be minimised. Not applicable to individual smallholder farmers.

Climate Smart Agriculture

The leverage of capacity by larger groups in support of more local initiatives would benefit local resilience of farm businesses.

²⁷ <http://ftp.fao.org/docrep/fao/011/aj996e/aj996e00.pdf>. Helping small farmers think about better growing and marketing

In practice, suppliers and farmers should imagine themselves to be in their neighbours' shoes to question how the effects of proposed activities would affect them and on whom. Good practice is to have a list of key stakeholders available on the farm. Any on-farm activities that may impact on neighbouring business operations or communities' well-being – like the generation of noise, unpleasant odour, the temporary reduction in water availability to down-stream users, or traffic – should be communicated to ensure that measures can be taken to mitigate any impact.

Parties to be informed included (but are not restricted to) are:

- Local landowners;
- Land users who utilise the land for business (E.g. Ecotourism and mining), recreational (E.g. Fishing or hunting) or residential use;
- Land users who traditionally access resources such as water, cultural sites, pathways across the farm, etc.;
- Tenants; and
- Stakeholder groups and forums that represent the interests of the local community and/or farmers.

Examples of the type of activities referred to include:

- Moving large machinery through small streets at busy times;
- Re-siting roads or manure stores;
- Changes in water and waste management; or
- Changes in working hours that may cause noise or disturbance, etc.

Upon being informed, parties should be afforded the opportunity to communicate their comments or concerns within a reasonable period of time. Upon being informed, parties should be afforded the opportunity to communicate their comments or concerns within a reasonable period of time. If land acquisition or major/long term land use changes are planned that affect collective legal, customary, or informal land tenure rights, the Free, Prior and Informed Consent of those tenure holders will be required. (See **RSP Chapter**). Informed consent of individual land holders will also be required. Note that certain farm activities may trigger the need for legal permits in accordance with applicable legislation (Such as an Environmental Impact Assessment), which often includes community engagement as a requirement. Further details on this aspect are provided in criterion 206 of the **RSP chapter**.

F108	Leading. Community complaints
Complaints from the local community should be documented and attempts made to avoid similar problems in the future. The outcome should be communicated back to the person or organisation that complained. Not applicable to individual smallholder farmers. During land acquisition, devise a culturally appropriate and accessible system that allows community members to file complaints about the process. Ensure the community members are aware of that system, track the complaints, and respond to such complaints within a specified time period.	
Climate Smart Agriculture	
The leverage of capacity by larger groups in support of more local initiatives would benefit local resilience of farm businesses.	

Where possible, the farmer should engage in local community forums to actively partake in conversation on matters that impact both the farm and community setting. This encourages the earlier detection of concerns that the local community may have regarding farm operations, as well as facilitate discussion and resolution of these issues.

Where possible, both parties should agree that actions to be taken are acceptable and will lead to a mutually acceptable outcome.

F109/ S13	Expected. Relationships with suppliers and purchasers
Pay and supply on time and at the mutually agreed price. Not applicable to individual smallholder farmers.	
Climate Smart Agriculture	
Good relationships along supply chains are important. Sustainable businesses operate within a climate where trust can be built and mutually beneficial outcomes developed. All actors along supply chains (including farmers) should pay and supply on time, and at the agreed price, thus ensuring the economic resilience of the suppliers.	

Good relationships along supply chains are important. Sustainable businesses operate within a climate where trust can be built and mutually beneficial outcomes developed. All actors along supply chains (including farmers) should pay and supply on time, and at the agreed price.

When drafting contracts, both parties concerned must agree to payment schedules that are reasonable and deliverable. Expectations must be communicated to avoid uncertainty or tension among either party.

All risks that may threaten the payment and supply of goods or materials on time and at the agreed price must be identified as early as possible and communicated with the effected parties. The establishment and maintenance of a risk register, shared among suppliers and purchasers, will ensure that all parties remain cognisant of potential scenarios that could impact their deliverables and relationships.

S14	Expected. Avoiding wasted production
Suppliers must inform farmers as soon as possible if their produce is not required for processing, so they can make other arrangements for using the land, labour or product, if at all possible. Not applicable to individual smallholder farmers.	
Climate Smart Agriculture	
Long storage times, delayed pickup from the field or collection sites, poor loading, inefficient transport and inefficient unloading at factories often result in quality deterioration. Processors should schedule field collections, transport and delivery to the factory so that there are no long delays, especially if these involve perishable materials being kept in sub-optimal conditions or delivery vehicles. In so doing, productivity is ensured, the economic resilience of farms is secured and lower emissions are generated.	

Long storage times, delayed pickup from the field or collection sites, poor loading, inefficient transport and inefficient unloading at factories often result in quality deterioration. Processors should schedule field collections, transport and delivery to the factory so that there are no long delays, especially if these involve perishable materials being kept in sub-optimal conditions or delivery vehicles. Delivery vehicles should not need to stand and run their engines to keep the produce cool while awaiting receipt.

8.3 SERVICE PROVISION TO WORKERS AND COMMUNITIES (LARGE FARMS AND PLANTATIONS)

F110	Mandatory. Provision of services and facilities
All provisions of services and facilities for workers and their dependents shall be at, or above, the legally required minimum standard and must meet the basic needs of workers and their families.	
Climate Smart Agriculture	
Not applicable	
WASH Principles	
This criterion addresses requires for a more fundamental provision of services and facilities that meets basic human needs, which would include access to potable water, drainage and hygiene.	

Accommodation and transport, where provided, must be safe (including the structure of buildings and the provision of security and fire safety where appropriate) and there must be access to toilets and washing facilities. Hygienic food preparation must be practical, and there must be access to safe drinking water. If families are housed, children must be able to attend school. See WASH criteria for potable water, drainage and hygiene.

These include the following amenities:

- Safe accommodation and transport;
- Non-hazardous work environments;
- Access to sanitation (see also other criteria linked to WASH);
- The ability to prepare food hygienically;
- Access to safe drinking water; and
- Access to school for children if families are housed.

8.4 LAND RIGHTS AND OBLIGATIONS

F111	Mandatory. Legal or customary right to farm the land
The farmer must have the legal or customary right to farm the land in the form of ownership, tenancy or traditional rights, and conformance to government or local authority zoning schemes that enable the land to be farmed. Not applicable to individual smallholder farmers. See also F177 in this regard.	
Climate Smart Agriculture	
Not applicable	

Deeds or an official document are appropriate evidence of a right to operate in countries/regions of countries where land is not typically held through customary or informal tenure. However, documented land titles, linked to clear maps and well-defined boundaries are not available in all parts of the world, and land in some cases may be held through customary title that might conflict with deeds or official documents. If land is held through customary title rather than through a formal deed, neighbours and local officials should recognise the right to farm the land. If land is held through a deed or official document in an area where customary land ownership is common, neighbours and local officials should recognise the right to farm the land, in addition to the evidence of a formal deed. If land is rented rather than owned, records of rent payments will serve as sufficient evidence for this point.

Any zoning of land by national or local government should show that the farming system in place is appropriate. In particular, deforestation (See **Biodiversity and Ecosystem Services chapter**) must not be a consequence of changes in farm management or development of greater farmed area.

There may also be conflicts between “owners”, organisations or individuals in “possession” and those with the right to “control” activities. Disputes between customary owners and managers of land areas, and the entities with legal control are particularly problematic. Clearly, efforts need to be made by all people concerned in disputes to resolve the issues.

Farms where there is a major dispute about the right to farm the land will be unable to comply with criterion unless they are taking part in dispute resolution processes. [Note - we would not classify a “major dispute” as one, for example where the argument is about the exact location of a farm boundary (e.g. to within 100m for a large farm)].

F112	Expected. Clarity on rights on other land users on farm
The farmer must have the legal or customary right to farm the land in the form of ownership, tenancy or traditional rights, and conformance to government or local authority zoning schemes that enable the land to be farmed. Not applicable to individual smallholder farmers. Not applicable to individual smallholder farmers.	
Climate Smart Agriculture	
Not applicable	

A farm map, showing such areas, is good practice (See also the **Biodiversity and Ecosystem Services chapter**). Additionally, people accessing the farm to exercise legal or customary rights shall not be exposed to danger – e.g. being forced to walk along cliff edges or encounter hazardous machinery or animals.

APPENDIX 8A: REFERENCES AND FURTHER INFORMATION

CPP Storage and Disposal (including containers)

Pesticide Storage and Stock Control Manual (1996), FAO
Pesticide Disposal Series. FAO Corporate Document
Repository: <http://www.fao.org/documents/card/en/c/140ae73a-79b0-56b3-8478-24d597be9379/>

This document details the features of a well-designed store, but also deals with local transport, how to handle spills and leaks, and how to dispose of chemicals and containers. It was originally written for Africa and the Near East, but most of the content applies to most regions.

New South Wales Department of Primary Industries
“Storing Pesticides Safely on the Farm”: http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0004/186394/storing-pesticides.pdf

Tasmania Department of Primary Industries and Water “On farm Pesticide Storage”: <http://www.dpiw.tas.gov.au/inter.nsf/WebPages/TTAR-62Q5Y2?open>

Basic personal protection equipment for the handling and application of organic and inorganic farm inputs

Application of insecticides, herbicides and nematicides:

Work clothes, overalls or long-sleeved shirt, and long pants made from a heavy material;

- Respirator with a special filter in accordance with the characteristics of the agrochemical used;
- Head protection (cap, hat, etc.);
- Unlined nitril gloves that cover at least halfway up each arm;
- Vinyl back protector in cases when a backpack sprayer is used;
- Unlined rubber boots;
- Face screen or goggles with indirect ventilation designed for chemical substances
- Socks.

Flag persons for aerial fumigation:

Work clothes, overalls or long-sleeved shirt, and long pants made from a heavy material;

- Respirator with a special filter in accordance with the characteristics of the agrochemical used;
- Head protection (cap, hat, etc.);
- Unlined nitril gloves that cover at least halfway up each arm;
- Raingear, poncho or other similar waterproof protection;
- Unlined rubber boots;
- Face screen or goggles with indirect ventilation designed for chemical substances;
- Socks.

Fertilizer application:

Apron;

- Unlined nitril gloves;
- Unlined rubber boots;
- Socks.

Collection of agrochemical spills:

Work clothes, overall or long-sleeved shirt and long pants;

- Respirator with a special filter in accordance with the agrochemical's characteristics;
- Unlined nitril gloves;
- Unlined rubber boots.

Handling materials impregnated with pesticides (bags, plastics, plant materials, tests, etc.):

Work clothes, overall or long-sleeved shirt and long pants;

- Respirator with a special filter in accordance with the agrochemical's characteristics;
- Unlined nitril gloves.

Washing clothes and work equipment contaminated with agrochemicals:

- Apron;
- Unlined nitril gloves;
- Unlined rubber boots.

SAN Sustainable Agriculture Standard April 2009.



9 ANIMAL HUSBANDRY

This chapter covers a range of requirements for good practice in animal husbandry, with a focus on animal welfare issues.

The Unilever Sustainable Agriculture Code itself is written in general terms in relation to animal husbandry practices in order to cover a wide range of animal species and production systems; it is here, in the guidance, that more specific recommendations are made: The focus is on poultry products (broiler meat and eggs), dairy, pork and beef as these are the main animal products used by Unilever. Where the animals, or the farming system on any farm differs significantly to the examples provided in this guidance, then the code must be interpreted in such a way that a similar level of care is taken as that described in these examples.

Animal Welfare

Unilever requirements for animal welfare are linked to maintaining standards of physical and mental wellbeing of animals; an animal's "quality of life". Animal welfare has been an important area of public concern in many parts of the Unilever world since the 1950s and 1960s, as a result of intensification of animal production practices and what was seen as the exploitation of animals in production systems involving crowded, unhealthy and barren environments. Consumer and citizen surveys have shown a continuing interest and the need for assurances that high quality food has been produced from animals able to have good feelings; the potential for good health; and an ability to express natural behaviour.

Governments have responded to this movement by creating animal welfare legislation. Charities, producer bodies and retailers have also created farm standards and product labels that provide assurances of minimum standards of animal welfare on the farms, during transport and in slaughterhouses. Many of these standards are of high quality and focussed on particular species, breeds and local or regionally relevant animal management systems.

Farms already working to local, regional or national standards that include an animal husbandry component should check whether these conform to Unilever general requirements. Such standards often have detailed requirements for different species and local production systems (e.g. cattle living mostly in pastures, that "run with the herd" or are mainly confined), and are often easier for farmers to understand and follow than the more general principles and guidance available in more generic codes such as SAC2017. If such standards are equivalent, or more

ambitious to those of SAC2017, evidence of compliance with such standards will be accepted as equivalent to part or all, of this code.

Knorr Higher Animal Welfare

This chapter reflects what we expect our suppliers to achieve through their livestock production operations. We are however trialling a project to source livestock materials from suppliers that meet 'higher animal welfare' defined criteria, which have been produced with technical guidance from Compassion in World Farming. As such, while this chapter reflects a certain level of scope and ambition, we are engaging with a group of suppliers on specific issues relevant to animal derivatives that form part of Knorr brand's products. For further information, we have included the livestock matrices in Appendix 9B of this chapter.

The Unilever approach to animal welfare.

There are general principles of animal welfare that can be applied whatever production system is used. These have been embodied in the "Five Freedoms" of the Farm Animal Welfare Council (Table 1), and which Unilever has chosen to use as a guide to Best Practice in the animal welfare part of the SAC2017 code.

TABLE 25: THE FIVE FREEDOMS

- 1 Freedom from hunger and thirst by ready access to fresh water and a diet to maintain full health and vigour
- 2 Freedom from discomfort by providing an appropriate environment including shelter and a comfortable resting area;
- 3 Freedom from pain, injury or disease by prevention or rapid diagnosis and treatment;
- 4 Freedom to express normal behavior by providing sufficient space, proper facilities and company of the animal's own kind; and
- 5 Freedom from fear and distress by ensuring conditions and treatment, which avoid mental suffering.

Source: <https://www.rspca.org.uk/servlet/Satellite?blobcol=urlblob&blobheader=application/pdf&blob-key=id&blobtable=RSPCABlob&blobwhere=1210683196122>

The Unilever SAC2017 criteria are designed to promote animal welfare based on these principles. General animal welfare guides can be found [here](#) and [here](#).

9.1 ANIMAL WELFARE ON THE FARM

Hunger and thirst are generally distressing emotions for animals, and also produce a number of severe consequences, which depending on the species, may include restlessness, aggression, vocalisations and physical damage. Hunger is linked to the energy requirements of the animal and is therefore not static, varying with factors such as growth rate, pregnancy, lactation, climate (cold may increase intake, heat may reduce it), activity etc. Similarly, demand for drinking water varies with factors such as age, climate (heat increases consumption), diet (amount and water content), activity etc. Animals must be able to satisfy their changing needs for food and water at all times and to do this there must be free access to both these resources.

F113 Expected. Feed Plan

There must be an Animal Feed Plan, which is designed to achieve good animal nutrition and freedom from hunger and malnutrition. The diet must be sufficiently nutritious to maintain full health and promote a positive state of well-being. The plan must include provision for all ages and all stages of production of animals kept on the farm. The plan must be updated at least once per year if there are significant variations in the farm population.

Climate Smart Agriculture

A properly designed and verified feed plan should be the assurance for good animal feed purchase and traceability. Implementation of such a plan, would offer quality assurance of feed and prevent contaminated feed from being fed to animals, thus safeguarding the health and well-being of livestock, increasing productivity and lowering emissions associated with wasted feed.

A properly designed and verified feed plan should be the assurance for good animal feed purchase and traceability.

The feed plan may be combined with other documents, e.g. the animal health plan (see criterion F128), and the quality assurance and sustainable sourcing of animal feed (see criteria F136 and F138 in the **Value Chain** chapter) and must include both record keeping and an element of planning for the future. Water supply and water quality should be included in the feed plan.

The feed plan will be a written or electronic document, and only in the case of smallholders, will the same plan be acceptable for all the farmers delivering to a single Unilever supplier.

The feed plan must include plans and records of:

- Type(s) of feed provided;
- Amount of each type of feed provided, including feed supplements;
- Vendor or pasture used;
- Quality assurances obtained (see below);
- Drinking water provision and preferably; and
- The consequences, in terms of provision of energy, protein, minerals and fibre available in the diet (and/or other criteria appropriate for the animals involved)

Suppliers of feed should be asked for data on the nutritional quality of the ingredients, and this information incorporated into the feed plan.

Farmers must ensure that feed is stored correctly once on the farm, and not contaminated by rodents or foreign matter. Examples of feed plans can be found [here](#).

Information on feeding regimes for various farm animals is provided in the following section for each livestock group.

DAIRY CATTLE

General

Unilever encourages grazing wherever this is possible (as the cattle are able to express natural behaviour in this way). The feed plan must contain a section on the nutrition of young stock and calves if these animals are present on the farm (see below).

Calf nutrition

Providing an adequate volume of high-quality colostrum or colostrum replacer is critical to calf health, because calves depend on colostrum for immune protection. All calves, whether to be raised as a replacement heifer, veal, or dairy steer, should receive colostrum or colostrum replacer and be fed in a way that promotes health and reduces the risk of disease. The recommended provision is 2-4 litres within 2 hours after birth. After receiving immunity through feeding colostrum or colostrum replacer, calves should be fed milk or milk replacer until weaning. Within two weeks after birth, calves who are to be retained on the farm should be offered a palatable, high-quality starter ration.

Advice on weaning seems to vary considerably depending on location. We therefore advise you to conform to official local (veterinary) advice for your breed and farming system – this should be sought from your Ministry of Agriculture or similar government department, or university extension service if there is one.

We recommend that the farm adopts (or generates) monitoring systems for judging the adequacy of feed and health plans (see criterion F127). The following documents contain advice on weaning and other aspects of calf nutrition, as well as, in some cases, general calf care:

- The Northern Ireland Department of Agriculture's 'Blueprint for rearing dairy origin calves'¹
- The University of Florida Extension Service's 'Feeding and Management of Young Dairy Calves'²
- The UK Department for the Environment, Food and Rural Affairs' 'Improving Calf Survival'³
- Dairy Australia's 'Rearing Dairy Heifer Calves'⁴

Young stock nutrition

As the young stock are the cows of tomorrow, good animal health and welfare are important. The adequacy of young stock nutrition can be judged by estimating the weight of young stock on a certain age (will be different between breeds; ask local adviser for the standards), the general condition and the colour and shine of the coat*.

Lactating dairy cows and **dry cows** should have different diets as they have different requirements. These diets should meet health requirements and avoid nutritional or metabolic problems.

Details of the key ration components should be detailed in the farm feed plan e.g. energy, protein, key minerals and amino acids.

Good dairy nutrition may be judged on the basis of:

- 1 General condition of the dairy cows (e.g. the colour and shine of the coat);
- 2 Body Condition Score
- 3 Incidence of feed-related diseases like milk fever and rumen acidification (the development and use of such KPIs is included in criterion F127; compliance with criterion F113 does not therefore require the use of KPIs.).

For additional information on feed plans follow the links:

- EBLEX, UK's manual 'Feeding suckler cows and calves for Better Returns'⁵
- DairyCo UK's 'Feeding dairy cows' page⁶

1 <http://www.afbini.gov.uk/blueprint-for-rearing-dairy-origin-calves.pdf>

2 <http://ufdc.ufl.edu/IR00004754/00001>

3 <http://www.teagasc.ie/faol/NR/rdonlyres/9CBDBC71-9205-4788-93A9-FF75097DAFBF/50/ukCalfsurvival1.pdf>

4 http://www.dairyaustralia.com.au/Responsible-Dairying/Animal-welfare/~/_media/Documents/Farm/Animal%20Health/Calf%20and%20Cow%20Management/Rearing%20Dairy%20Heifers%20Fact%20Sheet%20BP%2028Jun07.ashx

5 <http://beefandlamb.ahdb.org.uk/wp/wp-content/uploads/2013/06/Manual-5-feeding-suckler-cows-and-calves-for-better-returns.pdf>

6 <http://www.dairyco.org.uk/farming-info-centre/feeding/feedingplus.aspx>

PIGS/HOGS

The feed plan must ensure that pig diets are appropriate for the stage of production of all pigs on the farm: fed in sufficient quantities to maintain the pigs in good health, while maintaining body condition and satisfying their nutritional requirements.

Lactating and dry sows, and pigs at different stages of the rearing and finishing process should have different diets as they have different requirements. These diets should meet health requirements and avoid nutritional or metabolic problems.

This can be best regulated and documented in a feed plan. Ideally, the feed plan should detail the type of feed that is provided and the level of ingredients used. The feed plan should also indicate the levels of energy, protein, minerals and fibre in the ration.

The feed plan ideally should also contain a section on the nutrition of pigs during the rearing and finishing periods. Good pig nutrition is judged on the basis of: (1) general condition of the pigs, (2) production performance.

Details of the key ration components should be detailed in the feed plan e.g. energy, protein, key minerals and amino acids.

Efforts should be made to avoid sudden changes in the type and quantity of feed.

Good pig nutrition may be judged based on:

- General condition of the pigs;
- Production performance, (the development and use of such KPIs is included in criterion F127; compliance with criterion F113 does not therefore require the use of KPIs).

POULTRY

Diets should be specifically formulated to satisfy the nutritional requirements of the type of bird that is being reared. Feed should be presented in a form that is suitable for the age and type of bird. Feed should be sourced from a purpose built feed mill that operates to an approved local scheme (e.g. the Universal Feed Assurance Scheme, UFAS)⁷

Details of the key ration components should be detailed in the feed plan (E.g. Energy, protein, key minerals and amino acids).

Procedures should be in place to minimise the contamination of stored feeds. All ration ingredients and formulations should meet local legislative requirements (E.g. The use of mammalian /avian proteins and 'growth promoters' in diets is banned in some countries). Diets should be free from hormones and, if fishmeal is used, it should be fed at levels that do not result in the tainting of finished product.

Prior to depopulation of houses feed should not be withdrawn from the birds for more than 12 hours before the time of slaughter.

F114	Expected. Food and Water Distribution
Food and water must be distributed in such a way that animals can eat and drink without undue competition. Water must be available at all times.	
Climate Smart Agriculture	
Food and water consumption are often linked and if there are signs of a reduction in either, the way each is supplied should be checked. Ensuring adequate access to quality food and water for livestock will drive productivity of the farm practice, by maintaining the condition and wellbeing of animals.	

Food and water consumption are often linked and if there are signs of a reduction in either, the way each is supplied should be checked

⁷ <http://www.agindustries.org.uk/content/output/93/93/Trade%20Assurance/Trade%20Assurance%20Schemes/UFAS.msp>

1. Access

There are many guides to feeder space and water provision for animals, which can be used as indications of good practice. At any given time, an animal's ability to satisfy hunger or thirst can be affected by many factors such as:

- Feed type - Forages vs. concentrates vs. grazing, time to consume daily ration, effort required, distance;
- Competition - Space at the feeder and dominant animals (merely a dominant animal's presence may be sufficient to deter a subordinate from feeding). Having more than one feed or drinking water site may well solve this problem;
- Animal size, group size and make-up - feeder allocation, size differences between animals, males vs. females, stage of growth;
- Feeder and drinker size and design - length, height, width, access, rate of food and water supply; and
- Other factors - predation, disturbance etc.

Recommended feed trough space are as follows

TABLE 26: RECOMMENDED FEED TROUGH SPACE		
Weight (kg)	Ration fed	Ad-lib/Self feed
	(centimeters per animal)	
200	45	15
250	45	15
300	50	15
350	50	15
400	55	17
450	55	19
500	55	22
550	55	24
600	60	26
650	65	27
700	70	30
750	75	32

Source: UK Red Tractor Assurance Scheme⁸

It is therefore best to determine that all animals can freely access food and water without undue competition and use body condition and behaviour as a guide to adequacy.

2. Quality

Water or feed that is contaminated by substances such as faecal matter, toxic compounds, rodents etc. encourages disease and can effectively discourage consumption. All ration ingredients and formulations must meet local legislative requirements (e.g. the use of certain animal proteins is banned in the EU).

In extensive systems, pasture on which animals are kept should be maintained to ensure adequate provision of forage. Pasture quality will depend on many factors, including:

- Geographic location;
- Environmental conditions (temperature, humidity, precipitation);
- Type of grass and/or legume;
- Grazing management; and
- Harvesting (direct grazing or production of hay or silage)

Farmers should take locally-applicable advice on the nutritional value of their pasture, and in situations where pasture alone is insufficient (for example where local soils are deficient in specific nutrients or where the weather has been problematic) provide supplementary nutrition (feed, grains, root crops or forage as appropriate).

Recommended standard limits for potable water by the WHO:

TABLE 27: RECOMMENDED WATER QUALITY THRESHOLDS FOR WATER	
Parameter	Factor
Ammonia	1.5mg L ⁻¹
pH	6.5-8
Chloride	250 mg L ⁻¹
Iron	0.3 mg L ⁻¹
Lead	0.01 mg L ⁻¹
Arsenic	0.01 mg L ⁻¹
Copper	2.0 mg L ⁻¹
Faecal Coliform bacteria	0 counts/100 mL

Source: InVEST 3.0.1 User's Guide⁹

⁸ http://assurance.redtractor.org.uk/resources/000/965/778/Beef_and_Lamb_Scheme_Standards_interactive_V5.pdf

⁹ http://data.naturalcapitalproject.org/invest-releases/documentation/3_0_1/waterpurification.html

3. Amount

Both food and water must be freely and continuously available. Where energy intake may need to be regulated, this must be met by varying the energy density of the feed to minimise the negative consequences of hunger, for example, by providing lower quality forage for ruminants.

Guidance on food and water distribution for different farm animals is as follows:

DAIRY CATTLE

General

All cattle should have daily access to food (except when required by the veterinarian) and good access to drinking water. Efforts should be made to avoid sudden changes in the type and quantity of feed. The method of feeding and provision of water must be designed and placed so as to minimise competition between animals.

CALVES

Calves should have continuous access to fresh water, or provided water at least twice a day (only if continuous access is impossible and there is no competition), that is free of contaminants or pollutants. Calves should be watched particularly carefully to check they are all feeding properly. In particular, when calves are put on limited milk-feeding diets, you should ensure that there are enough teats/places to drink to avoid competition.

Young stock

Providing good quality of feed (preferably ad libitum) and good access to water free of contaminants and chemicals is crucial for good health of young stock (period after weaning until first calving).

Pasture

Pasture used for grazing, hay, silage etc. must not be contaminated with pollutants (including heavy metals and organic pollutants) or recently-applied Crop Protection Products. Pasture quality and nutritional value must be appropriate for the type of animal involved, for example Dairy producers in Penn State (USA) strive to achieve legume forage with 20 to 23% crude protein (CP), 26 to 30% acid detergent fiber (ADF), 38 to 42% neutral detergent fiber (NDF), and a net energy for lactation (NEL) of 0.62 to 0.68 Mcal/lb¹⁰.

Water

All cattle should have continuous access to a sufficient quantity of clean drinking water, so that they are able to satisfy their fluid intake needs. Equipment for providing water to animals should minimise contamination, and the harmful effects of competition between animals. There should be enough water available for at least 10% of housed cattle to drink at one time. An appropriate number of water sources (natural or man-made) should be available to grazing cattle which are easily accessible. Water troughs should be managed in a way that ensures they are capable of dispensing water, that access is available at all times for example, minimising possible freezing in cold weather, and ensuring areas around water troughs do not become water logged.

Good cattle nutrition is judged based on:

- 1 General condition of the cattle (coat, over fat or thin)
- 2 Production and performance (milk yield, food conversion ratio, daily live weight gain)
- 3 Nutritional disease incidence (such as milk fever, ketosis, laminitis, and bloat)



¹⁰ <http://extension.psu.edu/animals/dairy/nutrition/forages/pasture/articles-on-pasture-and-grazing/pasture-quality-and-quantity>

PIGS/HOGS

All pigs should have daily access to food (except when required by the attending veterinarian).

The method of feeding and provision of water should minimise the contamination of feed and water and should minimise bullying: restricted feeding in troughs should enable all pigs to feed simultaneously. If a floor feeding system is used, feed should be scattered over a wide area to reduce the potential for bullying. Mechanical and automated (e.g. Electronic Sow Feeders) feeding systems should be monitored to ensure procedures are in place in the event of a breakdown.

Pig diets should be appropriate for the stage of production: fed in sufficient quantities to maintain the pigs in good health while maintaining body condition and satisfying their nutritional requirements.

Procedures should be in place to minimise the contamination of stored feeds. All ration ingredients and formulations should meet local legislative requirements (e.g. the use of mammalian and avian proteins in diets is banned in some countries).

Efforts should be made to avoid sudden changes in the type and quantity of feed.

Water

All pigs should have continuous access to a sufficient quantity of clean drinking water so that they are able to satisfy their fluid intake needs. Equipment for providing water to animals should minimise contamination and the harmful effects of competition between animals. Water troughs, bowls and nipples should be managed in a way that ensures they are capable of dispensing water at all times.

Ideally, provision of water should take into consideration the following: the total volume available; sufficient flow rate for the type of animal (e.g. some classes of stock may not spend a long time taking water); the method of provision (e.g. the type of drinker); and its accessibility to all the animals in a group. Pig keepers should be aware of the daily water requirement of the animals under their care.

POULTRY

Procedures should be in place to minimise the contamination of stored feeds. All ration ingredients and formulations should meet local legislative requirements (E.g. The use of mammalian / avian proteins and 'growth promoters' in diets is banned in some countries). Diets should be free from hormones and, if fishmeal is used, it should be fed at levels that do not result in the tainting of finished product.

Feed should be presented in a form that is suitable for the age and type of bird. Feed should be sourced from a purpose built feed mill that operates to an approved local scheme (e.g. The Universal Feed Assurance Scheme, UFAS¹¹). Details of the key ration components should be detailed in the farm feed plan e.g. energy, protein, key minerals and amino acids.

The method of feeding and provision of water should minimise the contamination of feed and water and minimise competition.

Feed

Birds should be fed ad-libitum. Pan type feeding systems are preferable. Sufficient feed space should be provided according to the recommendation of the equipment manufacturer.

Water

Nipple drinker systems are preferable, although bell drinkers may be used. Sufficient drinking space should be provided according to the recommendation of the equipment manufacturer. Drinkers must be positioned at the correct height for the size of the birds.

Mechanical and automated feeding / watering systems should be monitored and procedures should be in place in the event of a breakdown.

Water meters should be fitted in all houses and the amount of water consumed should be monitored on a daily basis. Changes in water consumption provide an early indication of health issues within flocks. A 24 hour supply of water should be available on site or there should be provision made to achieve this e.g. the use of a dedicated bowser.

11 <http://www.agindustries.org.uk/content.output/93/93/Trade%20Assurance/Trade%20Assurance%20Schemes/UFAS.msp>

Typical daily water consumption for layers (liters per 1000 birds) at 21°C:

TABLE 28: TYPICAL DAILY WATER CONSUMPTION FOR LAYERS		
Production Stage	Age/Rate of Production	Liters of water per 1000 birds at 21°C
Layer pullet	4 weeks	100
	12 weeks	160
	18 weeks	200
Laying hens	50% production	220
	90% production	270
Source: Poultry CRC: http://www.poultryhub.org/nutrition/nutrient-requirements/water-consumption-rates-for-chickens/		

Typical daily water consumption for broilers at 20°C (litres per 1000 mixed sex birds):

TABLE 29: TYPICAL DAILY WATER CONSUMPTION FOR BROILERS								
Age (weeks)								
Water Intake (liters)	1	2	3	4	5	6	7	8
	65	120	180	245	290	330	355	370
Source: Poultry CRC - http://www.poultryhub.org/nutrition/nutrient-requirements/water-consumption-rates-for-chickens/								

F115	Expected. Feed Storage
Storage conditions for feed must be controlled to ensure quality is maintained and to avoid contamination. Any mouldy feed must be rejected.	
Climate Smart Agriculture	
The implementation of good practice like cleaning and disinfecting storage areas between seasons/batches, maintaining appropriate storage conditions for materials to be stored to minimise risk of mould and the exclusion of animal waste, vermin and birds from such areas, will ensure that quality of feed is sustained. The health of livestock benefits farm productivity, resilience of the business and avoids wastage of feed thus lowering emissions associated thereto.	

All animal feed must be stored in conditions that maintain the quality of the feed until it is used. Different conditions will clearly be needed for different types of feed. Good practice generally involves:

- Cleaning and disinfecting storage areas (silos, sheds, bins etc.) between seasons/batches. Effluent and washings must be managed correctly (See **Water Management** and **Waste Management** chapters);
- Appropriate storage conditions for the materials to be stored to minimise risk of mould or other forms of deterioration. Particular care is needed for root crop (e.g. beet)

and moist feed (e.g. brewers' grains and crimped maize), where clamps are usually required for long-term storage;

- Excluding animal waste, vermin and birds. This includes capping wide hoses when they are not in use as these are otherwise become infested. In many types of stores it is impossible to completely exclude vermin; and
- Separate storage for feed and CPPs, disinfectants or other chemicals in order to minimise risks of contamination.

All farms must comply with local legislation and good practice for feed stores.

It should be noted that the contents of silage stores and other clamps have the potential not only to spoil and lose value if air and water gain access, but also to seriously contaminate water if the store is badly sited or the drainage is not well managed (for example where filters become clogged). See also general section on farm Stores in the **Value Chain** chapter.

Animal environment (freedom from discomfort and freedom to express normal behaviour)

Managing the environment in which farm animals are kept is not only important for minimising pain and discomfort, but also has a major influence on the way animals behave. When people are asked what constitutes good welfare, they generally consider that provision for natural behaviour is an important factor. The number of natural behaviours animals perform is obviously large and species specific, covering aspects such as feeding, grooming, social interaction, thermoregulation, hiding and resting.

Importantly, the presence of natural behaviours can be construed as an indicator that an animal is coping and likely to be in a positive mental and physical state. Not only does an ability to carry out natural behaviours satisfy basic needs, it allows animals to maintain themselves in positive and healthy states, e.g. by dust bathing, hiding, or shade or shelter seeking. At certain times, animals have a very strong drive to perform specific behaviours such as nest building, hiding or wallowing. If they are unable to do so because of environmental constraints, it can lead to symptoms of boredom, frustration and stress. The ability to hide or retreat is an example of a specific behavioural requirement that occurs in response to fear or distress and which can help alleviate stress from dominant or aggressive interactions in group situations or can encourage prey species to be less fearful in extensive environments.

Many species live in housed or confined environments where opportunities for natural behaviour can be reduced and there are more potential factors under human control that can cause poor welfare. These include; space allowance, flooring, temperature, air quality, light, potential for injury, feed and water access. In these situations special attention must be taken to ensure that the environment does not reach a state where animals cannot cope. For example, thermal discomfort is a specific welfare issue and arises in hot or cold situations in which an animal's natural systems for regulating body temperature can no longer cope. Signs of thermal discomfort are species specific e.g. postural changes, panting, grouping, water and shade-seeking, sheltering, shivering etc., and methods to alleviate it and allow animals to cope in hot and cold conditions include providing shade, sprinkler systems, wallows, altered diet, ventilation, shelter etc.

Training is required to include knowledge of the basic natural behaviours for your animals, and it is also important to be able to recognise behavioural signs of problems or deficiencies in the environment. Once again the list of these behaviours is huge and can include activities such as feather pecking, aggression, cannibalism, tail-biting, bar chewing, fence-pacing, and vocalization.

A common environmental characteristic that prevents natural behaviour in production systems is space. Overcrowding and confinement not only prevent natural behaviours but also can lead to symptoms of stress and frustration. There are a number of space guidelines available on a country and species basis. For example in the European Union, the Broiler Directive sets a maximum density for meat chickens of 33kg/m² (unless other welfare conditions are satisfied, allowing Member States stock at 39kg/m²), whereas for broiler chickens in New Zealand¹⁰ the recommended density is 30kg/m².

Legislated space allowances should be used as a guide to the minimum recommended densities, and the suitability of these allowances to your specific situation should be evaluated based on other health and welfare outcomes. While it is not expected that animals need to perform every natural behaviour in their repertoire, a consideration of, and provision for the animal's needs and allowance for these in its environment where possible is an important way to help meet requirements for good welfare. Enrichments are items that are often added to environments, particularly those indoors, to stimulate natural behaviour in a situation that would not normally do so. This could include provision of objects such as hay bales, dust baths, and items to play with or simply scratch against.

F116	Expected. Preventing thermal discomfort
	The environment in which the animals are kept must protect them from thermal discomfort. This includes the provision of shade, wallows and windbreaks if necessary when animals are outside or on pasture, and adequate ventilation of the house / shed with appropriate cooling and/or heating when needed for indoor environments.
	Climate Smart Agriculture
	Not applicable

Welfare codes cover these issues and local and situation specific information and resources are often available, for example:

- Heat stress in Dairy cattle and Beef cattle in Australia¹²;
- Cold stress in Cattle in Canada¹³; and
- Heat stress in UK broilers¹⁴.

¹² <http://www.dairyaustralia.com.au/~media/Documents/Animal%20management/Animal%20health/Heat-Stress/Cool%20Cows%20infrastructure%20booklet.pdf>

¹³ <http://www.omafra.gov.on.ca/english/livestock/beef/facts/07-001.htm>

¹⁴ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69373/pb10543-heat-stress-050330.pdf

CLIMATE

Humidity

With the exception of chickens, cattle and pigs have sweat glands and are able to a degree, to regulate their body temperature to offset external thermal conditions. In a hot-dry climate evaporation is rapid, whilst in a hot humid climate, the ability of the air to absorb additional moisture may often be limited, with inadequate cooling resulting in heat stress. An ideal range for humidity according to the FAO is between 40 to 80%¹⁵.

Radiation

Direct solar radiation onto animals in outdoor systems will also impact on thermal comfort – influenced by the colour and density of the coat of the animal. Windbreaks and shade trees in and around pasture can be an excellent way to minimise thermal discomfort, and their design and management can also contribute to the farm's Biodiversity value (see Biodiversity and Ecosystem Services chapter) and carbon fixation on the farm (see Energy and Greenhouse Gas chapter). Other forms of shade may also be needed in pasture if trees encourage biting insects in the local environment.

BUILDINGS

Many animal husbandry systems involve animals spending part, or all of their lives indoors.

Ventilation of buildings is important to maintain a suitable temperature, whilst ensuring air movement, and protecting animals from rain, snow, direct sunlight, dust and discomfort (E.g. From ammonia, biting insects, respiratory problems). Suitable lighting should be provided to enable the animals to function well and to enable workers to inspect the animals. To provide animals with relief from direct exposure, natural and artificial shading is effective.

Farmers should know and recognise the characteristic behaviours that may indicate thermal discomfort, and have systems in place to solve problems when they arise. The following table provides some per species guidelines on thermal comfort, with information sourced from FAO guidance¹⁶

Guidance on thermal conditions for different animals is provided below.

Calves

Insulation, heating and ventilation of the building must ensure that the air circulation, dust level, temperature, relative air humidity and gas concentrations are kept within limits which are not harmful to calves.

Beef Cattle

Beef cattle thrive at temperatures of below 25°C and can easily tolerate temperatures of below 0°C if they have a good supply of feed.

Pigs/Hogs

Pigs require a change in ambient temperature as they age and grow, and like cattle, they show a decreased feed intake when under heat stress. Initially, piglets survive and develop best at 30 to 32°C, followed by a gradual decline to 20°C over the first three weeks. For pigs weighing 75 to 100kg, the optimum temperature is 15°C, but experience discomfort if exposed to temperatures above 25°C because they do not perspire when hot. Temperature should be kept well within this range for sows, which can trample baby pigs if under heat stress.

Poultry

Poultry do not have sweat glands, requiring all evaporative heat loss to originate from the respiratory tract. Systems

15 <http://www.fao.org/docrep/s1250e/s1250e10.htm>

16 <http://www.fao.org/docrep/s1250e/s1250e10.htm>

should be in place to maintain a suitable temperature that is appropriate for the age and type of bird being housed. Supplementary heating and cooling systems should be available that are capable of maintaining the optimal temperature in all climatic conditions likely to be encountered throughout the year. In hot weather, houses may switch to a tunnel ventilation system or use misting / cooling systems. The level of Relative Humidity in the poultry house should also be monitored and controlled. Best practice is thought to be the provision of a Relative Humidity between 50 and 70%.

EU: COUNCIL DIRECTIVE 2007/43/EC of 28 June 2007, lays down minimum rules for the protection of chickens kept for meat production. In Annex II – Requirements for the use of higher stocking densities, requirements for the holdings and control of environment parameters are as follows: “The owner or keeper shall ensure that each house of a holding is equipped with ventilation and, if necessary, heating and cooling systems designed, constructed and operated in such a way that:

- A) The inside temperature, when the outside temperature measured in the shade exceeds 30°C, does not exceed this outside temperature by more than 3°C; and
- B) The average relative humidity measured inside the house during 48 hours does not exceed 70% when the outside temperature is below 10°C.”

LIGHTING

A lighting programme should be in place that is appropriate to the production method, age and physiological requirements of the birds. This programme should define both the duration of the light / dark periods and the intensity of light provided. The source of light may be either natural (through open sided houses or via windows) or artificial, or a combination. The lighting programmes should comply with local legislation. Within every 24 hours there must be a period of darkness irrespective of bird age and production system.

EU COUNCIL DIRECTIVE 2007/43/EC of 28 June 2007, laying down minimum rules for the protection of chickens kept for meat production states in Annex II – Requirements applicable to holdings

“All buildings shall have lighting with an intensity of at least 20 lux during the lighting periods, measured at bird eye level and illuminating at least 80% of the useable area. A temporary reduction in the lighting level may be allowed when necessary following veterinary advice. Within seven days from the time when the chickens are placed in the building and until three days before the foreseen time of slaughter, the lighting must follow a 24-hour rhythm and include periods of darkness lasting at least six hours in total, with at least one uninterrupted period of darkness of at least four hours, excluding dimming periods.”

This directive relates to broilers and there is no specific legislation for lighting for egg layers, but typical guidelines are:

- Over the first seven days (from day old) the day length should be reduced from 23 hours to 9 / 10 hours. Intensity is typically reduced from 20 lux to 5 – 10 lux;
- From week 2 to week 15 – 16, the day length is maintained at a constant length (9 / 10 hours); and
- From week 15 – 16 the day length is increased to a maximum of 14 / 16 hours to bring the birds into lay and maintain egg production.

Lighting levels in laying houses tend to be lower than in broiler houses to discourage pecking, but the RSPCA Assured standard suggests a minimum of 10 lux. It is good practice to use dawn and dusk simulation when lights are switched on and off in a poultry house. This reduces levels of stress within flocks. This can be achieved by using automated systems which gradually lower or raise the light intensity over a period of time (typically 15 – 20 minutes), by switching rows of lights on / off sequentially, or by utilising the natural dawn and dusk in open sided / windowed housing systems.

F117	Expected. Preventing physical discomfort
The environment in which animals are kept must protect animals from physical discomfort. Stocking densities must be at a suitable level. Housing must be maintained to provide a safe, hygienic and comfortable environment. The requirements for individual species - detailed in the implementation guide - must be adhered to	
Climate Smart Agriculture	
Not applicable	

There are many examples of specific actions that can be taken to protect animals from physical discomfort and stress, and enable them to perform natural behaviour. In general ...



ANIMALS IN PASTURE

The pasture should be managed in such a way that:

- Drainage is arranged so that animals do not usually stand in mud after rain;
- Animals have access to shade during hot periods and windbreaks and/or indoor shelter during cold periods;
- In arid areas, and at times of low rainfall, areas should be managed to avoid excessive dust;
- In open lots, there is routine manure removal surrounding feeding and watering areas; and
- Where animals are at serious risk of attacks by predators, steps should be taken to minimise this risk e.g. by providing overnight housing or by locating young animals in areas where they will be surrounded by older animals better able to defend them. (See also the criterion on hunting in the Biodiversity and **Ecosystem Services** chapter).

ANIMALS IN HOUSING

Buildings should provide a safe, hygienic and comfortable environment. The building should be weather proof and vermin-proof whilst still maintaining good ventilation and temperature control. All relevant surfaces should be cleanable (this includes ceilings and pen dividers for poultry), and floors should be non-slip for larger animals.

Dairy cows and Beef Cattle

Using non-slip flooring – Slipping on floors is a common cause of leg damage. Build-up of slurry can also make the floors slippery as well as potentially causing health issues, so cleaning systems should be in place to avoid this:

- However, floors should not be too rough either, as this can also damage feet. Consideration should also be given to hard standing around water troughs and regularly-used cattle paths on the farm, to avoid poaching and foot damage;
- **Avoiding sloping floors** – no more than 10% slope is commonly recommended, as steeper slopes can cause leg problems, slipping and falling;
- Ensuring **slatted floors** are suitable for cows – for example the gaps should not be wide enough to cause foot injuries;
- Routine urine and manure removal;
- Actions should be taken to ensure that **cows do not stand for long periods** waiting to get milked. Long standing times will have a negative impact on hoof health and decrease the efficiency of production; and
- Ensuring manure is removed on a daily routine basis, and that sanitation programmes are in place that result in

clean animals. Removing manure on a regular basis will decrease ammonia levels as well.

Space Allowances

For cubicle house there should be a minimum of one cubicle per animal (ideally here should be 5% more cubicles than animals), unless there is adjacent, adequately-sized loose housing. Cubicles must:

- Be long enough and wide enough to allow animals to rest without injury – but short enough to prevent defecation in the bed and narrow enough to prevent turning around or lying at angles;
- Accommodate the natural rising of the animal and not cause it injury as it rises.

For cubicle house there should be a minimum of one cubicle per animal (ideally here should be 5% more cubicles than animals). The following tables provides recommended cubicle dimensions as suggested by the UK Red Tractor Assurance Scheme.

TABLE 30: SPACE ALLOWANCE FOR CALVES AND CATTLE		
Category/Animal	Approx. weight (kg)	Area in m ² /animal
Small Calves	55	0.30 to 0.40
Medium-sized Calves	110	0.40 to 0.70
Heavy Calves	200	0.70 to 0.95
Medium-sized Cattle	325	0.95 to 1.30
Heavy Cattle	550	1.30 to 1.60
Very Heavy Cattle	>700	(>1.60)

Hogs/pigs

Pigs should be kept in an environment that takes into account their welfare needs, be designed to protect them from physical and thermal discomfort, fear and distress, and allows them to exhibit natural behaviour.

There are many examples of specific actions that can be taken with respect to the pig farm environment, to protect pigs from physical discomfort and stress, and enable them to perform natural behaviour. These include:

- **Using non-slip flooring** – slipping on floors is a common cause of leg damage. However, floors should not be too rough either, as this can damage feet. Build-up of slurry can also make the floors slippery as well as potentially causing health issues, so cleaning systems should be in place to avoid this.

- **Avoiding sloping floors** – no more than 10% is commonly recommended, as steeper slopes can cause leg problems, slipping and falling.
- **Ensuring slatted floors, where used, are suitable for pigs**, for example the gaps should not be wide enough to cause foot injuries.
- **Ensuring manure is removed on a daily routine basis**, and that sanitation programmes are in place that result in clean animals. Removing manure on a regular basis will decrease ammonia levels as well.

Sites for outdoor production should be chosen carefully: sites with free draining soils, in low rainfall areas with low frost incidence are most suitable. Adequate shelter (to protect the pigs in hot or cold weather conditions) should be provided for all pigs that are outdoors.

Mature sows should be given a minimum total floor area of 3.5m²/sow, and 2.5m²/gilt for first and second parity animals. Minimum permitted space allowances are based on the average weight bands shown below.

TABLE 31: SPACE ALLOWANCE FOR PIGS	
Average Live Weight (kg)	Minimum Total floor Area (m ² /pig)
<10	0.15
10.1-20	0.20
20.1-30	0.30
30.1-50	0.40
50.1-85	0.55
85.1-110	0.65
>110	1.00
Source: UK Red Tractor Assurance Scheme	

Poultry

Bedding

In deep litter systems the floor should be completely covered in litter to maintain dry and friable bedding. This should provide an appropriate environment for the birds that reduces the likelihood of hock burn, pododermatitis and cleanliness issues, and encourages dust bathing and other natural behaviours. The material used should be absorbent and safe. Typically materials such as wood shavings, chopped straw and rice hulls are used. Used litter should be disposed of in a responsible manner, in accordance with the waste management plan for the farm (see criterion F66 for further details).

Stocking Density

Stocking density (space allowance) must comply with local legislation as a minimum and take into account the local climate. Specific stocking densities will depend on the type of bird being reared (broiler / layer) and the production system (intensive / extensive).

Thinning

Thinning is commonly used within some regions of Europe to maximise productivity. However, this practice does have disadvantages for the birds left after thin, including:

- Necessity to withdraw feed and feed treatments, e.g. coccidiostats from all birds
- Disruption of lighting programme
- Stress due to the proximity of machinery and personnel
- Risk of disease introduction

For these reasons best practice is considered not to thin and if absolutely necessary it should only be carried out once per flock. Note: It is accepted that it may be necessary to thin in cases of unexpected hot weather to avoid heat stress.

F118	Expected. Preventing fear and distress and promoting natural behaviour
The environment in which animals are kept must prevent fear and distress and enable natural behaviour. This includes factors such as ensuring animals are kept in appropriate groups, ensuring that light levels are suitable and ensuring that animals have suitable environmental enrichment. Requirements for individual species are detailed in the implementation guide - you must adhere to these requirements.	
Climate Smart Agriculture	
Not applicable	

Requirements for different animals are as follows:

Dairy cows

Lying is critical to the welfare of cows and lying time is a good guide to the design success of a barn system. It is important that minimum lying times are met to avoid physiological stress response in cows. Furthermore cows will produce more efficiently if their lying time increases. The following measures should be implemented to aid this objective:

- Ensuring lying places for dairy cows are well designed – the size, shape and weight of cows need to be considered so that these lying places encourage cows to lie down and stand up without injuring themselves. There must be enough bedding to keep cows comfortable, prevent pressure sores, and keep udders and teats clean. The use of deep bedding (for example with sand) has been shown to be particularly good in this respect. The positioning of steel framing has a major influence on injuries and comfort of dairy cows;
- Barns should not be overstocked, meaning that the minimum standard should be 90 spaces for every 100 cows present (i.e. 90%) lying and feeding places for dairy cows and young stock. This will prevent competition and stress in the herd;
- Ensuring light levels inside cow sheds are high enough for animals to feed and behave normally. Examples of checking this are: (1) you should be able to read a newspaper in the barn or (2) you should be able to read the ear tag of the cow from a reasonable distance.

Housing

The priorities for protecting cows from physical discomfort and stress, and enabling them to perform natural behaviour may differ depending on the type of facility. Some examples are listed below:

Stanchion/tie stalls (see also criterion F119)

- Daily exercise for animals
- Ability for animals to stand and lie down
- Space to stretch, eat, drink, urinate and defecate comfortably
- Routine manure removal

Free-stalls

- Routine removal and replacement of soiled bedding
- Size of stalls
- Adequate time for rest, exercise and feed and water consumption
- Provision of lunge space
- Provision of air movement and/or cooling systems for animal comfort

Open lot and pastures

- Avoiding situations in which animals stand in mud after rain e.g. by drainage, moving cattle to new areas or providing hard standing around feeding and drinking areas
- Management to avoid excessive dust
- Routine manure removal from feeding and drinking areas
- Adequate shelter
- Access to shade during hot periods and windbreaks during cold periods.

Forming appropriate group sizes.

Barns and lots should not be overstocked so as to prevent competition and stress in the herd and ensure that all cattle can be accessed by the stockman. Age, sex, live weight and behavioural needs of the animals, as well as environmental factors, should be taken into consideration when determining group size. Bulls raised for slaughter should ideally be kept in groups of in excess of 20 animals. Steers/heifers should ideally be kept in groups of less than 40 animals.

Calving facilities and calf environment

A clean, dry, well-lit, well-ventilated calving area has many health benefits for mother and calf at the time of birth. For indoor calving ideally the cow should be housed and calved on their own, with pens being cleaned out and disinfected between each calving. Areas used for calving should not be used for sick animals due to the risk of contamination and infection. For outdoor calving a maternity paddock should ideally be available which can be easily inspected by staff so assistance can be provided to the cows at calving. In extensive systems where a maternity paddock is not possible, in-calf cows should be regularly checked to ensure no difficulties in calving occur.

Housed or penned calves and young stock should be given adequate space to stand, lie down and turn around without difficulty as well as being able to groom themselves and stretch their limbs. They should also be protected from extreme weather conditions, including high and low temperatures, draughts, and rain (see **criterion F117**)

Routine early weaning of suckled beef calves should be avoided as this can reduce their resistance to disease. Weaning is recommended between six and nine months of age. Early weaning is acceptable where the cattle are suffering from poor health, body condition or welfare. Weaned calves should have access to fresh forage and a concentrate mix.

Hogs/pigs

Pigs should be kept in an environment that takes into account their welfare needs, be designed to protect them from physical and thermal discomfort, fear and distress, and allows them to exhibit natural behaviour.

- **Ensuring housing for all classes of stock** is within sight and sound of other animals and includes an exercise area.
- **Providing all housed pigs with lying areas that are dry and clean.** Where bedding is provided it should be checked daily and replenished to ensure that all animals are physically comfortable and dry.
- **Accommodation used for pigs should allow each pig to: stand up, lie down and rest without difficulty** while maintaining a comfortable temperature and allowing enough space to allow pigs in the group to lie down at the same time.
- **The housing of sows and gilts in groups,** except during the period between 7 days before the predicted day of farrowing and the day on which the weaning of piglets (including any piglets fostered) is complete.
- **Ensuring light levels inside housing are adequate for animals to feed and behave normally.**
- **Supplying pigs with permanent access to a sufficient quantity of material such as straw, hay, wood, sawdust, mushroom compost, peat** (or a mixture of such which does not adversely affect the health of the animals), to enable proper investigation and manipulation activities.

Note- **ventilation** to regulate temperature is covered in **criterion F116**.

Where pigs are kept in outdoor husbandry systems, stock/breeds of pig should be selected for their suitability for outdoor conditions. Sites for outdoor production should be chosen carefully: sites with free draining soils, in low rainfall areas with low frost incidence are most suitable. Adequate shelter (to protect the pigs in hot or cold weather conditions) should be provided for all pigs which are outdoors. A stocking density guideline of 25 sows per ha overall is considered acceptable on suitable sites.

Farrowing, piglet environment and facilities

- The feeding management of sows and gilts should ensure they are in suitable body condition at the time of farrowing: a target score of 3.5 -4 should be aimed for.
- Farrowing accommodation should be constructed and be sufficiently big enough to allow sows to rise up and lie down again without difficulty. Additionally, the space available to sows in farrowing crates should be long enough to allow sows to lie in a fully outstretched comfortable position, which will depend on the weight of the sow. Ideally sows should not be placed in crates more than five days before the expected farrowing date.
- Nesting material should be provided, whenever possible, particularly in the 24 hours prior to farrowing to enable sows to exhibit nest-building behaviour.
- If necessary, piglets should be provided with a source of supplementary heat, together with a solid, dry and comfortable lying area away from the sow where all of them can rest at the same time. In farrowing pens where sows are kept loose, some means of protecting piglets should be installed, e.g. creep rails.
- Unless the health and welfare of the sow or piglets is being compromised, piglets should not be weaned from the sow at less than 28 days.
- At weaning, piglets should be moved into specialised housing which has previously been emptied of pigs, cleaned and disinfected.

Poultry

Enrichment

For broiler production and the rearing of replacement egg layers in deep litter, there is no legislation relating to the provision of enrichment, but it is considered to be a key element of ensuring birds can express natural behaviour. In laying systems enrichments are also an essential tool in reducing the likelihood of feather pecking.

Typical enrichments include:

- Broilers: Perches, Pecking objects, Bales of straw / wood shavings
- Replacement Layers: Perches, Strings and other pecking objects, Bales of straw / wood shavings

For egg layers, within the EU there is specific legislation relating to the design of enriched cages, which must include:

- A nesting area
- Litter such that pecking and scratching are possible
- Appropriate perches allowing at least 15 cm per hen
- A feed trough which may be used without restriction must be provided. Its length must be at least 12 cm multiplied by the number of hens in the cage
- Each cage must have a drinking system appropriate to the size of the group; where nipple drinkers are provided, at least two nipple drinkers or two cups must be within the reach of each hen
- To facilitate inspection, installation and depopulation of hens there must be a minimum aisle width of 90 cm between tiers of cages and a space of at least 35 cm must be allowed between the floor of the building and the bottom tier of cages
- Cages must be fitted with suitable claw-shortening devices
- In outdoor systems the quality of the range area is as important as the quantity of space provided. Cover, such as shrubs, trees and man-made shelters will encourage ranging behaviour. Sites for outdoor production should be chosen carefully e.g. sites with free draining soils are preferable.

Protection from predators

In areas where predators like wolves and wild cats may frequent, management systems should be put in place to reduce risks to young and vulnerable stock. Options include:-

- Temporary housing for vulnerable stock (including calves)
- Maternity paddocks located in areas surrounded by paddocks in which less vulnerable stock is kept

Note that the hunting of predatory animals considered vermin on the farm is not acceptable. Further information on this aspect is provided in criterion F5 of the Biodiversity and **Ecosystem Services** chapter.

F119	Leading. Moving to no-tethering systems (cattle only)
Farmers should make changes required to move to systems that do not use tethering.	
Climate Smart Agriculture	
Not applicable	

Tethering is where an animal is fastened to an anchor point, which prevents it from straying or moving from the area. Tethering may take place outside, or in animal housing.

Open lots and pasture

Whereas tethering may be used to prevent injury or to make effective use of grazing in otherwise-dangerous areas (e.g. roadsides, cliff tops), the routine use of tethering or tethering for long periods generally prevents natural animal behaviour, for example by:

- Isolating them from others in the herd;
- Restrictions on voluntary movement;
- Lack of exercise;
- Making it harder to provide water and shelter and protect the animals from extreme temperatures or distressing noises (e.g. traffic); and
- Greater risk of injury from entanglement on a long tether and inability to make natural movement on short tethers.

Housing

Tethering is traditionally used in tethered-stall systems for cattle during winter in many parts of Europe and elsewhere.

Unilever wishes its suppliers to move towards no-tethering systems for cattle, and therefore asks farmers that currently use tethering to move to different – preferably pasture-based systems. Where tethering is the only practical option, systems where cattle have a daily exercise period in which they are not tethered are clearly preferable to those where the animals remain tied permanently. This is of course weather permitting.

F120	Mandatory: Physical abuse
Direct physical abuse of animals is prohibited. This includes using excessive physical force on animals or deliberately causing pain or injury.	
Climate Smart Agriculture	
Not applicable	

Livestock at all stages of production should be handled and managed in a considerate and compassionate manner at all times. There should be no reason for staff to abuse (this includes shouting at, striking with hands or other objects etc.) or mistreat animals in their care, any breach should be treated seriously and staff involved should be reported to the relevant authority.

The use of electric goads is illegal in many countries and many animal welfare organisations are calling for a world-wide ban. Their use is not acceptable to Unilever except in extreme and emergency circumstances (e.g. for an adult animal that refuses to move and is putting other animals or humans in danger as a result); the expectation is that every such use would be justifiable to an auditor, and preferably recorded. The use of electric goads on animals with no room to move, or on young animals in mixed age groups is unacceptable.

Dairy cattle

Male calves

Male calves should be treated properly during their stay at the farm (i.e. in a similar way to female calves). If no market exists for veal, the supplier and farmers should put energy into developing this market to prevent male calves being slaughtered at birth. Slaughter of male calves at birth (with the low economic value as main reason) cannot be accepted by Unilever.

Cattle handling (general)

Since cattle are often subject to movement and transportation, employees should be properly trained to handle cattle at all stages of production, keeping stress to the animal at a minimum.

The consequences of inhumane handling should be known to employees.

Handling facilities should be well-maintained and free of objects such as broken boards or rails that may cause bruising. The transit of cattle should be safe, humane, and comfortable in order to ensure their health, quality and value. For further information and advice on livestock transport please see the “transport” section of this chapter.

F121	Expected. Training
Managers and stock keepers must be trained in aspects of animal husbandry - this includes care of animals at all ages, humane handling, feeding and how to deal with sick and injured animals.	
Climate Smart Agriculture	
Not applicable	

A high degree of caring and responsible management and stockmanship is vital to ensure good animal welfare. Managers and stock-keepers must be thoroughly trained, skilled and competent in animal husbandry and welfare, and have a good working knowledge of their system and the animals under their care.

This requirement covers the need for training of farmers and stock-keepers in all aspects of animal farming, including all aspects of reproduction, feeding, transportation and dealing with sick and fallen or culled birds and animals.

One of the biggest influences on animal welfare in production systems is the interaction between animal and humans. Many production systems rely on regular, close contact between humans and animals, which can have either a negative or positive effect on welfare. Stockmanship describes the ability of humans to interact

with and care for animals. Many species have a natural fear of humans and, not surprisingly, humans are the major source of negative feelings such as fear and distress in animals. If prolonged, fear responses not only have negative health consequences but have also been correlated with reduced production in many species. In addition, poor human behaviour can directly cause injuries, pain and suffering.

Regular positive contact on the other hand can reduce fear of humans. Good stockmanship can therefore have a positive effect on animals while poor stockmanship can be detrimental. Training is an essential part of good stockmanship and the following guidelines are provided per livestock species group.

Dairy cows

This requirement covers the need for training of farmers and stock-keepers in all aspects of dairy farming, including insemination, pregnancy care and calving, lactation management, milking practices, calf handling, movement and transportation as well as dealing with sick and fallen or culled stock.

Calf handling, movement and transportation

Since calves are often subject to movement and transportation, employees should be properly trained to handle calves with a minimum of stress to the animal, and the consequences of inhumane handling should be known and enforced. Handling facilities, including trailers, must be well-maintained and free of objects such as broken boards or rails that may cause bruising. The transit of calves should be safe, humane, and comfortable in order to ensure their health, quality and value. Transported calves and cows should have enough space during transport. Transport over longer distances should include the ability to drink fresh water.

Pigs

This requirement covers the need for training of farmers and stock-keepers in all aspects of pig farming, including insemination, pregnancy care and farrowing, management practices, pig handling, movement and transportation (see next paragraph) as well as dealing with sick and fallen or culled stock.

Pig handling, movement and transportation

Since pigs are often subject to movement and transportation, employees should be properly trained to handle pigs at all stages of production keeping stress to the animal at a minimum. The consequences of inhumane handling should be known and enforced.

The transit of pigs should be safe, humane, and comfortable in order to ensure their health, quality and value. For information and advice on livestock transport please see the transport section below.

Poultry

This requirement covers the need for training of farmers and stock-keepers in all aspects of poultry farming, including management practices, bird handling, movement and transportation (see transportation section of this chapter) as well as dealing with sick and injured stock.

Poultry handling, movement and transportation

Employees should be properly trained to handle birds at all stages of production keeping stress to a minimum. The consequences of inhumane handling should be known and enforced.

The transit of birds should be safe, humane, and comfortable in order to ensure their health, quality and value. For further information and advice on livestock transport please see the “transport” section of this chapter.

F122	Expected. Routine procedures
Routine procedures must be carried out in such a way as to protect animals from fear and distress. This includes procedures such as milking, calving (cattle), farrowing (pigs), insemination and thinning (poultry).	
Climate Smart Agriculture	
Not applicable	

Due to the modern ‘industrial’ model of livestock production, routine procedures are a necessity to maintain productivity and the health and well-being of the animals involved. As expected, different procedures effect each livestock group, all which have the potential to place animal

under distress and fear. Best practice when undertaking some of these procedures have been described under criteria F117 and F118, such as that for thinning of poultry, calving for cattle and farrowing for pigs.

F123	Expected. Mutilations
Mutilations must be minimised as far as possible. Where deemed necessary such interventions must be carried out by competent, trained personnel and with appropriate use of anaesthetics and analgesics. Requirements for individual species are detailed in the implementation guide - you must adhere to these requirements	
Climate Smart Agriculture	
Not applicable	

Thought should be given to the necessity on individual farms to carry out such tasks as tail docking, disbudding and castration. Where deemed necessary, such surgical procedures must be kept to a minimum and only be performed by competent, trained personnel. The use of anaesthetics and pain relievers, when undertaking surgical procedures is strongly recommended.

Cattle

The preferred methods for identification of cows are the use of ear tags or ear tattoos. These procedures should be undertaken by competent, trained personnel. Branding is unacceptable. The docking of dairy cow tails is not an acceptable practice, unless undertaken by a veterinarian for welfare reasons (such as injury or infection) and with the use of anaesthetics and pain relievers. Spaying of female cattle and castration of males should also be avoided.

Routine dehorning (removal of horns in animals over 8 weeks of age) should be avoided.

Options to avoid dehorning include:

- Disbudding (i.e. removal of horn buds on animals under 8 weeks of age)
- Using polled genetics
- Operating a system which allows horns intact.

With certain double-muscled breeds, like the Belgium Blue, caesareans are routinely required because of a narrower birth canal and reduced pelvic dimensions in dams. In such instances where doubled-muscled cows are concerned, caesareans can be undertaken by a veterinarian and sufficient anaesthetic and pain relieving drugs.

Hogs/pigs

Thought should be given to the necessity on individual farms to carry out such tasks as tail docking, teeth clipping and castration. Tail docking and teeth clipping should not be carried out routinely: only being carried out where there is evidence on the farm that injuries to pigs have occurred (e.g. injuries to sows teats, ear/tail biting) or are likely to occur as a result of not tail docking or tooth clipping.

Where deemed necessary such surgical procedures must be kept to a minimum and only be performed by competent, trained personnel. If castration is deemed necessary; it should ideally take place within 72 hours of birth and an anaesthetic and prolonged pain relief should be administered. Other tasks such as boar tusk removal, should only be carried out when by not doing so would cause injury or distress.

Poultry meat (Broilers) and Eggs (Layers)

It should not be necessary to use any mutilations for growing broilers.

In all egg production systems there are on-going challenges with feather pecking and cannibalism during the rearing and laying phases. Best practice is considered as not beak trimming. If beak trimming is deemed necessary, and recommended by a veterinary surgeon, then it should ideally be performed at one day old using an infra-red system.

Various management techniques should be used to reduce the need for beak trimming. These are referred to elsewhere in this guidance and include:

- Ensuring synchrony of the rearing and laying environments for the birds (lighting, water, feed, housing);
- Avoiding barren environments;
- Reducing stocking density;
- Genetics – understanding differences between and within breeds;
- Rapid recognition and treatment of issues;
- Consistent nutrition/ration formulation;
- Lighting – managing intensity, avoiding shafts of light entering the building; and
- Effective control of parasites such as red mite

F124	Expected. Emergency Plans
An emergency plan must be in place so that the needs of animals are taken care of in the case of emergencies such as power cuts, fires, flooding, disease outbreaks etc. This may include alarm systems in animal housing to alert farmers if water, feed or power supply are disrupted.	
Climate Smart Agriculture	
Not applicable	

All farms are expected to develop emergency plans, to ensure that animal welfare is compromised as little as possible during emergencies including:

- Floods and other extreme weather events (many of which are expected to become more frequent as climate changes);
- Fire;
- Disease outbreaks;
- Disruption in feed supply; and
- Failure of water, electricity or gas supply

Alarm systems are particularly important where stockmen are not necessarily in direct contact with the animals for long time periods.

Alarm Systems

Poultry houses and pig pens should be equipped with alarm systems that are capable of alerting the stockkeeper to problems. Alarms are typically used to alert the stockman to: high and low temperatures, power failure and, in some cases, failure of water supply.

Emergency generator

Farms should also be equipped with a generator that is capable of running the entire site in the event of a failure in electric supply. On broiler farms it is good practice that the generator starts automatically, especially if the site is not continuously manned.

Alarms and generators should be tested regularly and records maintained.

F125	Expected. Casualty slaughter
If animal casualties must be slaughtered on-farm, this must be done in a humane manner and prevent additional suffering to the animal.	
Climate Smart Agriculture	
Not applicable	

Casualty slaughter of livestock on the farm (due to sickness or injury) should be undertaken in a humane manner and prevent any additional suffering to the animal. Any

on-farm slaughter should preferably be done by a veterinarian or a trained and competent member of staff (if local legislation allows).

F126	Expected. Reducing impacts on local community
Systems must be in place to minimise biohazards, flies and odours associated with keeping livestock.	
Climate Smart Agriculture	
Not applicable	

Clean air is important for everyone, including farming families and the local community. One of the best ways for farmers to be good neighbours is to minimise odour, by making sure barns are kept clean and by ensuring manure storage facilities are designed well.

Certain manure treatments can also reduce odour. For more detail on odour management, see:
<http://www.milkproduction.com/Library/Scientific-articles/Housing/Preparing-an-odor-management-plan/>
<http://www.thepigsite.com/articles/1023/methods-and-practices-to-reduce-odor-from-swine-facilities>
<http://www.thepoultrysite.com/articles/387/coexisting-with-neighbors-a-poultry-farmers-guide>

F127	Leading. Animal Welfare key performance indicators
Farmers should develop and monitor animal welfare KPIs appropriate for their farming system and species held, e.g. % mortality, growth rate, lameness, mastitis etc. Monitoring results should be analysed to highlight issues and guide any necessary remedial action.	
Climate Smart Agriculture	
Not applicable	

This criterion is designed to encourage farmers and farmers' organisations to monitor important aspects of animal welfare and to use the data collected to help drive improvement over time. This requires much more than monitoring on-farm deaths and/or moves to slaughterhouses or knackeries.

"Body Condition Scoring" has been recommended for monitoring a range of animals (e.g. see www.dairynz.co.nz/animal/herd-management/body-condition-scoring/)

Welfare codes cover these issues and local and situation specific information and resources are often available

Good examples of KPIs – and the organisations that have developed them as part of their value chain include Waitrose - <http://www.waitrose.com/content/dam/waitrose/Inspiration/Waitrose%20Way/Animal%20welfare/KPIs.pdf>

In order to comply with this criterion, you need to

- Know the natural behaviours that are characteristic of the species you are raising.
- Consider how the environment might meet these requirements and if changes can be made to facilitate behaviours.
- Know the characteristic behaviours that may indicate potential welfare problem, for example indicators of overcrowding or thermal discomfort, and how to solve these.
- Schedule regular time to observe your animals and note the behaviours present and/or missing.
- For missing or behaviours indicating welfare issues, look for any underlying causes in the animal's environment and correct these.

Dairy Cattle

Calves

In general the health of calves can be judged by: (1) looking at the general condition of the calf (e.g. colour and shine of the coat) and (2) counting the number of calves that suffer from diarrhoea and/or the number of calves that have been treated for diarrhoea.

Cows

KPIs include (1) general condition of the dairy cows (e.g. the colour and shine of the coat), (2) Body Condition Score, (3) incidence of feed-related diseases like milk fever and rumen acidification.

F128	Expected. Health Plan
A documented Health Plan must be developed in consultation with a veterinary surgeon. The plan should include identified diseases, treatment schedules for regularly encountered conditions, vaccination protocols, parasite controls, protocols for pre-delivery health checks, quarantine procedures, bio security procedures, monitoring protocols. The plan should be reviewed on an annual basis.	
Climate Smart Agriculture	
Not applicable	

The Health Plan may be combined with other planning and record-keeping documents e.g. animal feed plan and farm emergency plan (see criterion F124), and will usually be combined with record-keeping (see criterion F130).

Ideally the health plan should consist of:

- Records of animal diseases that are diagnosed and/or treated on a daily basis;
- Risk assessment on all relevant factors for animal health (e.g. housing and feeding);
- Treatment plans for the most relevant diseases (especially when antibiotics are involved);
- Preventative measures taken on the farm to achieve good animal health performance;
- Treatment protocols for regularly encountered conditions (Including chemicals, drugs, medications, withdrawal/ pre-harvest period etc.) including injuries;
- Recommended vaccination protocols (when applicable);
- Recommended parasite controls;
- Protocol for health checks (for all stages of production);
- Mortality records, including cause of death;
- Quarantine procedures
- Biosecurity procedures

The health plan should be developed in discussion with the vet if practical. The health plan should be reviewed and amended accordingly at least once a year.

Guidance per livestock group

Cattle

Animal health plans for all cattle should include:

- Calf health and management protocols
- Monitoring of cattle health e.g. monitoring of locomotion, body condition and lesions;
- For dairy cows, Milk yield and milk quality are also useful indicators of cow health, so monitoring of milk yield and quality parameters should also be part of the health plan (somatic cell count, bactoscan and TBC as well as nutritional indicators such as fat and protein).

Monitoring for these issues enables early identification of problems and therefore early intervention to address underlying factors. Such monitoring can link to the requirement for continuous improvement, monitoring and benchmarking.

For additional information on monitoring and management systems follow the links:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69368/pb7949-cattle-code-030407.pdf

Photographic guides for monitoring are available such as the UK government guide to Body

Condition Scoring:

Further information surrounding health planning can be found at:

- https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69370/pb6491-cattle-scoring-020130.pdf - Herd health planning
- <http://www.dairyco.org.uk/technical-information/animal-health-welfare/lameness/husbandry-prevention/mobility-scoring/> - Locomotion scoring
- http://www.vetmed.wisc.edu/dms/fapm/fapm-tools/6lame/New5point_locomotionscoreguide.pdf - US University

Extension Service Guide to Locomotion Scoring

- <http://www.vetvice.com>

Your veterinarian may be able to provide you with similar guides, so remember to ask as part of the health planning process.

Calf Health

Since calves are more susceptible to a number of diseases, good hygiene is particularly important, as is monitoring of their general health. Your vet will be able to advise further.

Procedures carried out on calves should be, where applicable be under anaesthesia (e.g. dehorning). The number of procedures carried out on calves (like dehorning, castration) should be kept to a minimum (for additional advice surrounding procedures see criterion F123).

Calves should be provided with food that contains sufficient iron to ensure a blood haemoglobin level of at least 4.5mmol/litre (by providing 40 to 50 mg Fe/kg supplied in feed). A minimum daily ration of 100g of fibrous food should be provided for every calf over 2 weeks. This should be raised in line with growth to 250g by 20 weeks old.

Hogs/pigs

Animal health plans for sows, piglets and rearing/finishing stock should include, as a minimum: Identified diseases; treatments to be administered for regularly encountered conditions (Including chemicals, drugs, medications, pre-harvest period etc.); recommended vaccination protocols (when applicable); recommended behaviour; protocol for pre-delivery health checks; quarantine procedures; biosecurity procedure.

Procedures carried out on pigs should be, where applicable (e.g. castration) under anaesthesia. The number of procedures carried out on piglets (like teeth clipping, tail docking) should be kept to a minimum (for additional advice surrounding procedures see

Poultry

In broiler systems, stock-keepers should run a proactive programme to maximise the leg health of the flock. They should be trained to recognise signs of abnormal gait and proactively cull birds to prevent any unnecessary suffering.

F129	Expected. Hormones and Antibiotics
Hormones and antibiotics must be used prudently with the aim of optimising therapeutic efficacy and minimising the development of antibiotic resistance. Products or equivalent products (e.g. fluoroquinolones) that can be used to treat human disease must not be used unless deemed necessary by a vet.	
Climate Smart Agriculture	
Not applicable	

Antibiotics are an essential tool in treating disease outbreaks and maximise animal and bird health and welfare. However, antibiotics must be used responsibly and only if prescribed by a veterinary surgeon. Products, or equivalents products e.g. fluoroquinolones that can be used to treat human disease, should be avoided whenever possible.

The animal health plan must also take into account the likely development of resistance to antibiotics.

All feed must be free from hormones (see feed plan criterion F113); the use of hormones to boost milk or meat production is illegal in some countries and is not acceptable in Unilever supply chains.

F130	Expected. Record keeping related to animal health
Records must be kept of the following: animals bought, sold, produced and destroyed (traceability), feed supplements purchased, medicines (including all antibiotics) administered, veterinary interventions carried out. Records must be traceable (to the individual, flock or herd as appropriate) and accessible for 2 years after disposal of animal.	
Climate Smart Agriculture	
Not applicable	

The records for this criterion, and those for others in this Chapter, will normally be combined.

In principle high levels of animal health and welfare can be achieved in all systems. Farm management is the key success factor in this process. The farm workers and supplier employees (responsible for visiting the farm) should be able to monitor and score the welfare and health status of individual cows and the herd. Usually courses are in place to help the farmers learn this.

Animal transport.

Most Unilever suppliers will buy meat products from a central facility (e.g. a slaughterhouse or a small number of slaughterhouses) and that most animals are transported to such a facility by contractors or hauliers immediately before slaughter. It therefore makes sense for the Unilever supplier (rather than the farmer) to be responsible for assessing transport conditions for animals. However, there are circumstances where farms are responsible for animal transport, e.g.

- Where the farm uses its own transport facilities to transport the animals to their final destination or
- Where animals are transported between different farms, or parts of the same farm that are a long way away from each other, for example
 - At different life-stages (e.g. milking, breeding) or
 - To take advantage of different facilities and pasture available at different times of year

If the farm is responsible for the majority of transport, the expectation is that the farmer (rather than the supplier) will be asked to assess the transport systems against this section of the Code.

9.2 LIVE ANIMAL TRANSPORT

The following recommendations and guidelines are aimed to provide farmers, hauliers and slaughter plants with a framework by which high levels of welfare could be achieved during the transport of livestock.

Ideally, anyone responsible for the haulage of live animals (farmers, commercial hauliers) should be approved under a global, national or local assurance scheme (if available) or, as a minimum, should ensure that the vehicles used are compliant to country specific transport legislation. Journeys must be planned and managed so as to prevent distress or anxiety.

Hauliers must be trained and hold a recognised certificate of competence (if approved training courses are available), or as a minimum be aware of the health and welfare requirements of the animals they transport and the legislation surrounding their transport. Training should be reviewed and refreshed periodically, with records maintained.

S15	Expected. Hauliers and vehicles
Suppliers must ensure that hauliers are approved under an assurance scheme (if available) and that vehicles used for live animals are fit for purpose.	
Climate Smart Agriculture	
Not applicable.	

Some regions require hauliers hold a certificate of competence, issued by the competent authority. Training courses, whether internal or externally delivered, should always be succeeded by certification from an independent external body. External bodies should be authorised to carry out assessments and award certificates by the competent authority in the country in which the haulier operates.

Operators of vehicles, whether farmers or commercial hauliers, should only use vehicles that are fit for purpose.

A TRANSPORT BY LAND

Recommended guidelines for transport vehicles are:

- Non-slip, solid flooring: to minimise slips and falls of the animals. Examples of non-slip flooring would include, rubber mats, stamped tread, sand, shavings, straw bedding etc. It is possible to measure the number of slips and falls in a group of animals to ensure facilities provided are adequate;
- Gates and doors open freely and can be secured shut: gates and partitions should not have gaps or spaces where animals can get their heads or legs stuck;
 - To minimise the risk of injury, partitions are provided in vehicles to ensure animals are not too tightly loaded or too loosely stocked. (Guidance: partitions should be provided when pen length exceeds 3.7m - cattle; 3.1m - sheep and pigs; 2.5m - calves).
 - Partitions should be rigid, and strong enough to withstand the weight of the animals being transported.
- Internal ramps should function properly and extend all the way to the floor.
- There should be no sharp or protruding objects that pose a threat of injury to animals;
- To prevent leakage of faeces and urine, vehicles should be bedded or be fitted with drainage and storage into on-board tanks;
- Vehicles are fitted with adequate protection to shelter animals from extremes of weather and temperature; and
- Vehicles operated in the EU and transporting animals on journeys of over 65km (40 miles), must have been issued a certificate of approval from the competent authority.

B TRANSPORT BY SEA

For transport by sea, vessels should be fit for purpose, ensuring design and fittings are appropriate for the transported species. In addition to the above 'Vehicle' requirements above:

- Roll-on/roll-off vessels and containers should have securing points for attachment to the vessel. Vehicles should be adequately secured before the start of the sea journey to avoid displacement; and
- Secondary ventilation systems are necessary in vehicles/containers on enclosed decks where natural ventilation alone is not sufficient.

Transport companies undertaking livestock transport should be authorised with an industry body or competent authority authorising such operations.

C RECORD KEEPING

Record keeping should include a journey log of inspection during transport, morbidity and mortality (and any actions) climatic conditions and medication provided (and outcomes).

It is the responsibility of the exporter to ensure compliance with veterinary certification and requirements of the importing and exporting countries. A detailed journey plan should be devised showing knowledge and competence in:

- A Record keeping;
- B Appropriate travelling conditions for the species transported (including feed and water provision, space allowance, ventilation requirements);
- C Compliance with relevant authorities transport regulations;
- D Appropriate species specific animal handling methods and associated activities such as cleaning and disinfection, loading and unloading; and
- E Emergency/contingency plans surrounding potentially encountered problems such as adverse weather conditions.

S16	Expected. Training of staff
Personnel employed for loading and unloading animals (including catching poultry) must be trained and competent.	
Climate Smart Agriculture	
Not applicable	

In regions where assurance schemes are not available to certify hauliers or transport companies, the Global G.A.P Livestock Transport Standard¹⁷ provides the following guidelines for driver training:

Training should include the following:

- A Handling of animals;
- B Fitness of animals to travel;
- C Loading /unloading;
- D Stocking densities;
- E Segregation;
- F Ventilation requirements;
- G Suitability of Vehicle;
- H All necessary documentation for animals and vehicle;
- I Safety considerations for animals and personnel;
- J Journey Times;
- K Feed and water requirements; and
- L The impact of driver's behaviour on the animals being transported

All persons transporting animals must employ special driving techniques when transporting livestock, such as careful acceleration and braking, and an awareness of road conditions.

Competency should be tested by an independent body, which then issues the staff with a certificate to conduct the duties for which they have been trained. This should test their knowledge on procedures in the form of case scenarios and a written or oral exam.

The above text includes recommendations from the Global G.A.P Livestock Transport Standard.

S17	Mandatory. Prohibited actions
When handling or moving animals it is prohibited to strike or apply pressure to sensitive parts (e.g. eyes, nose, tail, genitals), suspend, throw or drag live animals.	
Climate Smart Agriculture	
Not applicable	

Ideally, all personnel employed in the loading and unloading of livestock vehicles should be trained and competent (training conducted by an approved trainer/course). Personnel should at all times handle the animals in a calm, gentle manner.

Staff handling or moving animals must:

- A Never strike or apply pressure to particularly sensitive parts of the body (eyes, nose, ears, tails or genitals);
- B Never crush, twist or break the tail of any animal;
- C Never grasp the eyes of any animal;
- D Never inflict any blow or kick to any animal;
- E Never suspend any live animal;
- F Never drag any live animal;
- G Never use prods or other implements with pointed ends; and
- H Never purposefully obstruct any animal being guided or led during handling.

The above text includes recommendations from the Global G.A.P Livestock Transport Standard.

¹⁷ http://www.globalgap.org/export/sites/default/.content/galleries/documents/111004_gg_cpcc_transport_final_version_1_Oct11_en.pdf

S18	Expected. Use of electric goads
Electric goads must only be used on adult animals who refuse to move with passive methods - not in the first instance.	
Climate Smart Agriculture	
Not applicable	

Wherever possible, passive methods of moving animals are preferred (e.g. the use of flags or pig boards). Occasionally, it may be necessary to use electric goads. Electric goads (preferably battery operated), designed for use on animals, should only be used on adult animals, which refuse to move, provided that:

- A The shocks last for no more than 1 second and are adequately spaced out.
- B The animal has room ahead of it in which to move.
- C The shocks are only applied to the muscles of the hindquarters.

S19	Expected. Fitness to travel
All animals must be fit to travel (i.e. journey must not cause suffering or injury) and there must be an inspection before loading to ensure this is the case.	
Climate Smart Agriculture	
Not applicable	

Animals shall not be considered fit for travel by the farmer and haulier if:

- A They cannot move independently without pain or walk unassisted:
- B They have a severe open wound, or prolapse;
- C They are pregnant females for whom 90% or more of the expected gestation period has already passed, or females who have given birth in the previous week;
- D They are new-born mammals in which the navel has not completely healed; and
- E They are pigs of less than three weeks lambs of less than one week and calves of less than ten days of age, unless they are transported less than 100 km.

A TRANSPORT OF CASUALTY ANIMALS

If necessary casualty animals (sick or injured) can be transported, if the following requirements are met:

- They can be loaded and unloaded without using any force or causing any pain or suffering;
- The animals can comfortably bear weight on all four legs and stand without pain or distress;
- The condition will not deteriorate during the journey;
- Plentiful bedding is provided;
- The casualty animal must be segregated during transport; and
- Veterinary advice should always be sought prior to the transport of casualty animals.

B GENERAL MEASURES

- Where necessary, sedatives may be used under veterinary supervision to ensure the wellbeing of the animal;
- Lactating females of bovine, ovine and caprine species not accompanied by their offspring shall be milked at not more than 12-hour intervals;
- Keep a record of all animals not deemed fit for transport, and reasoning thereof, to ensure they are accounted for; and
- An incident register for in transit injuries/ deaths must be kept, documenting the injury incurred and emergency actions taken. Emergency actions must be in align with those given by the emergency plan (See criterion S25 of this chapter).

C TRANSPORT BY LAND

Animals must be fit for the intended journey before the journey starts and must remain sufficiently fit throughout the journey. The animal should be healthy enough to tolerate the entire journey it is about to make (including loading, unloading and any journey breaks) with no, or very little, adverse effect on it, the journey should not cause the animal any suffering or injury.

Any animal which has been injured during transport, these may include animals with broken legs, or recumbent animals (unable to stand) must be slaughtered or killed immediately on arrival at the destination (in-situ animals must not be dragged off vehicle to facilitate casualty slaughter) using a humane method.

D TRANSPORT BY SEA

Journey planning should take into account expected weather and sea conditions. Special consideration and precautions should be undertaken for livestock that have not acclimatised to, or those unable to cope with extreme weather conditions. In some extreme conditions animals should not be transported at all.

A INSPECTION/HANDLING DURING TRANSPORT

Consignments should be checked immediately before departure by sea. During transport, the behaviour of livestock and any indicators of disease or poor animal welfare (such as stress, pain or fatigue) should be monitored daily. Any treatment or handling of animals, such as emergency killing (appropriate equipment must be readily available), should be undertaken promptly and appropriately and carried out by a competent veterinarian or animal handler.

Ventilation, watering and feeding systems should be monitored throughout the journey and corrective actions undertaken immediately

B LOADING/UNLOADING

Priority should be given to livestock vessels when arriving in port. Suitable unloading facilities at the port should be available. Animals should be unloaded as soon as possible after arrival. On occasions euthanising an animal whilst aboard the vessel is most appropriate for the welfare of the animal. Unloading sick or injured animals should therefore be carried out only if appropriate. Suitable equipment for unloading sick or injured animals should be available and appropriate facilities and treatments provided once unloaded.

The above text includes recommendations from the [Global G.A.P Livestock Transport Standard](#) and the [European Union Council Regulation \(EC\) No 1/2005 on the protection of animals during transport and related operations and the welfare of animals \(2005\)](#).

S20	Expected. Loading ramps
Loading ramp angles must comply with the implementation guidelines for the relevant species, as provided below.	
Climate Smart Agriculture	
Not applicable	

It is recommended that wherever possible, the steepness of the loading ramp be kept as level as possible.

- A For pigs and calves - an angle of 20 degrees, that is 36.4% to the horizontal (equivalent to a vertical rise of four over a distance of 11);
- B For cattle other than calves - an angle of 26 degrees 34 minutes, that is 50% to the horizontal (equivalent to a vertical rise of four over a distance of eight)'
- C Where the slope is steeper than 10 degrees ramps shall be fitted with a system, such as provided by foot bat-tens, which ensure that the animals climb or go down without risks or difficulties; and
- D Lifting platforms and upper floors shall have safety barriers so as to prevent animals falling or escaping during loading and unloading operations.

The above text includes recommendations from the [Department for Environment, Food and Rural Affairs \(DEFRA, UK\)](#) and [Global G.A.P Livestock Transport Standard](#)

S21	Expected. Food and water provision
The need for food and water in transit varies depending on length of journey, climate etc. Provision must be aligned with local legislation or recommendations. For poultry, the period of feed withdrawal should not exceed 12 hours (empty feeder to slaughter time).	
Climate Smart Agriculture	
Not applicable	

A journey log must be kept to document actions taken, like feeding and watering, throughout the transport of animals. Feeding stuffs be protected from the weather and free from contaminants such as dust, fuel, exhaust gases and animal urine and dung. Containers should be designed as such that animals can be provided with water readily whenever necessary. Feed and water is to be provided to livestock on journeys exceeding 12 hours. For transport in temperate climates, livestock watering should be provided more frequently.

The above text includes recommendations from the [Global G.A.P Livestock Transport Standard](#) and the [Royal Society for the Prevention of Cruelty to Animals Live Animal Transport Information Sheet \(2008\)](#).

S22	Expected. Segregation
Certain groups of animals must be transported separately from others.	
Climate Smart Agriculture	
Not applicable	

Animals shall be handled and transported separately in the following cases:

- A Animals of different species;
- B Animals of significantly different sizes or ages;
- C Adult breeding boars;
- D Sexually mature males from females;
- E Animals with horns from animals without horns;
- F Animals hostile to each other; and
- G Tied animals from untied animals.

The above text includes recommendations from the [Global G.A.P Livestock Transport Standard](#).

S23	Expected. Stocking density
Stocking densities in vehicles must be appropriate to the type of stock, duration of the journey and climatic conditions. Requirements for individual species are provided below.	
Climate Smart Agriculture	
Not applicable	

Stocking densities in vehicles must be appropriate to the type of stock being carried, the duration of the journey and climatic conditions.

TABLE 32: RECOMMENDED TRUCK LOADING DENSITIES FOR CATTLE		
Category	Approx. weight (in kg)	Area in m ² / animal
Small Calves	55	0.30 to 0.40
Medium-sized calves	110	0.40 to 0.70
Heavy calves	200	0.70 to 0.95
Medium-sized cattle	325	0.95 to 1.30
Heavy cattle	550	1.30 to 1.60
Very heavy cattle	>700	(>1.60)
Source: EU Guidelines		

PIGS

When transporting pigs, they must be able to lie down and stand up in their natural position. The load density for pigs of around 70-130kg LW should not 235kg/m² (as stated by the European Council Directive 95/29/EC). Space allowance may need to be increased by up to 10% in hot weather (over 25°C). Stocking density should not fall below around 215kg per m² otherwise animals may struggle to keep their balance. Strategic use of pen divisions will help to achieve this.

S24	Expected. Journey times
Journey times must comply with local regulations, and the equipment on board the vehicle must be suitable for the journey time. In the absence of any local legislation, the EU legislation detailed in the implementation guide must be adhered to.	
Climate Smart Agriculture	
Not applicable	

The journey or transport time for a load is defined as the total time animals remain in the transport vehicles – “*First animal loaded to last animal unloaded*”. EU legislation states that animals are not transported for more than 8 hours, unless additional requirements for vehicles carrying out long journeys are met. The following equipment should be provided

TABLE 33: VEHICLE EQUIPMENT TO BE INSTALLED FOR TRANSPORTING LIVE ANIMALS			
Vehicle Equipment	Travel Time		
	8-12 Hours UK	Over 12 Hours UK	Over 8 Hours Europe
Insulated Roof			
Feeding Equipment			
Partitions			
Water Supply			
Ventilation & Temperature Control Equipment			
Temperature Monitoring Equipment			
Satellite Tracking, Data Recording & Transmission Equipment			
Source: Global G.A.P Livestock Transport Standard			

TABLE 34: JOURNEY TIMES AND REST PERIODS FOR FARM LIVESTOCK	
Unregistered cattle, sheep and pigs.	Must not be transported for more than eight hours, unless additional requirements for vehicles carrying out long journeys are met (see section 5 of this guidance on Transportation by Road).
If long journey provisions are met then the following journey times apply.	
Unweaned calves, lambs, which are still on a milk diet and unweaned piglets. (Calves could be considered as unweaned under the age of two months, and lambs under six weeks).	After a maximum of nine hours of travel, must be given a rest period of at least one hour (sufficient in particular for them to be given liquid and if necessary fed). After this rest period, they may be transported for a maximum of a further nine hours.
Pigs	May be transported for a maximum period of 24 hours. During the journey, they must be offered water at appropriate intervals and afforded an adequate opportunity to drink.
Cattle`	After 14 hours of travel, must be given a rest period of at least one hour sufficient for them in particular to be given liquid and if necessary fed. After this rest period, they may be transported for a further 14 hours.
If after these journey times animals have not reached their destination, they must be unloaded, fed and watered and be rested for 24 hours at an EU approved control post.	
Source: Global G.A.P Livestock Transport Standard	

S25	Expected. Emergency Plans
An emergency plan must be in place to deal with emergencies such as animals falling ill, delays, breakdowns or accidents.	
Climate Smart Agriculture	
Not applicable	

It is recommended that anyone transporting livestock makes contingency plans to deal with emergencies that can arise during a journey such as animals falling ill or injured, unforeseen delays, breakdowns or accidents.

An emergency plan must be documented and a copy kept in the vehicle covering:

- A A code of practice for conducting roadside checks and fixing punctured tyres.
- B Adverse weather conditions during which transportation of livestock should be avoided.
- C Accident procedure.
- D Out of hours telephone numbers.
- E Fire extinguishers and instructions for use thereof.

In addition, it would be in good practice to have standard operating procedures in place to avoid the occurrence of emergencies. These should be documented and a copy kept in the vehicle covering:

- A List of good hygiene measures, including a procedure for cleaning of lorries prior to collection of cattle.
- B A copy of this Implementation Guide relating to live animal transport.
- C A procedure for loading/unloading of the animal delivery vehicle.
- D A procedure for the delivery of animals to customer sites.
- E Daily journey sheets.
- F Total Quality Management leaflet – if appropriate.
- G A country specific driver's handbook and tachograph regulations.
- H Guidelines on correct environmental conditions during the journey, depending on length of journey and ambient temperature.

The above text includes recommendations from the Royal Society for the Prevention of Cruelty to Animals [Live Animal Transport Information Sheet \(2008\)](#).

S26	Expected. Transport certificates
Animals must be accompanied by transport documentation to enable traceability, monitoring of transport times and stocking densities.	
Climate Smart Agriculture	
Not applicable	

To aid in the traceability of the livestock and ensure that transport times are not exceeded, animals should be accompanied by a transport certificate, which includes the following information

- A Name & address of consignor/owner of cattle
- B Details of haulier/driver
- C ID/registration number of vehicle
- D Place of loading & final destination
- E Date & time first animal was loaded
- F Date, time & place last animal was unloaded
- G Animal identification; slap mark, tattoo, ear tag number etc.

**It is recommended that all animals are accompanied with this information.*

S27	Leading. Monitoring
Suppliers should encourage the use of outcome measures, e.g. % of animals slipping, % of cattle moved with a goad and % effective stunning with hauliers and slaughterhouses.	
Climate Smart Agriculture	
Not applicable	

Monitoring incidence of use of stunning equipment and effectiveness thereof would serve to identify opportunities to limit this practice and evaluate the effectiveness of such interventions. Steps that can be taken to establish a monitoring system are:

- 1 List interventions that you would like to monitor;
- 2 Make a list of indicators for each to be addressed (i.e. what would you consider to represent the issues considered?);
- 3 Determine how to observe and measure the indicators chosen (i.e. point system to use in observations and the frequency of these);
- 4 Describe each observation technique (i.e. what are you looking to discern?);
- 5 Assign a responsible person to undertake the monitoring;
- 6 Work out how the information will be used (i.e. will you compare your results against best practice in your country on that issue?);
- 7 Document to monitoring system and review for further improvements

Conducting risk assessments are another way of monitoring risks associated with transport. An approach that could be taken would be to establish the following:

- A hazard checklist list identifying hazards in the following categories:
 - Situational e.g. extreme weather events, road closure due to accident
 - Equipment e.g. Contact with moving parts of machinery, vehicle collision
 - Physical e.g. electric shock
 - Chemical / Biological e.g. Fumes in the atmosphere, exhaust gases
 - Health e.g. Manual handling, anxiety
 - Environmental e.g. ventilation, temperate/hot weather
 - Other
- A risk matrix indexing the likelihood of occurrence [Remote (1) – Likely (5)] against the severity of harm [Negligible (1) – Very Severe (5)].
- An evaluation of hazards recognised in the hazard checklist by describing:
 - The hazard in occurrence
 - What animal is at risk
 - How they could be harmed
 - Existing control measures to mitigate the risk
 - Risk with mitigation measures in place (likelihood of occurrence x severity of harm)
- Should the risk be perceived to be too high, a more detailed risk assessment can be carried out, identifying further action required to reduce the risk to acceptable levels. In this case, the action, person responsible, due date, revised risk score and completion statement should be stated.

A risk assessment should be conducted annually to ensure that all risks associated with identified hazards are kept within an acceptable level.

Record keeping of incidents that resulted in animals being exposed to hazards or hazardous situations should be maintained and should form part of an annual risk assessment review.

The above text includes information derived from Unilever's own Risk Assessment form.

9.3 ANIMAL SLAUGHTER

This section has been specifically developed to provide guidance to suppliers and abattoirs on good practice and measures to help maintain and improve their systems.

It is crucial that you are fully aware of all legislative requirements in your country, which may require practices that go beyond those recommended in the guide below.

The slaughter of any animal for the production of food must be carried out in a humane manner, and without any suffering to the animal. It is important that staff are familiar with the needs of the animals they work with, and training should be given to all staff handling live animals.

Some Religious authorities prohibit animals being stunned before slaughter. Unilever recognises that Religious freedom is important. From an animal welfare perspective Unilever prefers stunning of the animal to be carried out prior to slaughter, whenever permitted under local regulations.

S28	Expected. Training of staff
Personnel employed to either handle or undertake stunning or slaughter of animals at the slaughterhouse must be properly trained and competent in best practice for the relevant task.	
Climate Smart Agriculture	
Not applicable	

Handling: all staff handling live animals should be capable and skilled. Training should be provided to ensure staff are competent in all aspects of their work with the animals. Staff working with animals should understand their behavioural patterns and use these principles to help handle them.

<http://www.grandin.com/behaviour/principles/flight.zone.html>

Slaughter: any staff undertaking the stunning and slaughter of animals, including casualty animals, must be properly trained and competent. Training should be provided by a competent person or authority with approved staff receiving a certificate of proficiency detailing which duties they are permitted to perform.

One person should be designated as an animal welfare supervisor who has overall responsibility on site.

Shackling staff should be trained to recognise birds that are unfit, either because they are sick or injured, or if they are too small (birds that are too small may pass over the water-bath and not be stunned).

S29	Mandatory. Prohibited actions
When handling or moving animals it is prohibited to strike or apply pressure to sensitive parts (e.g. eyes, nose, tail, genitals), suspend, throw or drag live animals	
Climate Smart Agriculture	
Not applicable	

It is never acceptable for staff to resort to acts of violence or extreme force to an animal. Staff handling or moving animals must:

- A Never twist, break or crush an animal's tail
- B Never grasp or pull an animal's ears
- C Never poke the eyes of an animal
- D Never jab objects into the animals mouth, ears, anus or genitals
- E Never be lifted or dragged by their heads, horns, tail, or legs.
- F Never deliberately slam gates on livestock
- G Never drag a conscious, non-ambulatory animal
- H Never initially apply electric prods to sensitive parts of the animal such as the eyes, ears, nose, anus or testicles.
- I Never maliciously drive ambulatory livestock on top of one another either manually or with direct contact with motorized equipment
- J Never kick, strike, throw or deliberately injure a bird.
- K Never lift an animal (sheep) by their wool

S30	Expected. Holding areas – design, bedding, feed and water provision
Holding pens and areas must be designed to minimise fear and distress in the animals. There must be continuous, easily accessible water, and feed for animals being kept for more than 12 hours. Animals held overnight must be provided with bedding, unless floor type (e.g. slatted) makes it impractical.	
Climate Smart Agriculture	
Not applicable	

A THE LAIRAGE (HOLDING PEN): OVERVIEW

The main objective of a holding pen (lairage) is to provide a secure holding area for the animals, offering protection from the elements (especially extreme weather conditions) and provide drinking water and adequate space to lie and rest. Facilities can vary from a purpose-built unit or a secure field.

Animals should spend no more than 24 hours in a lairage. Research shows that cattle's ability to adjust to new surroundings may take several days; therefore there is limited benefit to extending the lairaging period for any longer than is absolutely necessary. Ideally, pigs should be rested for 2 hours prior to slaughter, although if they are calm and stress free at unloading, it is possible to slaughter them immediately.

B THE LAIRAGE (HOLDING PEN): DESIGN

Non slip flooring; the floor surface should be designed to minimise the risk of animals slipping (but also be easily cleaned). Smooth concrete should be grooved to reduce slipping; there are also proprietary compounds on the market which can be applied to concrete to improve its non-slip properties. Wet, dirty or slurry covered flooring can also increase the incidence of animals slipping; therefore they should be maintained in a clean, non-slip state.

C THE LAIRAGE (HOLDING PEN): FACILITY DESIGN

The route the animals take through the lairage should have a minimal number of corners and turns, it is especially important to avoid 90° corners as these can appear to be a dead-end to the animal.

Certain areas in the lairage can increase the risk of animals slipping, such as corners, handling areas, and unloading bays. Animals will panic if they slip or fall, this makes them harder to handle.

It may be possible to improve poorly designed systems by introducing some simple measures:

- 1 Remove or reduce 90° corners and sharp turns;
- 2 Improve lighting – animals move easier from dimly light areas to lighter areas, diffuse lighting is best as reflections from wet floors or shiny surfaces can cause the animals to baulk;
- 3 Remove obstructions and distractions – animals have a wide angle vision, so they can be easily frightened by shadows or moving distractions outside of races and pens. Construct solid sides to pens and raceways to improve sight lines and reduce visible distractions (the

use of wooden sheets or plyboard is a simple starting point to identify what works best);

- 4 Improve flooring where animals are observed to be slipping or falling; and
- 5 Reduce noise levels – constant loud noise and sudden noises are particularly frightening to animals, so it is important that staff do not shout and noises from equipment/gates etc. are kept to a minimum.

D THE LAIRAGE (HOLDING PEN): ENVIRONMENT

Important considerations when animals are held in the lairage:

- 1 **Temperature** – animal welfare can be adversely affected by high temperatures, so sufficient levels of ventilation and shade should be provided. Whilst held in the lairage animals should be monitored by staff for any signs of heat stress (especially pigs if they are seen panting). Water can be sprayed onto pigs and cattle via sprinklers or hoses to help keep them cool. The showering of pigs should be stopped when the air temperature is below 5°C or when pigs start to shiver;
- 2 **Humidity** – high temperatures combined with high humidity decreases the animal's ability to lose heat through the process of perspiration (sweating), it is therefore especially important to monitor the animals closely when the humidity is high; and
- 3 **Air quality** – sufficient ventilation should be provided to adequately control levels of harmful or irritant gases such as carbon dioxide and ammonia. High building ventilation rates are also important in removing excess heat and humidity.

E THE LAIRAGE (HOLDING PEN): WATER AND FEED PROVISION

All animals must have continuous easy access to clean drinking water. Staff should check regularly that drinkers are working and clean water is available for the animals. Feed should be provided to animals which are being held overnight or for longer than 12 hours. Feed should be provided in a sufficient quantity and be of an acceptable type and quality, with all animals having adequate access to the feed.

F THE LAIRAGE (HOLDING PEN): LYING AREAS

There are several different types of lying areas which are suitable for animals being held in the lairage. They can be solid, or slatted, and made from concrete, plastic or metal. The important factors are that they provide a non-slip, well drained lying area, which can be easily cleaned when necessary. Sufficient space should be provided to allow

all the animals in a pen to lie down and stand up without hindrance.

Animals which are held overnight should be provided with appropriate bedding materials, unless the type of flooring (slatted or mesh) makes its use impractical.

S31	Expected. Time in holding areas
For pigs and cattle the time in holding areas must not exceed 24 hours. For birds, the time in holding areas must be kept to a minimum.	
Climate Smart Agriculture	
Not applicable	

Arrival: Animals should be unloaded from transport vehicles as soon as possible upon arrival at the slaughterhouse/lairage. This is especially crucial during warmer weather conditions as the majority of the vehicle ventilation systems are dependent on the forward movement of the vehicle.

To reduce waiting times and ensure animals are unloaded as quickly as possible it is advantageous for a slaughterhouse to operate a scheduling procedure. Each vehicle is designated a specific vehicle time which can greatly reduce waiting times to unload animals, ideally waiting times for unloading should not exceed 30 minutes.

Shackling – poultry

Live birds should be presented to the 'hang-on' team in a way that minimises the amount of handling prior to shackling. There are many different transport containers, which provide a diverse range of openings and access to the birds. In any case care must be used when removing birds from their transport containers so as not to cause injuries or damage to the birds. This is especially important when dealing with spent laying hens as rough handling will result in fractures to the legs and hip joints.

High-speed poultry processing lines utilise shackle systems in which the birds are suspended upside down by their legs / feet. Shackling is known to be a stressful experience for live birds and the time that the birds are shackled should be minimised wherever possible. Ideally the time from shackle to stun should be for no more than one minute.

NB: This becomes a legal requirement in the EU from January 2013 for all newly built slaughterhouses and from January 2019 for all existing slaughterhouses.

Where birds are live shackled, it is essential that they are shackled by both legs and the shackle should be the correct size to accommodate the shank of the leg of bird being slaughtered (it may be necessary to have different sizes of shackle available). Live bird shackle lines should also have a 'breast comforter' (or breast rub strip) fitted which runs from the first hang-on point all the way through to the stunner point. The bird's breast should contact this strip at all times and it will help to calm the birds and reduce wing flapping prior to stunning.

Ideally, stunning or killing the birds whilst they remain in their transport containers is the best approach; this has the distinct advantage of not having to shackle live birds. This is generally only possible with controlled atmosphere systems. Some controlled atmosphere systems do require the birds to be removed from the transport containers and the birds then enter the system on a conveyor belt. In these systems the removal of the birds should be as smooth and gentle as possible. Such systems commonly include a tipping mechanism and it should be ensured that ramps or slides are incorporated to minimise any drops.

All systems should be designed to ensure that birds do not escape, and any birds which do must be caught immediately and returned to the slaughter line.

A system should be in place to ensure that all transport containers are empty before they are sent through the washer. At all times birds must be handled carefully to ensure that their welfare is not compromised.

S32	Expected. Unloading - facilities
The unloading bay must facilitate efficient movement of animals and ramp angles must comply with species-specific criteria in the implementation guidance. Containers for birds must be moved with care.	
Climate Smart Agriculture	
Not applicable	

Beef and pork

The unloading bay should be well designed and help facilitate the movement of the animals off the transport vehicle. Ideally, unloading bays shall be well-lit and fitted with solid sides to reduce incidents of animals being frightened by staff or other distraction occurred around the unloading bay. Ramp angles should be reduced to a minimum, ideally 10 degrees (a 17.6% slope or a 5:7:1 ratio) and should not exceed the following values:

TABLE 35: RAMP ANGLES FOR VARIOUS ANIMALS			
Type of animal	Degrees	Slope	Ratio
Cattle	26.6°	50%	2.0 : 1
Pigs & Calves	20°	36%	2.7 : 1

Ramps should be fitted with lateral battens to reduce the likelihood of animals slipping. The animals should be able to move freely and easily from the vehicle onto the unloading bay which should provide a solid, non-slip surface.

Steep ramp angles can increase the risk of animals being injured through slipping, jumping, or falling. It should be noted that many issues relating to poor animal movement at unloading are usually associated with inadequate or poor facility design.

Poultry

There are various systems used for unloading transport containers off vehicles, these systems depend on the stunning or killing system used (electric water-bath or controlled atmosphere) and the equipment manufacturer.

Systems vary from manually removing birds from 'side-loaders' through to manually lifting containers from the vehicles, and to systems which use forklifts, hoists or automated systems that remove the modules onto a conveyor system.

When unloading birds in transport containers, staff must ensure that:

- A Transport containers are handled and moved with care;
- B Transport containers are kept level, not jolted, raised or lowered too fast; and
- C When stacking transport containers in the lairage there is adequate space between them to allow sufficient airflow around the containers.

Birds should be slaughtered or killed as soon as possible after their arrival at the slaughterhouse, and the amount of time spent in the lairage minimised.

S33	Expected. Unloading - casualties
Casualty animals must be identified and treated as a priority.	
Climate Smart Agriculture	
Not applicable	

If an animal is identified as a casualty, it should be treated as a priority. If the animal is able to walk without experiencing any further pain or distress then it can be moved immediately to a pen or directly to slaughter. Any recumbent animals (unable to walk) must be humanely killed in situ; they should never be dragged, pushed or hoisted by shackles/chains whilst conscious.

Casualty pens should be bedded and provide animals with continuous access to clean drinking water and a thermally comfortable environment.

S34	Expected. Restraining animals
Restraining animals must be carried out humanely and using appropriate equipment. Requirements for individual species are detailed in the implementation guide - you must adhere to these requirements.	
Climate Smart Agriculture	
Not applicable	

To ensure that animals are correctly restrained the following provisions should be provided:

- A The stun box/restrainer should have a non-slip floor (animals, which trip or slip will panic);
- B Equipment designed to restrain the animal must not exert too much pressure, it is not acceptable to observe animal's struggling or vocalising;
- C Equipment designed to restrain the animals must be appropriately maintained to avoid distress (sharp edges); and
- D Animals should never be immobilised by cutting leg tendons, by severing the spinal cord, or through the use of electric currents.

S35	Expected. Stunning / slaughter equipment
All equipment used to stun or kill animals must be properly maintained, regularly cleaned and checked daily to ensure it is in full working order.	
Climate Smart Agriculture	
Not applicable	

All equipment used to stun or kill animals should be checked and serviced daily. Any maintenance or repairs should be recorded. Captive-bolts should be stripped down, inspected, and cleaned after use; if there are any concerns about its operation then it is recommended that the velocity is checked.

Any electrical stunning equipment should have the current and voltage checked under load every day prior to operation.

Electrodes should be cleaned regularly throughout the day to ensure good electrical contact with the animal.

Suitable back-up equipment must be easily accessible, at all times for use in an emergency. Back-up equipment must also be maintained on a regular basis.

S36	Expected. Stunning methods
	Animals must be checked for effective stunning before slaughter. Requirements for different stunning methods and different species are detailed in the implementation guide - you must adhere to these requirements.
	Climate Smart Agriculture
	Not applicable

Pre slaughter handling

For adult cattle and pigs which are refusing to move, an electric goad (battery operated only) may be used, provided that the shocks last no more than two seconds and are adequately spaced out, the animal has room ahead of it in which to move and the shocks are only applied to the muscles of the hindquarters. Goads should not be used on a routine basis and staff must not continually hold them as this can lead to habitual and casual use.

Electric goads must never be used on recumbent animals. If the electric goad is used on more than 25% of the cattle, then there is a fundamental problem with the handling system, which should be reviewed. The aim should be to use the goad on no cattle, but use on 5% of the cattle or less is deemed good.

The use of flags, plastic paddles/flappers and pig boards should be used to encourage animals to move forward, and should never be used to hit or strike the animals

Stunning

Animals must not be moved to the stunning point unless the slaughter man can immediately stun them.

Acceptable methods of stunning for beef and pork include:

A CAPTIVE BOLT

The gun should be angled correctly and be fired with sufficient force to pass through the skull and enter into the brain. Immediately after the animal is shot it should collapse, have no signs of rhythmic breathing, have a relaxed jaw, with the tongue hanging out, the pupils of the eyes should be fixed and fully dilated, with no corneal reflex.

B FREE BULLET (LIVE ROUNDS)

The animal should be stunned with a single shot to the head (shooting in the chest or neck is not a method of stunning and must never be used). The strength of the bullet should be appropriate for the species and size of the animal. A single shot should render the animal immediately unconscious. It is important that local and national laws are complied with and the increased risk to staff by using live rounds is considered.

C ELECTRICAL STUNNING

Sufficient amperage must be passed through an animal's brain to induce an epileptic seizure.

- 1 A minimum of 1.2 amps for at least 2 seconds must be passed through a bovine's brain for an effective stun;
- 2 A minimum of 1.3 amps for at least 3 seconds must be passed through a pig's brain for an effective stun.

When head only (reversible) electrical stunning is used it is recommended that:

- 1 Pigs are bled within 15 seconds of stunning;
- 2 Cattle are bled within 10 seconds of stunning

Stun to bleed intervals are less critical when non-reversible stunning methods (after the head stun, a second electrical current is applied to the animal's body to induce a cardiac arrest) are used but effective bleeding is essential to insure that all animals are dead prior to any other dressing procedures are carried out.

D GAS

(Pigs only) a CO₂ concentration of over 90% is recommended with an absolute minimum level of 70%, all systems should be fitted with an audible and visual alarm which are triggered in the event of gas levels falling below the minimum 70% level. Once placed into the system pigs

should be lowered into the maximum gas concentration within 30 seconds. All pigs should be dead or irrecoverably stunned when they exit the system; any natural or spontaneous blinking is not acceptable. Ideally a corneal reflex (induced by touch) should not be seen.

Stunned and shackled animals must not have an arched-back righting reflex, and any animal which is fully conscious and suspended upside-down will arch their backs in an attempt to lift their heads and right themselves. How to determine insensibility and signs of an effective stun: <http://www.grandin.com/humane/insensibility.html>

Acceptable methods of stunning for poultry include:

Controlled Atmosphere

In controlled atmosphere systems a non-aversive gas mixture should be used (as permitted by local legislation). The birds must be placed into an environment that already contains the correct concentration of the gases to be used. The system should automatically control the concentrations of the gas mix and should have an audible and visual alarm which triggers if key gases fall out of desired parameters.

The majority of controlled atmosphere systems are designed to kill the birds, but systems are available that only stun the birds. If stunning is used the birds neck must be cut immediately on exit from the system (see later section – Neck Cut) to ensure it does not recover consciousness.

Electric water bath

A breast comforter should be in place right up to the stunner to help settle the birds and reduce the likelihood of birds flapping their wings and 'flying' over the stun-bath. In electric water-bath systems it is essential that the birds enter the bath without receiving a pre-stun shock. To achieve this, an insulated entry ramp should be used. The bird's head should be the first part of the body to contact the water-bath and this should deliver an immediate and effective stun.

The height of the bath, position of the entry ramp and electrical stunning parameters should be adjusted to suit the size of each load of birds being processed.

The stunner settings used must be compliant with local legislation and deliver an effective stun. The birds should be regularly checked to ensure that the stun is effective.

The stunner settings (current and frequency) should also be regularly checked.

Signs of an effective electrical stun (reference Humane Slaughter Association) include:

- A Neck arched with head held vertically;
- B No rhythmic breathing;
- C Rigidly extended legs;
- D Constant, rapid body tremors;
- E Absence of a third eyelid (nictitating membrane) reflex; and
- F Wings held tightly against body

If any bird is seen to miss the stun bath, it must immediately be humanely culled. The most practical way of achieving this is by using neck dislocation followed by an effective neck-cut. Only fully trained operatives are permitted to carry out this procedure (see page 19 – Staff - Competence).

Council Regulation (EC) No 1099/2009, of 24 September 2009, on the protection of animals at the time of killing states the following Electrical requirements for water-bath stunning equipment (average values per animal).

TABLE 36: ELECTRICAL REQUIREMENTS FOR WATER-BATH STUNNING EQUIPMENT

Frequency	Current
< 200 Hz	100 mA
From 200 to 400 Hz	150 mA
From 400 to 1500 Hz	200 mA

New technologies

Unilever recognises that there are new stunning technologies in development; they should be carefully assessed and evaluated, then approved by a competent authority with a view to adoption if they do deliver a benefit. The evaluation and potential adoption of such technologies is encouraged.

Neck cut

After exiting the water-bath stunner or controlled atmosphere system, all birds should have their necks cut. In systems where the birds are stunned only, this must occur as quickly as possible, typically after no more than 10 seconds. Ideally, both carotid arteries and jugular veins should be severed to ensure a rapid loss of blood and death (if stunned). No further processes are permitted to take place until the bird has bled for at least 90 seconds.

The neck cut can either be automated or carried out manually. In all cases, an appropriate number of trained and licensed / competent slaughter men must be in place to ensure that all birds are checked for an effective neck cut. If any birds have been cut ineffectively, or missed completely, it is the responsibility of the slaughterman to ensure the vessels are effectively cut.

After the bleed line, birds will pass into the scald tank. It is critical that all birds are dead before they enter the scald tank.

S37	Expected. Slaughter without stunning
Wherever possible, stunning must be carried out before slaughter. If for religious reasons this is not possible, then the recommendations in the implementation guide for the reduction of pain and distress must be followed.	
Climate Smart Agriculture	
Not applicable	

Religious: Non-stun slaughter

Unilever accepts that Shechita and some Halal methods of slaughter involve animals being slaughtered without prior stunning. Unilever recognises that Religious freedom is important but whenever possible stunning of the animal should be carried out prior to slaughter.

The following recommendations have been developed to provide guidance and current good practice, by following these guidelines it can significantly reduce the animal's distress and pain during the slaughtering process. Suppliers are encouraged to implement these recommendations if stunning is not carried out prior to slaughter:

- A Flooring of the restraint box must be non-slip and lighting should encourage animals to enter;
- B Animals must be restrained in a comfortable and upright position;
- C Conscious animals must never be shackled, hoisted or dragged;
- D The animal's body must be fully supported if its feet are lifted off the floor;
- E Restraint devices must apply adequate pressure to provide the animal with the sensation of being held. Excessive pressure will cause the animal to struggle;
- F Staff must operate restraint devices with a steady smooth motion. Rapid and erratic movements of restraint devices will cause the animals to become fearful and agitated.

- G Head restraining devices should not cause excessive extension of the neck; the animal's forehead should be parallel to the floor;
- H Once the animal is completely restrained slaughter must be performed within 10 seconds;
- I Knives used to slaughter the animals should be twice as long as the width of the animal's neck and be extremely sharp;
- J A swift single cut must be made and the wound must not be allowed to close over the knife;
- K The condition of the blade should be perfect, without flaws;
- L Animals must not be removed from the restraint box until they have lost sensibility;
- M Ninety percent of cattle should collapse within 10 seconds of slaughter; and
- N If the animal does not collapse within 20 seconds it should be shot with a captive bolt prior to being released from the restrainer box.

For more information on religious slaughter, follow the link below:

<http://www.grandin.com/ritual/rec.ritual.slaughter.html>

S38	Expected. Documentation
Records must be kept of the following: receipt of transport certificates, time of arrival of animals at slaughterhouse, accurate weight of vehicle (if weighbridge present) and maintenance and checking of slaughter equipment.	
Climate Smart Agriculture	
Not applicable	

In addition to the documentation stated in criteria S37, slaughter staff should receive a licence or certificate of competence from a veterinary surgeon or other competent authority which details the procedures the licence holder can carry out and the type of equipment they can use.

APPENDIX 9A REFERENCES AND FURTHER INFORMATION

Body conditioning scoring

“Body Condition Scoring” has been recommended for monitoring a range of animals (e.g. see www.dairynz.co.nz/animal/herd-management/body-condition-scoring/)

Cattle environments and facilities

For more information on cattle environments and facilities follow the links:

- <http://thedairylandinitiative.vetmed.wisc.edu/>
- <http://www.uwex.edu/ces/dairymod/index.cfm>
- <http://extension.psu.edu/courses/beef/basic-production-practices/overview-of-the-beef-industry>

Dr Temple Grandin, Associate professor of Animal Sciences at Colorado State University has conducted research into the design of cattle facilities and how to minimise stress on the animal. These guides give specific information and links to additional information.

Handling and transport

<http://grandin.com/behaviour/transport.html>

Health planning

Further information surrounding health planning can be found at:

- <https://www.gov.uk/guidance/keeping-live-stock-healthy-disease-controls-and-prevention> - Herd health planning
- <http://www.dairyco.org.uk/technical-information/animal-health-welfare/lameness/husbandry-prevention/mobility-scoring/> - Locomotion scoring
- http://www.vetmed.wisc.edu/dms/fapm/fapm-tools/6lame/New5point_locomotionscoreguide.pdf - US University

Livestock handling systems

<http://www.grandin.com/design/design.html>

Non-slip flooring

<http://www.grandin.com/design/non.slip.flooring.html>

Odour Management

<http://www.milkproduction.com/Library/Scientific-articles/Housing/Preparing-an-odor-management-plan/>
<http://www.thepigsite.com/articles/1023/methods-and-practices-to-reduce-odor-from-swine-facilities>
<http://www.thepoultrysite.com/articles/387/coexisting-with-neighbors-a-poultry-farmers-guide>

Welfare Potential by Production System for Beef Cattle

Level	Example System		Space allowance ¹	Enrichment (Shade and shelter, bedding and enough forage when of pasture ²)	Feed
1 = bad	Fully slatted indoors		Low	No straw bedding	Grain or other concentrate significant proportion of diet
	Concentrated animal feeding operation (feedlot)		Low	No straw bedding No shelter/shade	Grain or other concentrate significant proportion of diet
2	Indoor part slatted flooring		Low	No straw bedding	Grain or other concentrate significant proportion of diet
	Straw barns/yards		Low to Medium	Straw bedding	Grain or other concentrate significant proportion of diet
3 = better	Semi-extensive system. Pasture reared on grazing season. Well ventilated straw yards or extensive paddocks are permitted	On pasture	Appropriate for feed intake on pasture. Does not harm the soil - prevent overgrazing ³	Shade and/or shelter (depending on the climatic conditions)	Grass is a significant part of diet - (May be supplemented by grass, concentrate, haylage, maize or other whole crop, waste products or suitable other ⁴)
		Off pasture	High	Environment is enriched: Forage available ad libitum and scratching polls, shade/shelter provided, comfortable bedding ⁵	
4 = best	Pasture reared/extensive		Appropriate for feed intake on pasture	Shade/shelter provided	Grass grazing (silage, concentrate, or suitable other to supplement ⁴)

¹Space allowance (see details overleaf). We recommend space allowances that fall into the high category, as defined by:

Low - ABM FS to general activity line ($k=0.068$)

Medium – general line to ABM Solid

High – in line with RSPCA / extrapolated K (0.131)

² Shelter and shade should be enough for every animal to be able to use it at the same time. Bedding should comprise straw or other suitable substrate – plastic slats and rubber mats are not acceptable as 'bedding'

³ Pasture meets minimum nutritional requirements. Recommended: more than 1500kg of dry matter/ha at the beginning of grazing season (or grass that is more than 4-5 cm height.)

⁴ Forage should make at least 60% of the diet

⁵ Bedding material should be locally available and accordingly to the climatic conditions (e.g: straw bedding, woodchip bed)

Source: Compassion in World Farming. 2015. Welfare Potential Matrix – Beef Cattle.

<http://www.compassioninfoodbusiness.com/resources/broiler-chickens/welfare-potential-matrix-broilers/>

Welfare Potential by Production System for Dairy Calves

Level	Example System	Space allowance	Colostrum provision	Enrichment (shelter and bedding)	Surgical procedures
1 = Bad	Calf killed at birth	NA	NA	NA	NA
2	Individual housing (with visual and tactile contact) ¹ . (UK legislation requires higher space allowances than the EU for heavier calves: 2m ² for calves 150-200kg, 3m ² for calves >200kg ¹)	Low - individual hutch/ pen	Insufficient/ unregulated	Straw bedding (required by law for calves up to 2 weeks old ²)	Any of the following: castration, disbudding/dehorning, tail docking (practiced in NZL, AU, IRL, CA, USA)
	Group housing after 8 weeks	Low - individual hutch/ pen, then group pen	Insufficient/ unregulated	Straw bedding	Any of the following: castration, disbudding/dehorning, tail docking (practiced in NZL, AU, IRL, CA, USA)
3 = Better	Group housing after separation from dam	High - group pen (RSPCA: 2m ² bedded area per calf <100kg ³)	As soon as possible (RSPCA: provide colostrum within 6 hours from the dam or another newly-calved cow ⁴)	Permanent deep straw bedding, well-ventilated barns	No routine mutilations, anaesthetic and analgesic provided when practiced
4 = Best	Dam suckling systems (Beter Leven calves suckle mother for 3 months for 1 star, five months for 2 stars or six months for 3 stars) ⁵	High - group calf pen with restricted or free access to dam	As soon as possible (Soil Association: provide colostrum within 6 hours from their mother, no weaning before 12 weeks of age ⁶)	Access to pasture in the grazing season, shade & shelter provided	No mutilations, polled breeds used

¹ [Welfare of Farmed Animals \(England\) Regulations 2000](#)

² Council Directive [2008/119/EC](#) of 18 December 2008 laying down minimum standards for the protection of calves

³ RSPCA Freedom Food Standard <https://science.rspca.org.uk/sciencegroup/farmanimals/standards/beefcattle>

⁴ RSPCA Freedom Food Standard <https://science.rspca.org.uk/sciencegroup/farmanimals/standards/dairycattle>

⁵ Beter Leven standards <http://beterleven.dierenbescherming.nl/>

⁶ Soil Association standards <http://www.soilassociation.org/LinkClick.aspx?fileticket=I-LqUg6illo%3d&tabid=353>

Source: Compassion in World Farming. 2015. Welfare Potential Matrix – Dairy Calves.

<http://www.compassioninfoodbusiness.com/resources/dairy/welfare-potential-matrix-dairy-cattle/>

Welfare Potential by Production System for Dairy Cattle

Level	Housing System	Pasture Access	Space/comfort available for lying	Welfare assessment
1 = Bad	Tie stall	None	Poor - severe confinement and discomfort	None
2	Free stall	None or partial access, e.g. only for low-yielding, heifer or dry cattle only	Low – fewer stalls than number of cows or mattresses with little bedding	None or limited, e.g. nothing beyond veterinary health plan
3 = Better	Free stall	Seasonal (RSPCA: at least 4 hours a day ² . Compassion Good Dairy Award: at least 4 hours a day for a minimum of 100 days/year ¹ . Beter Leven one star: 8 hours a day for 150 days) ¹	Better - 5% more stalls available than cows; deep bedded stalls. Pasture provides more lying comfort. (RSPCA: pasture stocking density 10-12 cows/ acre ²)	Active programme to regularly monitor and reduce lameness, mastitis, poor body condition and improve longevity ²
	Deep-bedded barn	As above	High - cows are able to lie in their preferred orientation and near chosen individuals	As above
4 = Best	Free stall or deep-bedded barn (Soil association: provide 10.5m ² per cow indoors) ³	Free choice of access between housing and pasture	As above	Active programme to monitor and reduce lameness, mastitis, poor body condition and improved longevity, robust breeds used ²
	Extensive	Year-round access	High - well-drained pasture, shelter and shade provided	As above

Organic systems can fall under better or best, depending on the type of housing provided

¹ Beter Leven standards <http://beterleven.dierenbescherming.nl/>

² RSPCA Freedom Food Standard <https://science.rspca.org.uk/sciencegroup/farmanimals/standards/dairycattle>

³ Soil Association Dairy standards <http://www.soilassociation.org/LinkClick.aspx?fileticket=LqUg6illo%3d&tabid=353> p167.

Source: Compassion in World Farming. 2015. Welfare Potential Matrix – Dairy Cattle.

<http://www.compassioninfoodbusiness.com/media/6887910/welfare-potential-by-production-system-for-dairy-cattle.pdf>

Welfare Potential by Production System for Sows

Level	Example System	Space Allowance	Confinement	Enrichment
1 = bad	Intensive standard indoor production (outside EU)	Sow and gilts given sternal lying (allometrics) or less	Sow stalls/tethering, Farrowing crates	No enrichment
2	Intensive standard indoor production (EU)	Sow and gilts given lateral lying in group housing (allometrics)	No tethering, Sow stalls first 4 weeks of pregnancy, Farrowing crates	Nesting material (from 24 hrs prior to farrowing), No or limited bedding, No or limited manipulable material (edible fibrous material)
3 = better	Higher welfare indoor production	Minimum; Sow and gilts given general activity (allometrics) space allowance in group housing	No confinement – group housing throughout gestation; free farrowing systems	Nesting material (from 24 hours prior to farrowing), Loose bedding material and Manipulable material (edible fibrous material) provided throughout life
4 = best	Free Range	The lying area (shelters) must be a minimum of: <ul style="list-style-type: none"> i) 1.5m²/sow for mature adults and ii) 1m²/gilt for first and second parity iii) Grouped animals must be stocked at no more than 30 adults per hectare 	No confinement – Outdoor grouping throughout gestation; Provision of: <ul style="list-style-type: none"> - Outdoor arks - Bale tents - Farrowing arks 	Outdoor access, Nesting material (from 24 hours prior to farrowing), Loose bedding material and Manipulable material (edible fibrous material) provided throughout life, wallows, rooting vegetation, shade

Other things that could be included:

- Flooring (slatted/partial slatted/solid)
- Litter numbers
- Nose ringing

Source: Compassion in World Farming. 2015. Welfare Potential Matrix – Sows and Meat Pigs.

<http://www.compassioninfoodbusiness.com/resources/pigs/welfare-potential-matrix-sows-and-meat-pigs/>

Welfare Potential by Production System for Broiler Chickens

Level	Example System	Stocking density	Genetics	Enrichment
1 = bad	Cage Production	50 kg/m ²	Fast growth rate breeds – Cobb, or Ross	No enrichment
2 = bad	Standard Production (on floor) Thailand, Brazil, Europe	29 ¹ – 42 kg/m ²	Fast growth rate breeds – (primarily Cobb, Ross or Hendrix crosses)	Deep litter, which is friable enough to allow dust-bathing, and scratching
	Standard Production (on floor) (EU)	33 ² – 42 kg/m ²	Fast growth rate breeds – (primarily Cobb, Ross or Hendrix crosses)	As standard production, and may be with or without natural light, straw bales and perches
3 = better	Higher Welfare Indoor ³	30 kg/m ² or less in house	Intermediate growth rate breeds or fast growth rate breeds with a leg health plan	Natural light, perching, pecking substrates, straw bales
4 = best	Free Range	27.5 kg/m ² in housing and 1 m ² /bird outdoor	Intermediate or slower growth rate breeds	Outdoor access for 1/2 of life, natural cover/woodland and indoors: perching, straw bales
	Organic ⁴	30 kg/m ² inside house plus access to 4 m ² /bird outdoor area	Slow growing breed – Slaughter age 70 days or above	1/3 lifetime with outdoor access and limits on flock size, natural cover/woodland and indoors: perching, straw bales

¹ This is largely dependent on regional climate and ventilation capacity of shed

² As per EU Broiler Directive 33kg/m², Derogation (i) 39kg/m² (ii) 42kg/m². Standard UK (Red Tractor standard) 38kg/m²

³ See

<http://www.rspca.org.uk/servlet/Satellite?blobcol=urlblob&blobheader=application%2Fpdf&blobkey=id&blobtable=RSPCABlob&blobwhere=1158755026986&ssbinary=true> for details; See <http://beterleven.dierenbescherming.nl/> (in Dutch only); See <http://beterleven.dierenbescherming.nl/> (in Dutch only); See <http://cecentralsierra.ucanr.org/files/122130.pdf> for a description of the system requirements

⁴ Requirements vary between organic certification schemes

Source: Compassion in World Farming. 2015. Welfare Potential Matrix – Broilers.

<http://www.compassioninfoodbusiness.com/resources/broiler-chickens/welfare-potential-matrix-broilers/>



10 VALUE CHAIN

The value-chain for any Unilever product extends forwards, through our direct customers to consumers, and backwards to include all our suppliers, and the farmers who supply them directly or indirectly. This section of the Code is concerned with the relationships between farmers and the organisations they supply, with the local economy and through the value chain to Unilever, via our links to both direct and indirect suppliers.

The fortunes of farmers, processors and ultimately Unilever are all linked in the value chain. Many “Good Practices” in this indicator require liaison, co-ordination and flow of information (and, of course, money) among participants in the value chain. The value flow along the chain should be managed to ensure all players, including farmers, are able to capture a reasonable share of the benefit generated because of more sustainable agricultural practices.

The information flow along the chain should also be managed in both directions:

- Farmers, our suppliers, and Unilever - as links in the chain should address complaints and strive for continuous improvement.
- Unilever should also transmit its customers’ needs, inform, and educate suppliers and farmers on requirements of markets and consumers, urging them to produce higher volumes of better quality product for which they receive a fair price.

Farmers, Unilever suppliers and Unilever often participate in several value chains as part of their strategy to manage risks and diversify sources of income. This strategy is important in the face of uncertainties linked to climate, price fluctuations, variations in market size, and pest and disease outbreaks. At the same time, all the organisations involved must also strive to improve the quality and profitability of their own operations and this involves increased professionalism and management of every operation. For farmers, the challenge is to find a good balance between managing risks (usually via diversification of farm activities or customer portfolio) and becoming best in class in a small number of areas or for a limited number of customers.

What is a fair price and a fair contract?

A fair price is one that is agreed on by both the buyer and seller, in return for the provision of raw materials that comply with the required specification and delivered at the agreed time.

We expect the price of agricultural raw materials to have been freely, fairly and equitably agreed between farmers (and/or their representatives) and processing businesses who deal directly with farmers.

In many cases, **contract agreements** on pricing and other aspects of the business relationship are made at the start of a growing season, well-before harvest. These should be based on realistic predictions of yield and quality, taking into account services (such as transport) provided by the processor or farmer, with all parties being aware of the risks if these predictions are not realised.

Such arrangements/contracts should provide mutual benefit and security to both farmers and buyers/processors, preferably by including:

- A clear indication of the price that will be paid to farmers, at different times of year and for differing quality of raw materials where appropriate.
 - If the price is linked to quality, then farmers must be confident that the mechanism for calculating quality is reasonable (E.g. By a visit to the QA laboratory or factory showing how water content, sugar content, broken pieces, etc. are assessed and the value calculated); and
 - If the price is linked to international prices, farmers or their representatives should have access to the data used for calculations, and be confident that the source of data is either in the public domain or from a reputable source;
- Mutual understanding of how and when (I.e. Scheduling) produce will be shipped to the factory, the required conditions for transport, and agreement on who pays the cost of these and/or provides the service;

- Arrangements for payments to be on time and at the agreed price. In some cases, a minimum price will be paid related to delivery, with a “bonus” later, depending on market conditions – all such arrangements need to be agreed. Where a processor has paid for inputs (E.g. Seed, fertiliser and transitional-income in the case of perennials), arrangements for repayment need to be explicit in contracts;
- If, for some reason, there are problems either on farms or in the factory (E.g. Factory breakdowns, crop failure). For smallholders, a contract that helps buffer against climatic, environment or social extremes (in both the short-and longer-terms) (E.g. By providing insurance or an alternative income stream) can be a powerful incentive for the type of long-term relationships that can support investment for more sustainable production;
- The degree of flexibility in the arrangements (E.g. For processors to purchase elsewhere) or for farmers to sell to another market. A contract should be clear about if and when this is acceptable and any penalties that apply. No contract for a specified volume of produce should not punish farmers if they sell excess production elsewhere; and
- Clarity on how complaints will be resolved. All disputes should be resolved using reasonable local mechanisms (E.g. Legitimate, accessible, predictable, equitable, transparent, rights-compatible, a source of learning, and based on engagement and dialogue). If such mechanisms fail, the agreement should ensure that farmers/ suppliers have recourse to the national law, and/or external dispute resolution processes.

A **fair price** should reflect:

- The cost of efficient production, including the short- and long-term investment that farmers must make to produce the raw material sustainably. This may include arrangements for insurance against production shortfalls and poor world prices, etc.;
- The security/risk avoidance provided by the contract between farmers and processors;
- Supply and demand in the market. For some products, this will mean that the pricing system agreed is linked to an international commodity price at the time of purchase and
- An element of profit for the farmer; over time the expectation is that this element should ensure a living income for smallholders.

Our definition of a fair price can result in processors or farmers making a loss in individual years (E.g. In the case of bad weather or oversupply on world markets). We recognise that such losses are particularly difficult for smallholders to manage and therefore that supplier/ farmer contracts that incorporate an element of insurance against losses, making sure that this provision is fully understood, and generally welcomed by farmers, can be particularly important for farmer resilience.

However, in the longer term, fair pricing mechanisms enable farming to remain profitable and for farming families to have a reasonable standard of living according to local norms.

Note that Unilever does buy “Fair Trade” ingredients, but our definition of a “Fair Price” here is not the same as that of the Fair Trade movement.

The balance between specialisation and diversification

We (as Unilever) urge our suppliers to work closely with us and their suppliers (usually farmers), strengthening links along the value chain. We also urge our suppliers – and the farmers who supply them – to think carefully about the balance they wish to maintain between becoming expert, specialised, Unilever suppliers and linking themselves closely into Unilever supply chains – and the advantages of diversification.

Farmers who become too specialised run risks with limited crop rotations, which may increase vulnerabilities to pests and diseases, and limited markets for their products.

On the other hand, it is difficult for farmers to be “experts” in the management of a very wide range of crop and animal activities.

In many parts of the world, farming families and businesses have options to diversify out of farming – for example into rural recreation or tourism, or by renting out redundant farm buildings for other business enterprises. These diversified activities contribute towards the economy and employment in rural communities and enhance community resilience if/when there are problems with the dominant local agriculture.

10.1 VALUE CREATION - PROFITABILITY, YIELD, QUALITY, RESILIENCE

F131	Leading. Decision-making to enhance profitability
There should be a business plan that aims to optimise profitability, taking into account yield, quality, risk and return on investment. The plan should include all stages of the crop cycle from sowing to post-harvest and (for annual crops) considerations of the implications of crop rotation.	
Climate Smart Agriculture	
Both the crop (or other farm product) itself and the farm as a whole should be in profit and have sufficient cash flow for the farmer to have the confidence to invest in improvements and to stay in business.	

Crop, animal production and farm profitability

Both the crop (or other farm product) itself and the farm as a whole should be in profit and have sufficient cash flow for the farmer to have the confidence to invest in improvements and to stay in business.

It would not be ethical for Unilever to demand that its suppliers “prove” they are profitable, by asking to evaluate a farmer or supplier’s accounts in detail. However, we do expect suppliers, processors and farmers to have a good understanding of how different parts of their business affect profitability and the costs and benefits of making changes to their businesses.

Examples include knowing which:

- Vegetables providing the most profit;
- Crops that are grown have the greatest financial risks attached; and
- Farm activities are undertaken to enhance the long-term sustainability of the operation and that may have short-term negative impacts on profitability.

Suppliers may be able to support their farmers by providing insights or information that help farmers establish cost models, and better understanding, of their farms and crops. This includes an understanding of changes that need to be made on farms to comply with the Unilever “Sustainable Agriculture Code”, for example in making improvements to CPP stores, or by creating strips of land along riverbanks where no crops are grown.

Managing risk

For sustainability of supply of our products, Unilever, our suppliers and farmers must be aware of risks associated with the supply chain and mitigation measures.

Farmers should aim to optimise their profit margins at tolerable financial risk. This means that they should not always aim for the highest yield, but should optimise yields, taking into account safety, quality, and sustainable use of inputs, good agricultural practices and costs.

Farmers routinely work with risky production systems – subject to variation in climate, weather, pest and disease pressure and (often) volatility in market size and price for the products they produce. Farming decisions may be based more on minimising risk than on maximising potential profits. We expect that the farmers who grow for our suppliers should have a good understanding of their own businesses from the point of view of balancing risk, yield and profit. In some parts of the world, this will mean that suppliers have a role to play in providing training and insights to farmers or farmer-groups.

Working efficiently and avoiding wasted inputs

For any one crop in any one year, climate, variety and crop management will limit yield. Maximising profitability and reducing the risks of losses requires that inputs are used in such a way that the most expensive inputs are used most efficiently; it is no use applying the fertiliser that will result in the highest yield if the labour is not available at harvest-time. Many resource-use-efficiency criteria have been included elsewhere in the Code (Particularly in the **Agriculture – Crop and Pasture Management, Agriculture – Pest, Disease and Weed Management and Energy and Greenhouse Gas Emissions chapters**).

S39	Expected. Working with farmers
Suppliers are expected to work with farmers and farmer groups to generate opportunities for investment, loans and cost-saving.	
Climate Smart Agriculture	
Given the need for farm profitability, suppliers who buy directly from farmers (in ways that do not intrude unreasonably into the farmers’ businesses) should work with the farmers that supply them, or their representatives to generate opportunities for investment, loans and cost-savings that will facilitate more sustainable and profitable production.	

Given the need for farm profitability, suppliers who buy directly from farmers (in ways that do not intrude unreasonably into the farmers’ businesses) should work with the farmers that supply them, or their representatives, to generate opportunities for investment, loans and cost-savings that will facilitate more sustainable and profitable production.

This will normally therefore take steps to:

- A Help farmers monitor and evaluate local and international market information on crop profit margins and prices in order to ensure that the crops grown are profitable, especially where farmers are smallholders and cannot otherwise gain access to such information;
- B Understand opportunities available to farmers to improve their profit margins, and share this information with farmers (i.e. understand the cost benefit effects of proposed sustainable practices);
This includes:
 - Sharing information on any potential support from governments for improved environmental management on farms.
 - The potential for improved prices and more stable customer relationships arising from consistent high-quality production and the adoption of more sustainable farming practices.
- C Work with farmers and farmer groups to generate opportunities for money saving, and yield or quality improvements; and
Examples of services more available to groups than individual farmers are:
 - Bulk purchasing of seed, seedlings, fertiliser, other inputs and advice.
 - Opportunities for processors to pass on insights into the value chain to their farmers, e.g. on aspects of quality management or business opportunities for new crops or products.
 - Opportunities for farmers to take advantage of processors' insights into the market to develop new products or higher-value products.
 - Opportunities for agronomic and farm management advice and training from outside the farmers processor link in the chain (E.g. Health and safety, good farming practices, integrated pest and disease management, opportunities to benefit from government support schemes, business and accountancy skills, etc.). (See criterion S11 under the **Social Chapter** for information on co-ordination of farmer meetings).

- D Depending on the supply chain involved, customer agronomists or supply managers may be in a position to coordinate information from farmers and suppliers to create useful dialogues with plant breeders, research organisations, innovators and/or regulators or others who will affect the value chain in the future.
Examples of the circumstances where this is particularly useful include:
 - Where there are serious problems with a pest or disease:
 - Are there varieties available that are resistant? Are there varieties being developed that are resistant?
 - Are there insights into the life cycle of the pest that could help reduce pest pressure (E.g. By removing overwintering sites, or by encouraging predators, or by changing the crop cycle)? Moreover, if not, is research needed in this area?
 - Are there alternative CPPs available?
 - Where farmers have found it difficult to comply with the Unilever "Sustainable Agriculture Code" in any particular area, Unilever suppliers or supply management will be able to understand the scale of the problem and help find advice, support or partnerships that can work towards a solution;
 - Access to low-interest loans to farmers;
 - Centrally co-ordinated variety-selection trials; and
 - Drought -tolerant or -resistant varieties.

F132	Expected. Minimising quality deterioration and losses (not livestock)
Harvesting systems must be designed and maintained to achieve high product quality. Field edge storage, transportation times and container filling should be managed well, to prevent losses and quality deterioration.	
Climate Smart Agriculture	
In managing systems to promote the retention of product quality, productivity of yield is secured, benefiting the farm business.	

Loss or damage during the act of harvesting through to the processing of crops contributes to food waste and undermines broader efforts to promote intensification of production and greater food security. Quality losses can affect the nutrient/caloric composition, market acceptability and edibility of a crop, while losses in quantity are incurred in weight or volume.¹ If rejected by a buyer, economic impacts are borne on the farm business, which stand to undermine their operational longevity, placing farmers under financial

¹ http://www.actioncontrelafaim.org/sites/default/files/publications/fichiers/technical_paper_phl_.pdf

constraints. As such, quality is considered a fundamental aspect of sustainability along the agricultural supply chain and must be minimised.

Examples² of deterioration and loss of quality can occur through:

- Harvesting and threshing – Damage to crops from poor handling or technique
- Drying, transport and distribution – Loss of quantity and quality due to spoiling and bruising
- Storage – Attacks by pests and disease, spills, contamination and the drying out of food
- Primary processing – During cleaning, classification and packaging, contamination can occur reducing the quality of material

All stages in crop production on farms have the potential to impact the quality of materials. Harvesting is primarily driven by maturity of crops and weather conditions, when losses can occur if the maturation period is preceded or surpassed; or poor weather during harvesting can undermine operations and increase moisture content of harvested material.

Pre-cooling losses can happen if pre-cooling facilities are absent, in poor working order or if these are not operated correctly. Then during transportation, a lack of refrigeration, poor road infrastructure and inadequate transport systems can affect the quality and quantity of crops. Finally, during storage, facilities, hygiene and monitoring are required to sustain varying periods of storage.

Minimising quality can therefore be achieved by:

- Ensuring that proper tools and equipment with the appropriate training provided to workers when harvesting crops. Mechanised equipment should be selected to avoid injuries to crops like scratches, punctures and bruises. Harvesting during the coolest time of day is ideal.
- Avoiding damage to roots, tubers and skin when digging, harvesting and handling crops, as these provide important protection from bacteria and fungi
- Packing materials so as not to overfill bags and stacking with care will avoid bruising on crops. Containers must be ventilated to limit deterioration and losses to heat
- Transporting material in vehicles with sufficient air circulation to limit heat build-up and housing them in crates,

sacks, containers or baskets that allow for circulation of air

F133	Mandatory. Minimising contamination
Farmers must understand and implement the parts of supplier's Quality requirements (e.g. no-spray windows as part of HACCP plan) that require action on the farm. This will ensure that appropriate animal breeds and crop varieties are used and that contamination with pesticide residues, heavy metals, nutrients, foreign bodies, stones, animal parts, faecal matter or bacteria remains within specification limits.	
Climate Smart Agriculture	
Not applicable	

Maintaining and enhancing food quality and safety

Unilever contracts and specifications require Unilever suppliers to deliver products that are safe to use for their intended purpose and of an agreed quality. It is therefore vitally important that farmers deliver raw materials to the Unilever supplier that conform to these specifications. On occasion, this will mean that supplier's HACCP control points extend into field practices on farm. This can include minimising spray drift onto crops from adjacent fields (not necessarily on the same farm), checks on irrigation water quality (See also **Water Management chapter**) and improving hygiene amongst the workforce (See also **Social chapter**).

One of concerns of customers/consumers is often consistency of product quality. Consistency can be difficult to achieve throughout the growing season. Quality for agricultural raw materials starts in the field, not only in the factory, and quality can be lost anywhere along the value chain between field and factory. Failures in safety or product quality increase the Total Cost of Ownership (TCO) of our product.

Improving consistency may be achieved by:

- A joint strategy between processors and farmers in setting clear product standards;
- Working with Unilever buyers to understand the critical components of quality that the specification sets out to achieve; and
- Developing reliable and consistent benchmarking methods.

² http://www.actioncontrelafaim.org/sites/default/files/publications/fichiers/technical_paper_phl_.pdf

S40	Expected. Minimising contamination
Involve your farmers in your HACCP-based risk assessment for raw materials entering your factory. Consider which risks originating at farmer or field level need to have a control point in your factory. Provide farmers with a list of CPPs they are allowed/ forbidden to use, chosen with regard to legality, market requirements for (lack of) residues and sustainability (specificity, efficacy, toxicity and eco-toxicity).	
Climate Smart Agriculture	
Including farmers ensures that production meets quality specifications of the company, preventing waste of materials that may not comply thereto.	

Unilever suppliers must have a Hazard Analysis Critical Control Point (HACCP) plan for agricultural raw materials (for Unilever's own factories the plan must comply with specific standards).

Suppliers should contact Unilever directly for "Unilever General Requirements, Third Parties, Contract Manufacturers and Suppliers supplying to Unilever Foods, July 2004. Guideline for the Implementation of HACCP in Unilever (internal to Unilever only)".

For more distant and secondary suppliers, for whom HACCP is advisable but not mandatory, excellent advice on implementing HACCP can be obtained from "Codex Basic Hygiene text + Codex HACCP" and the "FAO HACCP Training Handbook"³.

The application of HACCP to agriculture is also described in "HACCP in Agriculture & Horticulture Guideline No. 10" (2nd ed.) 2000 and supplement 4, 2003. Campden & Chorleywood Food Research Association.

Many contamination and quality issues and risks (e.g. CPP contamination, stones, insects, enteric bacteria) arise during agriculture. The HACCP approach should therefore not be confined to factory situations but should extend into the field and agricultural operations. Any HACCP study for food processing must cover inbound raw materials (and therefore agricultural production) to fully understand where Critical Control Points are. Farmers must understand their responsibility.

HACCP is linked to Quality Assurance (QA) and can be used to identify, where cost optimisation opportunities may exist through working in partnership with suppliers using the Total Cost of Ownership (TCO) concept.

The TCO is an estimate of the life-cycle costs of owning a product or asset, and therefore includes the purchase price, any additional costs related to sub-optimal performance, and any additional training or maintenance requirements (for example, increased cost of handling out of specification product; damage to reputation, re-packing or re-cleaning costs incurred by a product recall).

Consideration of TCO results in

- Avoidance of hidden costs;
- clearer specifications; and
- by taking a holistic cost calculation along the value chain from raw material purchase to consumer purchase, it becomes easier to eliminate extra/hidden on-costs linked to reputation (product boycotts) or quality (consumer complaints).

HACCP, QA, TCO are not difficult, complicated or bureaucratic, unless an organisation makes them so. What is necessary is a thorough understanding of the value chain, through every step of agricultural production, including those factors that cause concern to customers (internal and external), consumers and key opinion formers.

HACCP and Agriculture

Stages in a HACCP study extending into agricultural production are:

1 Planning

- 1 Define the terms of reference
- 2 Select the HACCP team (a team might not be required for a small operation)
- 3 Describe the essential product characteristics
- 4 Construct a flow diagram of how the raw material is grown, including seed/transplant/clone production, through harvest to delivery to a Unilever factory.

2 Application

- 1 List all the hazards associated with each process step, conduct a hazard analysis and consider measures to control the identified hazard (HACCP Principle 1)
- 2 Determine Critical Control Points (HACCP Principle 2)
- 3 Establish critical limits for each CCP (HACCP Principle 3)
- 4 Establish a monitoring system for each CCP (HACCP Principle 4)
- 5 Establish a corrective action plan (HACCP Principle 5)
- 6 Establish verification principles (HACCP Principle 6)
- 7 Establish documentation and record keeping (HACCP Principle 7)
- 8 Review the HACCP Plan

³ <http://www.fao.org/docrep/W8088E/W8088E00.htm>

Critical Control Points

A point beyond which no further hazard elimination, removal or reduction to a safe level can occur. This must not be confused with actions, which can reduce the level of hazards.

The HACCP-based plan must extend to farms, following a field-to-fork principle.

Unilever suppliers must ensure they have explained to their farmers their roles and responsibilities in order to comply. The key areas in Unilever's quality assurance policy, underpinned by HACCP, cover both consumer safety and product quality.

Some livestock production systems to which this could apply are:

- For **dairy operations**, clearly the protection of milk is fundamental. Therefore, the use of CPPs in milking areas and milk storage rooms should be restricted to ensure that there is no contamination of milk, e.g. to when there is no active milking activity and no milk in storage. Milking equipment must be protected from contact and contamination; and
- Similarly, for **egg production** the use of CPPs in egg storage and handling rooms should be such that eggs are protected from contamination.

S41	Expected. Traceability
Suppliers must have a system in place to enable traceability back to the farm or field of origin.	
Climate Smart Agriculture	
Not applicable	

The options for ensuring traceability vary considerably with the raw material, supply chain and farming systems used. As an absolute minimum, the expectation is that Unilever suppliers can identify the farms or landscape where the raw materials were produced, in order to minimise the risk of the supply chain being derived from illegally occupied lands. This is important, as such cases can be associated with slavery or deforestation (or other unacceptable practice). Furthermore, it enables supply chain problems (such as unexpected contamination) to be traced quickly back to its origin thereby minimising the size of the problem for both Unilever and the supplier.

Options include:

- Paper-based or electronic systems logging input and output times for materials that can be linked through to the products produced within any specific time period (hours, days, or even annual cycle for wild-harvested material or those that can be stored for a long-time on-farm);
- Barcode-based systems;
- RFID systems/microchips/electronic tagging in different batches of raw materials obviously separated from, or removable from, the product);
- DNA markers; and
- Various other ways of storing and transmitting traceability data and data carrier technologies electronically.

Note that, for animal systems, it is also important for farmers to understand the implications of their source of animal feed, particularly:

- Whether it contains animal-derived ingredients;
- Whether it contains GM (Genetically Modified or GMO) ingredients;
- To ensure that "waiting times" after CPPs have been applied to fodder have been observed.

S42	Expected. Variety and breed selection
If high quality and/or high yielding varieties/breeds are preferable or required for Unilever products, or if varieties/breeds vary in pest, disease or drought resistance, then suppliers must regularly test varieties, or update their own awareness in order to recommend, specify or supply materials for the use.	
Climate Smart Agriculture	
The highest quality product can only be produced if high quality varieties are used, which are constantly reviewed for performance. This means that our suppliers and we must regularly test or update awareness of varietal developments in specifications for quality, pest and disease resistance and yield improvements, and recommend, specify or supply the seed or seedlings for farmers to plant.	

There is scope for conflict here because Unilever, processors and farmers have different requirements and priorities for their crops and animal production systems. We must aim to achieve a sensible outcome for all the actors involved, and this will sometimes mean compromise.

Firstly, it is the responsibility of Unilever to define (in our specification) as closely as possible the product we need, without placing unrealistic or unsustainable demands on our suppliers. It is possible for our specifications to be "out of date" in relation (for example) to the variety of crop specified or certain quality characteristics, and we certainly do NOT want our suppliers and farmers to be forced to grow older, disease-susceptible, low-yielding varieties if

better, modern varieties still produce the quality we need. However, the people who write the specifications or use them to buy raw materials are unlikely to be up-to-date with which varieties are available, in different seasons and in different parts of the world. This is an area where regular dialogue among all the parties involved along the value chain, can help define the best outcome for all the organisations and stakeholders involved.

Suppliers may also be able to reduce the risk of pest and disease attack on farms by recommending a range of varieties of some crops (with the varieties derived from as wide a genetic base as practical), in order to avoid genetically uniform crops being planted across large areas.

S43	Leading. Incentives for high quality
If quality of raw material makes a significant difference to profitability, Unilever suppliers should provide incentives for farmers to deliver high quality produce to the processing plant.	
Climate Smart Agriculture	
By incentivising farmers to produce quality materials, then productivity should benefit and resilience of the farm business is encouraged.	

It is in nobody's interests for payment terms or delivery schedules to encourage perverse practices – for example by:

- Paying by weight for irrigated vegetables, where it is the dry matter content that is important and “last-minute watering” only adds costs and energy consumption at the processing stage; or
- Only collecting crop at infrequent intervals, where quality deteriorates quickly after harvest

10.2 INPUT QUALITY ASSURANCE

F134	Expected. Medicines and veterinary medicines
Medicines and veterinary medicines must be stored according to manufacturer's instructions and recommendations; this may require some medicines and vaccines being stored in refrigerated facilities.	
Climate Smart Agriculture	
Not applicable	

Recognising the health and safety risks associated with bulks storage and specific disposal requirements for products exceeding their shelf-life are two important factors to consider when planning to house medicines.

The Smallholder Series⁴ provides a 9 point checklist to promote safety and meet legal requirements:

TABLE 37: CHECKLIST FOR THE SAFE STORAGE OF MEDICINES
1. Keep medicines in a designated and secure storage unit that prevents access by unauthorized persons and animals.
2. Separate medicines from associated equipment like needles, syringes and dosing guns.
3. Follow instructions on the product label or those of a qualified professional. Where refrigeration is needed, do not store with food or drink, and ensure this is secure from unauthorized access.
4. For small quantities, storage can be done by using a container, while larger quantities should be stored in a designated area or room.
5. Storage facilities should be sturdy to withstand damage and fireproof for at least 30 minutes where possible.
6. Containment of leaked or spilled liquids should be provided to match the capacity of products stored.
7. Warning signs and information must be clearly visible around storage facilities, such as the standard hazard warning sign (a black exclamation mark).
8. Preferably, the store should not be located in a staff room, office or animal feed store, nor in domestic areas or food stores.
9. Keep the store locked unless medicines are being accessed.

Following use of application equipment, disposal components like needles and syringes are to be disposed of according to legal requirements of the country. Usually this entails a designated purpose-made container held until such time that suitable disposal can be made.

⁴ http://www.smallholderseries.co.uk/index.php?option=com_content&view=article&id=599:storing-veterinary-medicines-safely-on-the-farm-hse&catid=22&Itemid=141

F135	Expected. Avoiding fraud by only purchasing materials in their original containers
CPPs, medicines and veterinary products must be purchased only from approved or industry recognised vendors who have appropriate storage and delivery facilities. Records showing location and contact details of vendor must be kept. CPPs, medicines and veterinary products must be purchased in the manufacturers original containers or packaging (which have not had seals tampered with) with the original label, with all the details of the label legible.	
Climate Smart Agriculture	
Not applicable	

Counterfeit and contaminated drugs and agrochemicals are sold worldwide, and are a particular problem in some developing countries. Such inputs may not only be a waste of money and prove ineffectual, but can actually cause harm.

To reduce these risks, all agrochemicals and drugs must be purchased in the manufacturers' original containers or packaging (which have not had seals tampered with and are not leaking) with the original label in a relevant language, with all details on the label legible. This not only reduces the risk of counterfeit, contaminated or stolen agrochemicals being used, but also ensures that hazard information in the label is retained

Agrochemicals must only be purchased or supplied by nationally approved or industry-recognised vendors, who supply products of known active ingredient quality or nutrient content in the proprietary containers, with appropriate storage and delivery facilities. Details of agrochemical vendors used by the farmer must be recorded giving business and agrochemical storage location and up-to-date contact details.

It may be an offence to buy and sell agrochemicals yourself. For example, in the UK, ammonium nitrate fertiliser needs to be sold by a vendor with a detonation resistance certificate because of the risk of creating explosions.

F136	Expected. Animal feed safety and nutritional value <i>(animal husbandry only)</i>
CPPs, medicines and veterinary products must be purchased only from approved or industry recognised vendors who have appropriate storage and delivery facilities. Records showing location and contact details of vendor must be kept. CPPs, medicines and veterinary products must be purchased in the manufacturers original containers or packaging (which have not had seals tampered with) with the original label, with all the details of the label legible.	
Climate Smart Agriculture	
Not applicable	

Feed quality assurance

Poor quality feed is unlikely to provide good, or reliable, animal nutrition. One way in which to be confident that purchased feed is of good quality is to purchase from a reputable vendor. In many countries, for example those in the European Union, this is regulated by law. Here, all vendors of animal feed must be registered or approved and have traceability procedures in place.

Feed contaminated with aflatoxins and dioxins must not be fed to animals

Aflatoxins and dioxins in feed can cause serious problems as the aflatoxins can pass into the finished product. In an ideal world, all feed would be tested for aflatoxins and dioxin before use, but as a minimum, testing for these hazardous substances should be done based on a risk assessment of feed constituents that pose a high risk of contamination. For example; aflatoxins should be tested where raw materials come from tropical areas and dioxins where raw material production is situated close to incineration sites (note that dioxin contamination can also mean that grazing or harvesting is not possible in certain parts of the world). If testing of feed is not possible, the testing of meat and milk for aflatoxins and dioxin levels must be done before purchase by Unilever.

10.3 SUSTAINABLY PRODUCED INPUTS

This is a new section within the 2017 Code, as expectations of managing sustainable production all along the value chain have risen.

F137	Expected. Fuel wood, firewood, pallets and crates
Use fuel wood, firewood, wood crates and pallets from a sustainable source.	
Climate Smart Agriculture	
In sourcing wood from sustainable sources, value chains that receive wood from deforestation practices are not supported, thus reducing associated indirect emissions.	

It is clear that a great deal of deforestation – and particularly illegal deforestation – underlies value chains where fuelwood, firewood and other wood products enter the market.

Farms and processing facilities that use large volumes of wood products.

For example as fuel or as pallets – must demonstrate that they have made efforts to ensure that their supplies come from legal, and preferably sustainable, sources. Examples of the types of assurance that can be expected include:

- **Species.** If fuelwood is from Eucalyptus species, it cannot have been extracted illegally from native forest (except, obviously, in Australasia). Shipments of wood derived from rubber trees may also be presumed to have come from rubber production systems when old trees were being replaced;
- **Documentation.** A certificate of origin should accompany purchased wood from native tree species from the Forestry Department or other reputable source that shows that the wood was produced and harvested legally. [In general, large amounts of native tree species wood is only available legally as a result of mining, dams or other large-scale civil engineering project.];
- **Certification.** FSC or PEFC (or sometimes another local certification system) – certified wood;
- **Produced on the farm itself.** If the wood is produced on the farm, the production system should ensure that the total forest cover is not diminished by forestry operations in the long term; and
- **Produced locally** (and checked). The farmer (or Unilever supplier acting on behalf of farmers) should be able to verify that the wood was produced sustainably and encourage sustainable forestry operations in the area.

F138	Expected. Horticultural use of peat
If no alternative to peat is available, attempts must be made to minimise the use of peat as a horticultural substrate (e.g. for tomato seedlings), by reducing the volume of soil required or mixing peat into other substrates. If peat is used, attempts must be made to document the source of the peat and ascertain that peat extraction was undertaken legally and did not involve the destruction of high conservation value ecosystems.	
Climate Smart Agriculture	
Peat use is a major threat to many peat-based ecosystems and associated rare species, and its use in horticulture (which inevitably involves the draining of bogs and the oxidation of large volumes of organic matter) also leads to the emission of greenhouse gases.	

Peat is the dominant growing media for horticulture in many parts of the world. However, its use is a major threat to many peat-based ecosystems and associated rare species, and its use in horticulture (which inevitably involves the draining of bogs and the oxidation of large volumes of organic matter) also leads to the emission of greenhouse gases.

Some Unilever crops are grown from seedlings that are produced in large numbers in horticultural operations that use a great deal of peat. We are asking farmers – or Unilever suppliers on their behalf – to be part of a movement to reduce the use of peat as a horticultural substrate. This will not be easy as many professionals argue that no substrate has yet been developed that performs as well as peat.

An important part of the problem is undoubtedly that peat is a cheap and reliable growing medium and that the substitutes available for peat often have a bad reputation for quality a wide variety of raw materials have been used to create the compost used for peat-substitutes. Progress will therefore be made by reducing the total amount of peat-based substrate used by either:

- reducing the size of the “plug” used for each seedling; or
- by mixing other media in with the peat.

If peat is used, attempts must be made to document the source of the peat and ascertain that peat extraction was undertaken legally and did not involve the destruction of high conservation value ecosystems.

Certification systems and assurance systems are also being developed for peat and peat-substitutes (e.g. coir). We encourage the use of certified peat as part of the improvement programme that peat-using businesses must develop.

F139	Expected. Livestock feed (Livestock only)
Farms using livestock feed must have a commitment to sustainable feed. Examples will include, purchasing from suppliers who are committed to using RTRS certified soy meal.	
Climate Smart Agriculture	
In so doing, underlying farming practices, which do not promote responsible production, processing and trading of soy, and which contribute more to emissions, are not supported.	

Purchased feed must come from traceable sources and there must be no reason to believe that feed ingredients are derived from production systems with strong links to deforestation, slavery and child labour.

We expect that our suppliers have a strategy in place to convert the feed supply chain within three years for soy and palm (for example by choosing for book and claim soy and palm derived feed),

We expect farmers to start to use more sustainably produced feed when this is available on the local market at a price roughly comparable with alternatives.

10.4 RESPONSIBLE FARM MANAGEMENT

F140	Expected. Store construction
Stores for hazardous or unpleasant materials (including CPPs, human and veterinary medicines, fuel, potentially explosive fertilisers, manure, flammable waste etc.) must be constructed of suitable materials, kept secure, dry and well ventilated.	
Climate Smart Agriculture	
Not applicable	

For all farmers, including smallholders, it is completely unacceptable for CPPs or spraying equipment to be stored in kitchens, bedrooms, living areas or food stores.

General principles of store construction

On many farms, old buildings are used as stores. Old buildings should be checked to ensure they are structurally safe; unsafe buildings are a particular problem for long-term fertiliser stores because stacks of sacks may have slumped against the walls. Furthermore, where fertiliser has been allowed to get wet or create fumes (a particular problem for urea and manure), the structure of the fertiliser store may have been compromised by water and fumes.

Agrochemical stores should be made of non-combustible material. Stores should be dry. The roof, walls and floor should be impermeable (for CPPs this is essential) and the roof should not leak in heavy rain. This will ensure that agrochemicals are not damaged by water and that labels do not become unreadable. It is good practice to raise the lower layer of agrochemicals off the floor to ensure that they do not become wet at times of high condensation. Stores should be secure but well ventilated to prevent the build-up of noxious or hazardous fumes (see also the Health and Safety Section related to confined space entry).

Temporary stores

Temporary stores – for example piles of manure or sacks of fertiliser awaiting use – should be securely tied down, under waterproof covering and preferably off the ground (“fully sheeted”) to discourage theft, runoff and pollution. If fertiliser must be stored outside, it should be and regularly checked to ensure that the stack has not been tampered with.

Crop Protection Products Stores

There are many options for the design of the CPP store, depending on the type of farm and amount of CPP products being stored. However, CPPs **always** need to be stored in a labelled, separate, well-ventilated box, cupboard, room or building, used only for CPPs.

Small CPP stores

For smallholder farmers, options for the secure storage of small amounts of CPP (for example, when the total volume does not exceed a few litres) include:

- A padlocked shed;
- A well-defined, separate part of a padlocked shed outside; and
- Small secure boxes, of similar design to a chicken coop.

Elsewhere, several smallholders who trust each other can share the costs and management of joint storage.

On smaller farms, or those using few CPP products or only storing them for a short time, smaller CPP stores can be created by converting old tanks, or by using plastic or metal boxes. For example, a hole can be cut in the side of a cleaned old tank (but not all the way to the bottom of the tank, because the bottom becomes the spill-containment area) and shelves inserted. In some parts of the world old, broken fridges are available, and can be padlocked to make small secure stores.

For smallholders with only a few litres of CPP to store, one option is to put all the bottles in a plastic bucket or tub within a secure shed or box. Bottles and boxes of CPPs must always be stored in such a way that any spills are contained.

A store of any type should be designed to contain 120% of all contents contained.

The container /store should be marked with signs that clearly identify the chemical store and explaining the dangers, limitations on access and precautions needed (this is covered by criterion 141).

Large CPP stores

For larger CPP stores, there should be a lobby area where PPE is kept for the storekeeper and where the storekeeper can change out of normal clothes and put on PPE without cross contaminating their domestic clothes.

The following points apply:

- Washing facilities should be available here for workers to clean themselves in case of spillage and at the end of the day's work;
- There should also be a small first aid kit available, including an eyewash bottle;
- There should be an appropriate fire extinguisher (suitable for chemicals) and spill kits. Good practice is to mount the extinguisher just outside the store, but if this is not practical it must be near the door on the inside. The storekeeper should be trained in how to use it;
- The lobby area should not be cluttered, and allow the storekeeper to escape easily in case of fire;
- Eating, drinking and smoking should not be allowed in the store or the lobby area; and
- The store door should be clearly marked to indicate that the contents are inflammable and/or toxic, and that entry is restricted to trained personnel (this is covered by criterion 141).

General considerations

General and detailed information on how to design, build and position a suitable CPP store can be found in the FAO "Guide on Pesticide Storage and Stock Control" - Pesticide Storage and Stock Control Manual (1996), FAO Pesticide Disposal Series⁵

The Sustainable Agriculture Network standard also lays out specifications for Pesticide Stores.⁶

In addition, there may be legal requirements regarding the design of your CPP store, depending on the country in which you are based. This should also be checked.

⁵ <http://www.fao.org/docrep/V8966E/V8966E00.htm>

⁶ Sustainable Agriculture Network, Sustainable Agriculture Standard, Feb 2008 http://www.rainforest-alliance.org/agriculture/documents/SAN_Sustainable_Agriculture_Standard_%20February2008.pdf

CPP stores

For most stores (and certainly for larger farms and plantations), where separate rooms or sheds are used for storage, the following applies:

- The CPP store should have its **own separate entrance**, only used by trained people;
- The store itself should have a minimum internal **height** of 3 metres;
- The **floors should be solid** (E.g. Concrete), smooth (but not slippery) and not cracked or damaged. Usually, the solid floor will be built up around the edges and across the threshold by around 15 cm (6") to create a retention wall ("bund"), which ensures containment (i.e. not allow to leak outside) for at least 120% of the total;
- The volume of product stored inside, if made of solid material (such as brick on concrete), should have a retention wall across the threshold. Ideally, the floor should slope so that spills and wash-downs can be collected;
- The room should be **well ventilated**. As guidance, if there is only natural ventilation, then 20% of the floor area should be left open (i.e. covered with mesh or bars to be secure, but allowing free circulation of air). The store should not smell strongly of the chemicals stored. Forced ventilation (E.g. Fans running on timers) may be needed if natural ventilation cannot be achieved;
- CPPs should not be stored on the floor. Shelving reduces the risk of damage by damp or rodents, and of contamination in the case of spillage. The shelves should be impermeable (i.e. they should not absorb chemical spills), and so metal or plastic shelving is preferable. If wooden shelves are used, they must be fully covered by plastic sheeting. The shelves should be labelled. Ideally, the shelves should be freestanding so that spills do not contaminate walls. All shelving should be strong enough to take the weight of the CPPs without bending, buckling or wobbling;
- Liquids should be stored on lower shelves and powders on upper shelves. This is to reduce the risks of contamination because of spillage;
- Boxes of chemicals should not be stacked on top of each other. This is because the lower boxes can be crushed and damaged, and because it makes first in-first out stock control more difficult;
- It is good practice to remove containers from the boxes and store them individually. This is so that any damage can be spotted more easily and to reduce the risk of containers being stored the wrong way up;
- Chemicals should be stored in their original containers only. In far too many cases, CPPs are decanted into other containers, the labels fall off and/or nobody can remem-

ber what is in the bottle. It is then useless AND hazardous;

- The store should be well lit – at least well enough to read labels easily. This can often be by natural light most of the time, if there is a large area open to the outside of the store for ventilation; and
- If there is decanting or mixing of CPPs inside the store this should be done on a separate spill collection tray.

Veterinary medicine stores

Veterinary medicines must be stored in secure facilities, which are locked to prevent access by unauthorised people or children, with a record of all medicines kept in the store, and they must not be stored with agrochemicals or fuels. Medicines must be stored according to manufacturer's instructions and recommendations; this may require some vaccines being stored in refrigerated facilities, which must also comply with the above requirements

Security and Access

Unauthorised people should not have access to CPP, fertiliser, medicine or fuel stores.

The level and type of security required obviously depends on the risks associated with the type of material (toxic, explosive, polluting), the amount of material being stored and the local environment (risk of theft, flood, earthquakes, etc.).

Because of the threat of terrorism and use of CPPs for murder/suicide and fertilisers to make explosives, there are often regulatory requirements and guidance on security of storage of both CPPs and fertilisers. Guidance may also be available such as the UK government '10-point plan' for Secure Fertiliser Storage.⁷

Good practice also includes, not leaving CPPs (including tank mixes) or bags of fertiliser in the field overnight. In some countries, fertilisers are sold in bulk directly to farmers and loaded on trailers or directly into the spreader or sprayer. In this case, fertilisers should be used immediately. Where there is no choice but to keep fertilisers or CPPs on trailers or in spreaders/sprayer this must be limited to a short period (e.g. overnight), they must be protected against rain and all necessary precautions must be taken to avoid risks to environment and people.

⁷ <http://www.secureyourfertiliser.gov.uk>

F141	Expected. Store Location
Hazardous material stores must be located where they minimise risks and offense to people and the environment during normal use and in foreseeable emergencies. This includes having separate stores for different hazardous materials (including CPP-contaminated PPE), waste, and ensuring that manure storage areas (stockpiles) are not located where leachate or unusually heavy rain will result in polluting water or environments of value for biodiversity, leisure or cultural activities.	
Climate Smart Agriculture	
Not applicable	

The location of stores – especially CPP stores - is very important, and is one area where unsatisfactory arrangements have been found on many farms.

Siting

General considerations for siting of stores is as follows:

- The CPP store should be at least 10m away from housing, offices, clinics, schools, food stores and other domestic areas where children play, pregnant or nursing women may be staying and where food is either stored or prepared. It is not acceptable for the CPP store to be divided from such areas within a building merely by an internal partition. This is to avoid risks to human health in case of spills, fumes or seepage;
- Agrochemical stores should be at least 10 metres away from flammable or combustible solids or liquids. This is because of the increased risks in case of fire or accidents when such stores are combined, especially if untrained people gain access to the CPP store;
- Agrochemical stores should never be located next to water supplies (for example in a building above the farm well), on riverbanks or in areas liable to flood, or where spillage would result in water contamination;
- It is good practice for agrochemical stores to be at least 10m from the property boundary, or any public road or footpath;
- There may also be local factors that affect where best to locate a store, E.g. Risks of vandalism, theft, wild fires, flooding, extremely high (or low) temperature;
- CPP stores should be protected from freezing and high air temperature (>30°C). In cold climates, if the store is an unheated building, one suggestion for storing relatively low volumes of CPPs or medicines is to construct an insulated box and use light bulbs to keep the temperature above freezing; and
- Composts and Manures, and general domestic waste should be stored in locations where smells, flies, vermin or effluent will not be unpleasant for the local community or pollute watercourses.

Separation of stores

Separation of stores of hazardous substances (fertilisers, CPPs, medicines, fuel, waste) is important. The appropriate separation mechanisms and distances obviously need to take the scale of the farming operation and the type and maximum amount of hazardous substances stored into account. CPP, medicine and fertiliser stores, should not be combined with (or located above or just to one side of a thin partition wall from) each other, fuel, oil, grease, or waste stores.

The following examples are meant to provide guidance on the options available:

• Large farming cooperative central store / large plantation or farm

Large organisations will be expected to have well-constructed separate stores for all hazardous substances. Ideally all stores should be in separate buildings, well away from (preferably >50m, and certainly >10m) schools, clinics, food stores, offices or housing.

If stores are in a central location, they should have separate entrances, each clearly labelled to show what materials it contains and the hazards they present. The separate stores should be divided from each other internally, so that the risks of all stored materials are not compounded in the case of e.g. fire. The escape route from each store should NOT involve being exposed to hazards from another store. Each store should only allow authorised, suitably trained people to enter.

Medium sized operation

As above – but where the volumes of materials are very low, separation may be achieved by using separate areas within the same room. Where compromises must be made, it is very important to minimise the risks associated with mixing materials in one store

The **used CPP container store** should ideally be a completely separate store from all other material stores. However, if there are low volumes of waste (for example if you only have 2 or 3 ex-CPP containers, each of less than 5 litres) and severe constraints on space, then a specified, labelled corner of a general or CPP secure store is a reasonable storage option.

- it is probably better to store CPP container waste in the same store as potentially-contaminated PPE, backpack sprayers and/or CPPs than to combine CPP-contaminated container waste with other hazardous waste materials or store with other materials, because

then only pesticide-trained people will have access to the storage area;

- In this case, the areas set aside for different uses must be clearly designated within the CPP store, access must be limited to trained personnel and the CPP store must not be used for any other materials other than those associated with CPP use.

Smallholders

Smallholders may have very few options for secure storage, and it may be very impractical to have separate secure storage sheds for fertilisers, CPPs, PPE and waste. In the case of very small volumes of such substances on smallholder farms (E.g. One or two sacks of fertiliser and a couple of bottles of herbicide) shared storage buildings are acceptable. Nevertheless, the different substances should be stored as far as possible from each other, preferably inside secondary containment (E.g. A separate plastic bucket and lid or cabinet for the CPPs) and never with food-stuffs, packaging that will be used for food, or items that children come into contact with.

Groups of smallholder farmers are encouraged to get together to create separate stores for different materials and share costs.

Temporary fertiliser and manure stores

Even temporary stores should not be where there is significant risk of flooding

Temporary stores of fertiliser in fields (e.g. stored overnight for spreading the next day) should not be stored near to, or visible from, public roads.

F142	Expected. Store labelling
Stores of hazardous materials must be clearly labelled to identify contents and to take action in case of emergencies.	
Climate Smart Agriculture	
Not applicable	

Hazardous materials (E.g. Crop Protection Products) stores

The container or entrance should be marked with signs that can clearly be seen 20 metres away, clearly identifying the chemical store and explaining the dangers, limitations on access and precautions needed. For example “Chemical Store – Keep Out - No Smoking. Contents are toxic and inflammable. Only trained personnel allowed entry”. In many countries, this is a legal requirement. Workers must be able to understand the signs (i.e. signs in the local language or language used by workers or clearly understood pictograms, and/or they must have received training in what the signs mean).

Action to be taken in the case of emergency should also be clearly visible and/or well understood by all worker, contractors, delivery vehicle drivers and farmers family members who spend a significant amount of time in the vicinity of the store. For example “In case of fire, evacuate the area, call the fire service, inform fire service that there are hazardous materials in the store”.

F143	Expected. Store records
A record of all agrochemicals (CPPs and fertilisers) and medicines in each store must be kept outside the store for use by authorities in case of fire, theft or natural disaster, and in order to provide evidence of CPPs used and stored	
Climate Smart Agriculture	
Not applicable	

This includes:

- Retaining all CPP, fertiliser and fuel delivery notes;
- Carrying out regular, frequent stock checks;
- Reporting any unexplained stock discrepancy or loss/theft to the police **immediately**;
- Using stock on a first-in first-out basis to maintain quality and reduce risks of them becoming out-of-date or obsolete;
 - For fertilisers, this will usually affect the stacking arrangement and make it necessary to have several “sub stacks”;
 - For CPPs, it is good practice is to date every container when it is received into the store and put onto the record sheet. If CPPs are stored between 5 and 30° C, then a “normal” shelf life should be at least 2 years.

Contact the manufacturer if in doubt about whether a product is still “in date”;

- Checking CPPs to ensure that they have not become illegal or banned under any quality-control or certification system in place. If illegal or “banned pesticides” are found in the store:
 - Try to get suppliers to take them away; or
 - Inform the buyers of your produce and ask them for advice. In remote parts of the world, the best option may be to use the product, rather than risk unsafe disposal – but this is not acceptable if it poses high risks to people, the environment or product quality;
- Regularly checking containers to make sure they are not leaking and that the contents are not out of date.

Once containers have been opened, it is good practice to identify the “current” product being used to ensure that two containers are not open at the same time. Powders sometimes “cake” if they become damp after containers have been opened, so secondary containment may be necessary



11 CONTINUOUS IMPROVEMENT (INCLUDING METRICS)

This chapter brings together two important components for generating improvement;

- Training and
- Monitoring and reporting.

Training

Training for farmers (including smallholders) and farm workers is critical for making long-term improvements in many aspects of sustainable production. Whereas farming is understood to be a highly technical business in many countries, requiring farmers and workers to exhibit expertise in a very wide range of disciplines, elsewhere (particularly for smallholders) it is possible for farmers and workers to have no specific training or understanding before taking up farming.

The aim of this section is to ensure that farmers and workers have sufficient training to:

- Abide by the law;
- Ensure farmers and workers are able to comply with the Code (and other sustainability assessments);
- Ensure farmers and workers are able to keep themselves and others on the farm safe. This means, for example, that farmers and workers must be trained in the dangers of CPPs (pesticides) and how to protect themselves, their families, others on the farm and the environment. In many countries, regular training is a legal requirement for all pesticide workers; by making a demand for training part of SAC2017, Unilever is promoting safer practices worldwide; and
- Empower people to adopt better practices by increasing their knowledge.

The aim is to ensure that all required training takes place within 2 years of first assessment, and that training is kept up to date (E.g. New workers are trained and regular re-training is provided where necessary).

Readers interested in guidance on group formation and the value of farmer Field School approach for training are referred to criterion S11 of the **Social chapter**.

11.1 GENERAL

F144	Expected. Training plan
	There must be a training plan, ensuring that all legally required training is kept up to date and that all relevant farmers and workers are trained in all areas of SAC within 2 years of the first assessment. Thereafter, training must continue, in order to retain and revise skills and bring in new farmers and workers. Training can be in any format such as E-learning, group events or one-to-one advice sessions. This includes ensuring that women and men farmers and workers have equal access to all supplier and farm-supported education and training programmes, including literacy classes, vocational and information technology training. Not applicable to individual smallholder farmers.
	Climate Smart Agriculture
	Not applicable

Although it is a farm level requirement that all farmers and workers are trained, it will often be convenient for Unilever suppliers to take on a coordination role, especially where and regular re-training is provided where necessary.

The training plan must include proposed topics for training, timing and methods of delivery. Where special arrangements have to be made to accommodate particular groups of people, (e.g. women with domestic responsibilities, farmers in remote locations or with no internet access, workers who do not speak the local language) this should be noted.

Training needs to be arranged so that female farmers and workers are able to attend - this usually means that training must take place during working hours, but may also mean that transport and/or childcare need to be provided. In some cultures, it may be necessary to provide separate training for women and men.

Attendance issues

If training is a legal requirement, or is mandatory in SAC2017, the relevant farmer or worker must have attended (barring *force majeure* such as a family bereavement).

If attendance for other types of training is low, then the format or timing of the training requires to be re-thought out. Could the training be delivered by another method (e.g. internet course)? Are people unable to attend because of domestic responsibilities or transport difficulties (i.e. would crèche, transport or re-timing the event help)? Is the training on offer not attractive enough and so would be better combined with another type of meeting or event that most of the farmers attend? Is there a need to supplement a group-training event with one-to-one training to reach those unable to attend? The aim must be for the required training to reach all the relevant farmers and workers within a reasonable time-scale, which will usually be a 3-year rolling training-retraining cycle.

F145	Expected. Training records
Training records must be retained, with the trainee information disaggregated by gender. Not applicable to individual small-holder farmers.	
Climate Smart Agriculture	
Not applicable	

Records

Records to be retained for at least 2 years, so that the commitment to training all farmers and workers within a 2 –year period can be demonstrated.

Gender

Why do we need the training records to show the gender of those who have been trained? It is an unfortunate fact that men are often trained, but it is women who then have to do the work. If this happens, then not only are the wrong people being trained (and money is being wasted), but opportunities for empowering women are also being wasted.

Unilever needs these data to be able to demonstrate our commitment to improvements in the professionalism and training in our supply chains, and as evidence of the commitment of those working in our supply chains to promote gender equity.

F146	Mandatory. Training in handling and applying CPPs
All farmers, workers and contractors who manage or are exposed to CPPs shall have received appropriate training. This includes equipment handling and maintenance, procedures and PPE for minimising exposure of the operators, bystanders, the environment and non-target areas, and the value of correct application methodology to ensure efficacy. Not applicable if no CPPs/pesticides used.	
Climate Smart Agriculture	
CPPs that do not reach their intended target cause waste, pollution, and reduced productivity. Training in how to use CPPs properly prevents waste, ensures the most is made of inputs, and optimises productivity.	

We are making the receipt of appropriate training BEFORE working with CPPs a requirement for compliance with SAC2017.

This is a regulatory requirement in many countries. Where the government farmers do not mandate it and/or farm manager shall make sure that all workers are trained. If the farmer or farm manager is not competent to provide training, then external training must be procured; a Unilever supplier on behalf of all the farmers in a group may do this.

F147	Mandatory. Biodigesters, manure pits, effluent ponds
All farmers, workers and contractors who manage or come into contact with enclosed spaces where hazardous gases can accumulate, shall have received appropriate training. This includes equipment handling and maintenance, procedures and use of PPE (including respirators - which must be provided) for minimising exposure and ensuring rescue is possible in case of problems. Training on recognising the hazards of effluent ponds (drowning, suffocating gases) and procedures to minimise risk shall also be provided if there are effluent ponds on-farm. Not applicable if no relevant facilities are present on the farm. Not applicable to individual smallholders as unlikely to have these dangers on the farm.	
Climate Smart Agriculture	
Not applicable	

Drowning or suffocation in bio-digesters, manure pits, effluent ponds, grain silos and other water bodies or confined spaces kills an appalling number of people every year on farms. All too often workers work alone in dangerous places, and safety rules are not understood or flouted. Sadly, workers who have been ordered to (or have naively chosen to) work in enclosed spaces have succumbed to fumes, and then the people trying to rescue them have also died.

We require safety training – and good safety procedures – for all facilities with bio-digesters, manure pits, effluent ponds or similar on their premises. Anyone who has access to such areas need to have received basic training in safety procedures – varying from “never go through that door” to detailed procedural training involving buddy systems and using respirators where applicable. For more detail on aspects involved, see criterion F99 of the **Social chapter**.

Minimising greenhouse gas emissions (E.g. From effluent ponds, biodigesters, etc.), may be covered in either this training or combined with the energy efficiency training (criterion 151).

F148	Mandatory. Nutrients
Farmers, or agronomy advisors who make decisions about fertiliser choice, source, application rate and placement must be trained in making calculations based around soil and crop characteristics and managing the risk of losses of N and P to the environment from different types of nutrients and application methods (e.g. to reduce volatilisation losses). All farmers and workers who apply fertilisers must be trained in the procedures and PPE to use to minimise risks to themselves and the environment, and any machinery calibrations and maintenance appropriate.	
Climate Smart Agriculture	
As detailed in 1.1, discriminate and timed nutrient provisioning to meet crop-specific needs increases productivity; strengthens ecosystem resilience by reducing the likelihood of nitrate leaching thus securing soil integrity; and lowers GHG emissions ⁹ . Training is important in enabling the optimal use of fertilisers.	

Minimising greenhouse gas emissions from Nitrogen-based fertilisers (E.g. Urea, NPK, manures etc.) may be covered in either this training or combined with the energy efficiency training (See criterion 150)

- 1 The person who makes the decision about which how and when to apply nutrients to the land needs to be competent. This is necessary in order to optimise production and maximise long-term profit, as well as minimising wastage and pollution. Specific training may be required. In many countries there are approved training course for those advising on the Nutrient management Plan, such as FACTS ([Fertiliser Certification and Training Scheme](#)) in the UK.

Evidence of general training (e.g. agricultural or agronomy degree or diploma) is good evidence of training, “competent” individuals or organisations may not have such a background. Under such circumstances, an auditor may ask a farmer to show how calculations are made.

- 2 Farmers and workers who apply fertilisers need to be able to protect themselves from harm. This requires not only that correct PPE is supplied, but also that workers are trained to use it and to understand the benefits of using it.

F149	Expected. Soils
Training to include managing locally relevant risks of soil loss and degradation (erosion, loss of structure, compaction, contamination, loss of soil Organic Matter), and associated tests, assays and management systems appropriate for preventing or correcting problems.	
Climate Smart Agriculture	
Good soil management increases productivity and maximises the efficient use of inputs, most of which are associated with GHG emissions. Training in soil management is important in encouraging the best use of soil management techniques.	

At least one decision-maker on each farm should be trained in soil management, unless the supplier or other agronomy service provider takes on this role. The risks identified in criterion 26 should be the priority.

F150	Expected. Halting deforestation, biodiversity and ecosystem services
Training must include requirement to halt deforestation - including encroachment into forested areas by farming. Also included will be any training required for farmers to be able to commit to action under their Biodiversity Action Plan.	
Climate Smart Agriculture	
As detailed in F56, forests harbour an estimated two thirds of all terrestrial species, and an intricate variety of ecological processes. Aside from their significant contribution to global biodiversity in plants and animals, forests also serve as carbon sinks, capturing massive quantities of carbon dioxide and retaining this in organic matter. In this regard, forests constitute the largest terrestrial store of carbon, deducing why deforestation ranks as the 3 rd largest source of greenhouse gas emissions globally (15%). Training in this regard should reduce overall deforestation.	

All farmers, workers and contractors on farms must have been informed that:

- No trees can be removed without explicit instructions, and then only after farm management has evaluated the proposed felling and confirmed that it:
 - Does not amount to deforestation (See criteria 56 of the **Biodiversity and Ecosystem Services chapter**); and
 - Is in accordance with the farm Biodiversity Action Plan (See criteria 58 of the **Biodiversity and Ecosystem Services chapter**);
- No changes in land use are made that result in the destruction of High Conservation Values of land either on the farm or beyond its boundaries (See criterion F55 of the **Biodiversity and Ecosystem Services chapter**). Training therefore needs to include the message that grasslands, wetlands, riverbanks, water catchment areas, and areas used for traditional practices and formal religious observation all need to be protected by default, and a HCV assessment done before any land conversion that will remove the value that is being conserved; and
- No draining of tropical peat soils (See criterion F32 of the **Agriculture – Soil Management chapter**) either directly or indirectly (E.g. By activities on farm that drain mineral soils on the farm but also peat soils outside the farm boundary).

Briefing contractors brought on to the farm to do building work, road maintenance etc. is particularly important, as many failures to support biodiversity and ecosystem service provision are because of “accidental” actions by contractors with mobile plant (excavators, bulldozers etc.) taking the easiest option to fulfil contractual requirements.

All farmers and workers must be trained to ensure that criterion F57 (on hunting, fishing and gathering) is complied with. If there is traditional access to the farm by the local

community for hunting, fishing and/or wild harvesting, then some form of training with the local community may also be required. This may take the form of notices being posted at access points to the farm or adjacent to critical areas in many parts of the world, but in other areas may require consultation and participative processes with local communities (see FPIC criterion in **RSP chapter**)

All farmers and workers must be trained to ensure that their actions support the farm Biodiversity Action Plan.

F151	Expected. Energy and water management
Training must include options for energy and water use efficiency. Investigations into the feasibility of on-farm efficiency improvements, reductions in water use or risk of water contamination, and/or renewable energy sources locally. Not applicable to individual smallholder farmers.	
Climate Smart Agriculture	
Clearly energy and water use are both associated with GHG emissions – irrigation more often than not involves the use of energy for pumping water. Better water management is also associated with higher productivity overall, hence a more efficient system.	

All farmers and workers must have received basic information on energy and water saving (“turn off lights and taps when not in use. Check for, and repair water leaks”). Farmers who are intending to make significant investment in irrigation systems, pumps, buildings or other energy- or water-intensive systems must be in a position to show that they have either received training in the options available to them and their implications, or have/are taking the advice available (e.g. on internet searches) into account in their decision-making.

F152	Expected. Waste Management
Training must include the need for waste minimisation, and the segregation, storage and disposal of waste on-farm and in the local farming community.	
Climate Smart Agriculture	
Not applicable	

All farmers and workers must have received basic information on how waste should be minimised, segregated, and stored on farm.

All farmers who are intending to make significant investment in irrigation systems, pumps, buildings or other energy- or water-intensive systems must be in a position to show that they have either received training in the options available to them and their implications, or have/are taking the advice available (e.g. on internet searches) into account in their decision-making.

F153	Expected. Irrigation
Training must include good management practices for the type of irrigation system present on the farm. Not applicable if there is no irrigation on the farm.	
Climate Smart Agriculture	
As mentioned, irrigation uses energy, so better irrigation management through training should lead to more efficient energy use, hence reducing GHG emissions.	

All farmers and/or workers who work with irrigation must have received training in good management practices for the type of irrigation system in use. The person responsible must be trained in calibration and irrigation scheduling.

F154	Mandatory. Health and Safety
General training on farm health and safety, focused on the locally relevant highest risk issues and job-specific risks within large farms and plantations (e.g. lack of hygiene and open defecation, transport, workshop and electrical safety, working at height, machinery, steep slopes) must be provided. Safety procedures, use of machinery guards and emergency stops, and use of protective equipment must be covered for all relevant workers.	
Climate Smart Agriculture	
Not applicable	

For farms and plantations employing many people, the critical part of this criterion is to ensure that all farmers and workers have been trained to identify hazards and reduce risks associated with their work.

Where training is a legal requirement (for example in relation to managing CPPs in many parts of the world) the specific training is mandatory.

All new workers and contractors on the farm are expected to receive basic safety instructions as part of their induction process, with basic information being provided on the first day of work.

New workers in high-risk roles must have received task-specific training before starting work.

Otherwise, the training must prioritise the highest risks and must focus on the most vulnerable farmers and workers. Training is likely to include issues that are important for health and safety not only on the farm, but also in the local community (E.g. Hygiene, smoking, HIV/AIDs prevention; community-relevant training may take place) to include other members of the community.

Farmer groups

Training for small-scale farmers is often best organised in groups of farmers.

Smallholders

Smallholders are expected to train family members and workers on their farm in basic health and safety and environmental management. Some of this training is likely to be provided at a group level by suppliers/co-operatives/government or charity organisations:-

- Avoiding dangers on the farm such as manure pits and confined spaces; and
- Ensuring everyone who comes into contact with CPPs has basic training in their use, uses safe equipment and wears/uses personal protective equipment.

F155	Expected. First Aid
The aim of this training will be to ensure that sick and injured farmers and workers receive appropriate treatment before professional medically trained help can be summoned. The expectation is that first aid will be available to farmers or workers immediately in case of an accident in farmyards, buildings or packing sheds - and within 30 minutes of an accident occurring in a remote part of the farm or farmed landscape. The number and location of people trained must be planned for with this in mind. Not applicable to smallholder farmers.	
Climate Smart Agriculture	
Not applicable	

First Aid Training

A sufficient number of people need to be trained in first aid. As guidance, this means that there should always be a trained first-aider on duty in a packing room or processing facility. Where harvesting or agricultural work is carried out in gangs or where many people work under one supervisor (e.g. in plantations), the supervisor would normally be a trained first-aider.

Many countries have systems in place for first-aid training, including "First Aid at Work". Where formal training courses are available, tuned to the type of working conditions locally, these are preferable. However, if such training is not available locally, the following sources should be checked to find which is the most appropriate and available:

- The Red Crescent or Red Cross (voluntary/charity NGO) provides first-aid training in many countries; and
- The local doctor's surgery or hospital should be able to provide someone who can do training.

For large organisations, external training organisations should be able to “train the trainers” who can then pass on their knowledge to more people within the organisation. Often first-aid training is of considerable interest to farmers, and therefore group training of farmers will be well received.

A useful training leaflet on First Aid is available from the UK Government Health and Safety Executive⁹ and a specific publication on “First Aid at Work”¹⁰.

Everybody needs to be made aware that they should assess the hazards & risk when providing first aid to others, and not put himself or herself in danger (E.g. Avoiding fire, electric shock or falling debris, and protecting themselves from body fluids such as blood by using gloves and other barriers).

F156	Expected. General farm management, accounting, record keeping for large farms and smallholders
For smallholders, training will be aimed at enabling farmers to keep records, have an understanding of accounting and be empowered to make decisions about farm activities based on a better understanding of the business aspects of farming. On larger farms, this will be expanded to include training around the importance of record keeping for environmental impact: explaining impact, continuous improvement and why good records for fertiliser, CPP, water and area/yield are critical.	
Climate Smart Agriculture	
Good record keeping favours good management of inputs, leading to increased productivity and reduced GHG emissions per unit of production.	

Smallholders

Basic business understanding and basic book-keeping can be of enormous benefit to smallholders as they help farmers understand how to manage their own business better; often traditional farming approaches make it difficult for farmers to understand how much of their farm and workload is dedicated to subsistence, how much to status, and how much to generating income.

Large professional farms

Large professional farms and plantations must be able to demonstrate that the farmer and/or staff or contractors maintain not only financial records, but also the documentation required in this code, to remain compliant with legislation. Where discrepancies in documentation have been identified by audits or self-assessment, training for key personnel may be required to remedy the situation.

F157	Mandatory. Product quality
Any aspects of quality requiring action on-farm (e.g. crop variety, harvest stage, colour, sugar content, lack of contamination, rapid transport to processing facility) must be managed in order to achieve the required specification of product after processing.	
Climate Smart Agriculture	
Any raw material rejected for quality-related reasons represents wasted resources.	

All farmers and workers need to understand how to achieve the required product quality. Training must include any HACCP issues where the critical control points are on-farm (See criteria F133 and S40 of the **Value Chain chapter**). This is an area where Unilever suppliers are often in an excellent position to train farmers, with outcomes that benefit both farmers and suppliers.

⁹ <http://www.hse.gov.uk/pubns/indg347.pdf>

¹⁰ <http://www.hse.gov.uk/pubns/indg214.pdf>

11.2 METRICAL DATA

Unilever is judged by the outside world on how well we monitor our supply chains and how transparent we are in making the information we have available to the outside world. One of the few ways we can do this is to collect the data the farmers and suppliers share with us – and publish the collated, anonymised, information.

Metrical data also allows our suppliers and ourselves to understand the variation in growing techniques and conditions amongst farmers, and so understand where particular issues have high impact and should therefore have higher priority for management.

We do understand that providing metrical data can be time-consuming, frustrating, and may at times seem to be intrusive. Thank you to the farmers who work hard to gather and share these data with us.

Metrics Data

TABLE 38: METRICAL DATA			
Criteria	Metric Aspect	Description	Category
F158	CPP	METRICAL data shall be supplied for each farm assessed... note that these data are also required inputs for the CFT or other high standard equivalent GHG calculators to calculate on-farm GHG from inputs and outputs	Mandatory
F159	N balance	METRICAL data shall be supplied for each farm assessed... note that application rates for fertilisers are also required inputs for the CFT or other high standard equivalent GHG calculators to calculate on-farm GHG from inputs and outputs	Mandatory
F160	Water use	METRICAL data shall be supplied for each farm assessed	Mandatory
F161	Output of cool Farm Tool (GHGs)	METRICAL data shall be supplied for each farm assessed	Mandatory
F162	More with less	METRICAL data shall be supplied for each farm assessed	Mandatory

More information on these metrics and how they are calculated can be seen in Appendix 11 overleaf.

What sustainable farming can achieve

Changes in farming practice through the Unilever Sustainable Agriculture Programme

Goal Statement

Expression of intent for the Unilever sustainable agriculture programme

Unilever will buy all its agricultural raw materials from sources applying sustainable agricultural practices, so that

- Nature and biodiversity are protected and enhanced
- Soil fertility of agricultural land is maintained and improved
- Farmers and farm workers can obtain a liveable income and improve living conditions
- Nitrogen fertilisers are used efficiently and don't harm the environment
- Water availability and quality are protected and enhanced
- Greenhouse gas emissions are reduced

Consumer proposition

*Statement of relevance for responsible consumers, **expressed for Unilever as a whole***

By buying Unilever products, you help to

- Save x ha of land from cultivation
- Reduce N-fertiliser potentially lost to the environment by x kg
- Save x kt of irrigation water
- Reduce toxic chemical use by x kg
- Save x tonnes of greenhouse gases (CO₂ equivalent) from entering the atmosphere

The Metrics

1 Produce more with less

Over the last 50 years, food availability per capita has increased. This despite the fact that the world population has grown from 2 billion to over 7 billion people. Breeding plant varieties that responded favourably to synthetic (nitrogen) fertiliser and the development of CPPs to protect crops from pests and diseases were the major breakthroughs that allowed this increase. However, the area of land under cultivation has also grown.

The future challenge for agriculture is perhaps even bigger: to meet the growing demand for food from a population that is predicted to grow to almost 10 billion by the year 2050 and at the same time demand more animal protein in the diet as a result of higher disposable incomes. This will put huge pressure on the remaining natural habitat to be converted into cultivated land. Add to that the recent growth in crops grown for biofuels, which will compete for land with traditional crops (for food, feed and fibre), and the conclusion is clear.

We need to produce more with less. More food (and feed, fibre and fuel), with less natural resource, especially land. This requires another revolution in agriculture, to further increase yields per hectare.

The potential for this is substantial. Agronomists know about the yield gap between experimental plots (carefully controlled field trials, with the best available varieties of plants, best nutrient management, best pest and disease management) and the yields good farmers get in reality. Farmers know about the yield gap between good farmers and not so good farmers. Targeted breeding programmes will go some way to address this, but increased knowledge and optimised inputs will also help.

We believe it is essential that farmers have access to the best varieties, best fertilisers and best knowledge required to optimise their yields, within ecological boundaries. We believe our sustainable agriculture programme will help them do that.

We therefore intend to start comparing the total number of hectares required to grow our raw materials, applying best practices, with the number of hectares required using less optimal practices. The difference between the two is the number of hectares we have “saved”.

We realise that this approach ignores a number of issues which also affect yield:

- Climate variability and other natural factors
- Higher yield might require more inputs (but inputs should not exceed ecological limits)
- Water might prove to be a constraint, so specific attention will have to be given to water efficiency
- It might not always be possible to grow crops on soils most suited for these crops. We will therefore always use local or national yield data as benchmarks.

Metric

Reduction in the hectares of land used by Unilever for cultivation	¹¹ Hectares required for Unilever volume of specified quality as per the average yield of our suppliers, compared to the hectares required for Unilever volume as per the average yield in the local country. The difference (if UL supplier yield is higher than the average) counts as an area saved.
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Formula:

$$(\text{Unilever volume}/\text{avg local yield}) - (\text{Unilever volume}/\text{avg yield Unilever supplier}) = \text{ha saved}$$

¹¹ The term yield here should be read as optimum yield at optimum quality as required by Unilever. Since the tea sector is in a situation of structural oversupply, tea will not be included in this metric.

2 Nitrogen balance

Nitrogen (N) is vital for plant growth, high crop yields and quality. At the same time, it can also harm the environment when lost from fields. The N-balance is a measure of how much of the N applied to a crop is actually used, and how much of it is potentially lost to the environment.

Nitrogen is one of the most important plant nutrients: N is a key element in all proteins and plays a vital role in photosynthesis. Plants take up N from the soil through their roots. In natural ecosystems, all N in the soil is either fixed from the air by specialised micro-organisms, which, when they die, release the N; or N is deposited with airborne particles, e.g. from volcanic eruptions. In managed ecosystems, such as agriculture, N applied through organic and inorganic fertilisers becomes the most important source of N to crops.

As N is a 'precious' mineral, natural ecosystems systems recycle it very efficiently from dead plant and animal bodies, faeces and litter. When crops are harvested, the N contained in them is removed, thereby breaking this cycle. Farmers replenish the N pool in the soil through fertilisation. As N is normally a limiting element, it also has a signalling function for plants: if there is little available in the soil, they will react with restricted growth while high amounts of available N in the soil encourage strong crop growth and high yields. N is also important for quality in crops that are high in protein, like cereals. This is why in many crops farmers apply more N than the crop will take up, in order to attain high yields and quality crops.

However, when N is applied over and above what crops take up it can also be lost to the environment and cause harm there: N becomes a pollutant when (a) surplus N leaches in the form of nitrate and pollutes ground water; (b) it 'fertilises' natural ecosystems that are adapted to low nutrient availability. High levels of available N favour the development of fast-growing species that can then out-compete the original species in the ecosystem; (c) high applications of N favour the formation of various gaseous N-compounds that can contribute to climate change, air pollution and acidification. Finally, synthetic fertilisers require high amounts of energy for production, thereby contributing to greenhouse gas emissions.

Loss of N from agricultural fields is one of the most important sources of environmental impact from farming. It represents the biggest source of embedded fossil fuel. It is the biggest contributor to fresh water contamination through run-off and leaching, leading to eutrophication. It

is the biggest contributor to greenhouse gas emissions from farms, since N fertiliser (and N bound by legumes) partly decomposes to nitrous oxide N_2O , a greenhouse gas 296 times more potent than CO_2 .

Unilever strives to apply as much N as needed to ensure high yielding high quality crops while losing as little of it as possible to the environment. A simple metric of how successfully we avoid losses to the environment is the N balance (N inputs minus N outputs), which is a measure of N efficiency. Detailed knowledge of N requirements during the crop growth cycle, ensuring good soil and growing conditions, choosing the right fertiliser for each purpose and using advanced application techniques are all factors by which farmers can improve the N efficiency and work towards balanced inputs and outputs.

Metric

Reduce the amount of nitrogen lost to the environment	The N balance can be expressed as the difference between N inputs from fertiliser and N outputs with the crop
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Formula:

$N \text{ lost (kg/yr)} = N \text{ input (kg/yr)} - N \text{ output (kg/yr)}$, where N input is the sum of all organic and inorganic fertilisers and N output the N taken off with the harvested proportion of the crop. The summation takes place over the reporting unit. No. of kilos lost fewer than previous year is reported.

3 Chemical use

In this context, chemical use means Crop Protection Products (CPPs). The majority of farmers who supply raw materials to Unilever apply CPPs to their crops.

We have been working with our suppliers and growers to minimise the use of CPPs whilst still maintaining the yield and quality of raw materials we need for our business. We have restricted the number of CPPs which can be applied in contract crops and are encouraging our suppliers and influencing at the sector level for pest control systems which maximise non-pesticide methods of control.

The use of CPPs is an emotive issue in agriculture and can quickly become over-complex in communication terms. For ease of communication, we have created a simple metric which reports the reduction in the amount of CPPs used from one year to the next, including the toxicity. The toxicity rating uses the World Health Organization's hazard classification of CPPs. Through our work on good practices with our suppliers and growers linked to CPP usage, we believe this metric's trend will be a shift towards the use of less toxic CPPs as well as a reduction in the amount of CPPs applied.

We realise the metric is an oversimplification, which doesn't take into account:

- CPP usage which is influenced by a number of natural factors beyond our control, such as weather conditions, which can lead to increases in usage between seasons.
- The fact that the WHO hazard classification is not an environmental hazard classification.
- CPP residue levels in food products.

Metric

Reduce toxic chemical use	Report on Active Ingredient use in three classes: WHO (Class 1a + Class 1b), Class 2, Class 3, Class U, Class Not Listed.
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Formula

Report WHO (Class 1a + class 1b), Class 2, Class 3, Class U, Class Not Listed: Number of kgs less than previous year

4 Irrigation Water use

Water is a precious and, in many regions, an increasingly scarce resource. Agriculture uses water to irrigate crops and Unilever can help protect water resources by improving the efficiency of water use for irrigation.

Water Use Efficiency

To calculate the total amount of water ‘saved’ by increased efficiency in irrigation systems, we:
Calculate the total amount of water used by our growers to irrigate crops
Compare with water use in previous year.

Reduce the volume of water used for irrigation	Compare volumes/ha water for irrigation with previous year. Volume of water “saved” each year is reported.
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5 Crop greenhouse gas footprint

Global GHG emissions due to human activities have grown since pre-industrial times, with an increase of 78% between 1970 and 2010. According to the Fifth Assessment Report of the UN Intergovernmental Panel on Climate Change (IPCC)¹² the atmospheric concentrations of the three main greenhouse gases (GHGs) – CO₂, CH₄ and N₂O – have increased markedly from their pre-industrial values as a result of human activities. The atmospheric concentrations of CO₂ and CH₄ today exceed by far the natural range over the last 650,000 years.

Global increases in CO₂ concentrations are due primarily to fossil fuel use, with land-use change providing another significant contribution. The observed increase in CH₄ concentration is predominantly due to agriculture and fossil fuel use. The increase in N₂O concentration is primarily due to agriculture.

Warming of the world's climate system due to these increased GHG concentrations is now unequivocal and evident from observations in real climate data. Changes are taking place faster and more strongly than projected in the past. Also, observational evidence shows that many natural systems are being affected by regional climate changes.

Agricultural, and to a lesser degree, forestry and other land use sectors, contributes around 10 - 12 Gt CO₂-equivalents/yr or 24% of mankind's greenhouse gas (GHG) emissions – similar to that for energy and heat production. Farming emits:

- Nitrous oxide (N₂O), mainly through nitrogen fertiliser use, soil tillage, manure management and peat land cultivation and energy use for producing inputs and carrying out field operations. N₂O is around 300 times more potent as a GHG than CO₂
- Methane (CH₄), mainly from fermentation from the digestive system of livestock, paddy rice cultivation, manure management and energy use for producing inputs. CH₄ is over 20 times more potent as a GHG than CO₂
- Carbon dioxide (CO₂), mainly through conversion of land, such as forest and savannah to crop land or grassland to arable land; and energy use for producing inputs.

Farming has two means by which it can contribute to GHG mitigation:

- 1 Reducing emissions of N₂O, CH₄ and CO₂ – decreasing the flow of GHGs into the atmosphere
- 2 "Absorbing" CO₂ from the atmosphere by storing carbon (C) in soils and standing biomass, such as trees – increasing the flow of C into long-term stores (so-called carbon sequestration).

However, most of these flows (emissions and sequestration) take place in natural systems: the farmed environment. Other than in industrial processes, flow into and out of natural systems are very variable and difficult to measure. This makes them difficult to manage at the field and farm level, where farmers could actually influence them.

Unilever is working with its partners to enhance the understanding of agricultural GHG flows at field and farm level and to come up with practical guidance for GHG mitigation for farmers. While we acknowledge that, at this stage, we may not yet be able to always effectively manage them, we can try to quantify the emissions from our operations by using a common GHG emission estimation tool.

This metric therefore estimates the following GHG emissions from our cropping operations:

- N₂O from soils, fertiliser use and fossil fuels combustion
- CO₂ and CH₄ from fossil fuel combustions
- Land use change

We are using the Cool Farm Tool, published on www.cool-farmtool.org, for the calculation of the GHG footprint of our crops (see website for more information).

We will report both the absolute footprint (in CO₂-equivalents) and the change over time.

Metric

Amount of GHG emitted from cropping	Sum of calculations in the Cool Farm Tool carbon footprint
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Formula:

GHG emitted from cropping = Cool Farm Tool output

12 IPCC 2014, Fifth Assessment Report (<https://www.ipcc.ch/report/ar5/wg3/>).



12 UNILEVER'S RESPONSIBLE SOURCING POLICY FOR FARMERS

Unilever's business ambition is to double the size of the company whilst reducing our environmental footprint and increasing our positive social impact. To achieve this, we apply the same principles and benchmarks to our suppliers as to our own company, and we expect our suppliers to pass on these requirements to the farmers (and others) who supply them.

This Responsible Sourcing Policy embodies our commitment to conduct business with honesty, integrity, openness, and respect for universal human rights and core labour principles throughout our operations. We aim to improve the lives of workers, their communities and the environment consistent with the Unilever Sustainable Living Plan. This Policy provides the framework through which we set out our responsible sourcing mandatory requirements, compliance against which is considered essential. Many aspects of the RSP will already be familiar to farmers who are working with the Unilever Sustainable Agriculture Code (2010), but there are some challenges too, which create an overlap with criteria of other chapters, or where the focus of the Policy and the Code have their differences, for example:

- Several of the criteria judged "good practice" (regarded as 'expected' requirements elsewhere in SAC2017) are mandatory in the RSP. In certain cases, a supplier may have reason to motivate where they feel a criteria is not applicable to their business or that of their farmer base (e.g. a human rights issue in a developed country, for which no/few cases have been recorded. This is particularly the case for Human Rights issues, which are based on Fundamental Principles including the International Bill of Human Rights consisting of the Universal Declaration of Human Rights, the International Covenant on Civil and Political Rights and the International Covenant on Economic, Social and Cultural Rights; and the International Labour Organization's fundamental conventions on Rights at Work. We support the OECD Guidelines for Multinational Enterprises. (see <http://www.oecd.org/corporate/mne/> for more detail)
- SAC has more detailed compliance criteria for farm-specific Health and Safety and Environmental Management than the RSP.
- The RSP was written to cater to the whole supply base (farmers, suppliers, 3rd party manufacturers, processors, and other businesses providing services and products

to Unilever); whilst the SAC was written specifically with farmers (including small-scale/smallholder) and suppliers in mind.

- Whilst both SAC and the RSP demand continuous improvement, the ways in which improvement must be demonstrated differ.

General guidance for evaluating these requirements on large farms

For large farms, an approach to evaluate each requirement can be adopted, specifically on large farms. The following provides an overview with guidance on how to evaluate the requirements detailed in this chapter:

- The farmer can complete a gap analysis, which will show the supplier the difference between the current practices in their business and the mandatory requirements of the RSP;
- Next, the farmer can conduct a root-cause analysis, which will enable them to discuss why they cannot / will not fulfil the requirements of the RSP;
- Once clarity has been achieved as to what the root causes are, the farmer can start to investigate solutions and develop corrective action plans;
- The farmer should communicate with their supplier, to confirm to Unilever that they have the willingness and commitment to work through the changes needed;
- Unilever can provide guidance to our suppliers for communication with farmers on support mechanisms to help them on the journey to becoming compliant with the RSP; and
- If a farmer makes a deliberate decision not to fulfil the requirements of the RSP, then this should be communicated to the supplier, as Unilever has to understand the reasons for this stance. This decision should be founded on a frank and open discussion between the supplier and Unilever, establish a sound basis for the decision and next steps.

Non-compliance status to a mandatory requirement

The mandatory requirements of the RSP are compulsory and if a farmer does not or cannot commit to fulfil any one or any number of these requirements, then this needs to be communicated to their supplier for further engagement on with Unilever. In all cases:

- We will endeavour to understand the farmer's reasoning for this non-compliance and escalated for action within Unilever;
- We cannot advise any supplier to modify answers to farm-related questions, as this has to reflect what they determine to be their compliance status, but we urge every supplier to encourage their farmers to act in the spirit of the SAC and to find a way to resolve the issue to achieve compliance and alignment with Unilever.

This Chapter of the SAC2017 therefore shows how the Unilever Responsible Sourcing Policy should be interpreted for farms and farmers.

12.1 BUSINESS IS CONDUCTED LAWFULLY AND WITH INTEGRITY

F163	Legal Compliance (RSP 1.1)
All relevant international and national laws and regulations not covered elsewhere in this code are complied with.	
Climate Smart Agriculture	
Not applicable	

Many farm practices that use water, plough land, apply fertiliser or pesticides, etc. require authorisation in accordance with national and local laws and regulations. Generally, the SAC2017 criteria cover what could be deemed minimum legal requirements in most countries, but there are inevitability exceptions. Farmers must be fully conversant of all legal obligations and in possession of necessary permits and approvals.

Examples of such permits are as follows:

- Water abstraction and borehole permit from the Water Management Authority;
- Attenuation, storage or diversion of surface water, from the Environmental or Water Management Authority;
- Permission to dispose of waste to water bodies from the Water Management Authority;
- Ploughing permit from the Agricultural Authority;
- Environmental Impact Assessment Authorisation for built infrastructure (e.g. waste treatment and management facilities);
- Environmental and/or Social Impact or FPIC studies and authorisations for land use change (See also criterion F56 on deforestation and FPIC in the Biodiversity and Ecosystem Services chapter)
- Air Emissions Licence for burning practices from the Environmental Authority;
- Livestock permit for stocking of farm animals from the Agricultural Authority; and
- Permits associated with Minimum wage and Employment laws.

All prosecutions and fines for non-compliance with regulations must be documented along with remedial action to ensure non-recurrence.

F164	No Bribery (RSP 1.2)
There is a prohibition on any and all forms of bribery.	
Climate Smart Agriculture	
Not applicable	

Preventing Bribery

On large farms and plantations, clear and effective internal training and/or guidelines must be put in place describing business integrity expectations relating to anti-bribery, gifts and hospitality. The guidelines and policies must comply with competition laws and conflicts of interest and they are readily available to the supplier's employees.

A useful resource is the UK Ministry of Justice's guideline, The Bribery Act 2010 Quick Start Guide (<https://www.justice.gov.uk/downloads/legislation/bribery-act-2010-guidance.pdf>), which provides information about procedures businesses can put into place to prevent persons associated with them from committing bribery.

Another resource independent of any standard or law, is the Organisation for Economic Co-operation and Development's (OECD) Anti-Corruption Ethics and Compliance Handbook for Business (<http://www.oecd.org/corruption/anti-corruption-ethics-and-compliance-handbook-for-business.htm>). This publication consolidates the main internationally recognised business instruments on anti-bribery, namely:

- Anti-Corruption Code of Conduct for Business (APEC: Asia-Pacific Economic Co-operation);
- Business Principles for Countering Bribery (TI: Transparency International);
- Good Practice Guidance on Internal Controls, Ethics and Compliance (OECD: Organisation for Economic Co-operation and Development);
- Integrity Compliance Guidelines (World Bank);
- Principles for Countering Bribery (PACI: World Economic Forum Partnering Against Corruption Initiative); and
- Rules on Combating Corruption (ICC: International Chamber of Commerce)

This handbook advocates a risk assessment be conducted to better understand the risk exposure and inform risk management decisions. Steps to such an exercise are laid out in the document.

Smallholders, and both farmers and workers on small farms, are expected to understand that bribery is unacceptable, as it undermines enterprise development and the potential for collective benefit, for productivity and in promoting strong, resilient farming communities.

Ways for smallholder farmers to avoid bribery on their farms might be:

- Maintain open channels of communication between farmers and their workers to encourage inclusivity and commitment to the business. One approach might be to hold weekly 'check-in' sessions where both farmers and

workers can share their experiences, make requests and suggestions to improve productivity and their well-being; and

- Adopt procedures for workers to report any observed bribery they may have witnessed. See criterion F170 for further details in this regard. All farmers and employees (including temporary workers) must receive the minimum training, which must include:
- Gaining an understanding that bribery is unacceptable;
- Gaining an understanding that attempts to bribe must be reported (see grievance procedure criterion F170 for details of how this can be done confidentially); and
- Explaining compliance requirements to achieve minimum legal thresholds.

Training

Workers on large farms should receive training on policies and guidelines as detailed above. Where possible, concepts should be simplified in language and with the use of relevant examples, to aid in understanding and interpretation.

For smallholders, the Unilever supplier or other "umbrella" organisation (e.g. the co-operative management or group administrator) may provide the training. The training can be very short, and either formal or informal, but there must be a record kept (for 2 years) that it has been provided.

More detailed in-person training should be focussed on the most vulnerable employees (e.g. those involved in transport, assessing the quality or quantity of received goods, or making and receiving payments) on large farms and plantations, and in smallholder "umbrella" organisations. Training should ideally be conducted by senior personnel and include the following topics:

- What the law says about bribery in that region.
- What the company/farm/plantation/smallholder group's ethical commitment and policies say
- How implementation starts at the top, and the consequences for personnel at all levels in the organisation.
- How farmers and employees can promote a culture of ethical business practices.
- The importance of accurate record keeping.

A record of all attendees must be kept on file for at least 2 years.

Local problems with implementation, ideally those elicited from farmers during participative training, must be noted and followed-up on in order to find ways to eliminate bribery and corruption.

Examples of the type of practices that may be found include:

- Complaints that the supplier's agents demand "back-handers" to weigh produce accurately. Such complaints must be investigated by the supplier, and problems remedied (e.g. by disciplinary action) (See also criterion F171 on complaints and grievance mechanisms); and
- Complaints that local police/government officials demand bribes for performing their job should be noted. In this case the Unilever supplier or farmer "umbrella" organisation must document progress in solving the problem (e.g. by negotiating an above-board donation to improve policing and eliminate corruption in the area).

F165	Financial accounts (RSP 1.6)
Large farms must keep financial accounts. Individual smallholders are not expected to keep accounts.	
Climate Smart Agriculture	
Not applicable	

Large farms and smallholder "umbrella" organisations (E.g. Farmer co-operatives) are expected to keep financial accounts.

Adequate financial procedures must ensure proper recording of all financial transactions. Keeping such records reduces the risk of corruption and fraud and is evidence of consistent and honest financial accounting. Furthermore, this allows managers to track expenses and identify ways of reducing erroneous or unnecessary spending, making the business more profitable and resilient.

F166	Product Quality (RSP 1.8)
Procedures are in place on farm to ensure that products meet customer specifications and quality and safety requirements.	
Climate Smart Agriculture	
Not applicable	

Adequate procedures must be in place to ensure that products meet quality or safety specifications and that all products are safe for their intended use. Quality and contamination aspects are also covered in requirements F132, F133, F157 and S40 in this Code.

F167	Reporting Concerns and Non-retaliation (RSP 1.9)
Employees on large farms and plantations have a channel through which they can raise concerns regarding business integrity e.g. dishonest or unfair business dealings without fear of retaliation. Smallholders must have a mechanism for raising concerns with the processor. Workers for smallholders should have a route of complaint through to any smallholder umbrella organisation in existence.	
Climate Smart Agriculture	
Not applicable	

Systems must be in place to enable all workers (including temporary and migrant labour, and labour employed by contractors) on the farm (and all farmers in smallholder groups) to raise concerns that they may have regarding any aspect of business integrity with the farm or group management. The ability to raise concerns should not be inhibited by language, literacy or cultural barriers, and the participation of women and youth - groups often recognised as being vulnerable or marginalised - are to be encouraged by creating appropriate channels through which to communicate concerns to persons of authority.

Encouraging disclosure

Systems encouraging disclosure of concerns and preventing intimidation must be employed, such as:

- Workshops that encourage integration and tolerance among workers;
- A channel that accepts anonymous complaints;
- Security controls for workers to protect them from victimisation or recriminations;
- Conflict mediation between complainants;
- If suggestion boxes are used, make sure they are located in discreet spots where complainants have some privacy when using the box;
- If you use a telephone grievance hotline, make sure that it is free of charge and that the service is available in the local language; and
- It must be clear that complaints really are investigated (rather than ignored), by making the procedures for the investigation of complaints and the resolution process clear to employees.

Components of a complaints procedure

The first point of contact should try to deal with the complaint or grievance verbally and informally. It is often simply a case requiring some clarification or explanation to clear things up. Even if the informal/verbal handling succeeds in resolving the case, ensure you make a note of the event. This is not a minute of the discussions or a formal record, simply a note that the complaint was heard and resolved.

If the issue is too complex or heated to be resolved through discussion, an escalation procedure should provide for a formal, written submission with a written response. This may still be at the level of the immediate supervisor, unless that supervisor is the object of the complaint. If the matter cannot be resolved at that level then the complaint should go to a higher level.

Prompt action

Complaints and grievances should be dealt with promptly. A process that leaves the complainant unsure of the progress of their complaint will only heighten frustration and undermine the credibility of the system. The procedure should provide regular updates to the complainant and they should know where things stand and what happens next. The rules of fairness must be clear to all concerned and everyone involved must be satisfied that they were applied. Those rules include the right to know what you are accused of and to examine the evidence, the right of all parties to be heard and their right of reply, and finally their right to appeal.

For smallholder farms, and small-scale farms where there are few workers, the “umbrella organization” should ensure that there is a locally-applicable appeals procedure available to workers with grievances (e.g. through trade union, group/co-operative administration, the local legal or customary systems or the Unilever supplier).

12.2 PROTECTING THE RIGHTS OF WORKERS AND COMMUNITIES

F168	Work is conducted on the basis of freely agreed and documented terms of employment (RSP 2)
All workers, both permanent and casual, are provided with employment documents that are freely agreed and which respect their legal rights.	
Climate Smart Agriculture	
Not applicable	

The key components of the employer/worker relationship such as hours, overtime, pay, benefits, leave, disciplinary and grievance systems should be (i) freely agreed by both parties; (ii) documented in writing; and (iii) signed by the employer and worker.

With the exception of smallholder farms, terms and conditions must be recorded in a contract, to formalise the employment and associated conditions. This will clarify the rights and responsibilities of both parties. A contract

should state the names of the employer and worker, commencement date, job title, payment details, work hours and station, holiday and leave day entitlement, sick pay, pension schemes (if any), notice periods and grievance, dismissal and disciplinary procedures.

A detailed contract may be impractical for short-term, seasonal or casual labour, but employment rights should also apply to these workers as far as is practically possible. As general guidance – a farm worker would normally be subject to a contract if they were intending to work on the farm/had worked on the farm for three months (unless local regulations required a contract to be in place earlier than this; the probation period is usually enshrined in local law). Documentation will not be expected for farms where the farmer has poor literacy.

Terms and conditions should be understood. An adequate understanding of terms and conditions by workers is important if fair employment conditions and compensation is to be ensured. Employers must be certain that workers understand requirements and expectations. In most cases, a written contract will need to be supplemented by other ways to explain and iterate terms and conditions, for example:

- Reframing terms and conditions by using language that is more colloquial.
- Giving examples of instances where such terms and conditions would apply.
- Inviting workers to ask questions and seek clarification where they do not understand the requirement.
- Getting an interpreter (this could be a supervisor that already works directly with persons of this ethnicity or region) to translate the requirements into the appropriate language or dialect.

This is a requirement on all farms, even those where a written employment contract is not (yet) in place or will not be issued due to low literacy. The key requirement (which may be determined by interviewing both parties) is that both employer and employee have the same understanding of the terms and conditions of work.

Changes in terms and conditions

Changes to terms and conditions should be communicated to workers ahead of time, explaining what these entail and obtaining any feedback from workers on how best to formalise and implement such changes equitably. Where changes are agreed on, affected workers should always

sign a document specifying what these entail, as proof of acceptance.

Should worker have poor literacy, they should be formally consulted on these changes, to ensure that pending changes are understood and agreed to. The key requirement (which may be determined by interviewing both parties) is that both employer and employee have the same understanding of any changes in the terms and conditions of work.

F169	All workers are treated equally and with respect and dignity (RSP 3.1)
No worker should be subject to any physical, sexual, psychological or verbal harassment, abuse or other form of intimidation.	
Climate Smart Agriculture	
Not applicable	

Intimidation is the act of harassment, with the intent to coerce or deter a particular individual or group of people. This can be applied in many ways, through physical, sexual, psychological and verbal abuse and harassment. Intimidation may be the result of retaliation, such as that of a supervisor on workers who laid grievances against him, or among workers of different ethnicity or country of origin. Farmworkers can be particularly vulnerable to acts of intimidation, since they may not fully understand their rights or might serve as temporary or migrant labour and feel disempowered to take appropriate action against the offender.

Situations where intimidation may occur, are:

- Conflict, when difference of opinion amounts to aggression, tension and hostility
- Protest action, particularly between striking and non-striking workers
- Sexual harassment of women by male workers

Farmers, managers and supervisors should demonstrate a zero tolerance for intimidation, taking appropriate investigative or disciplinary action when reported or observed.

F170	All workers are treated equally and with respect and dignity (RSP 3.2)
Large farms must have employment policies in place to prevent discrimination based on race, ethnicity, age, role, gender, gender identity, colour, religion, country of origin, sexual orientation, marital status, pregnancy, dependants, disability, social class, union membership or political views. Smallholders must understand that discrimination is not acceptable.	
Climate Smart Agriculture	
Not applicable	

Policies should ideally cover discrimination in any aspect of employment, including hiring, compensation, advancement, discipline, termination or retirement. Exceptions are given in specific cases where there are overriding health and safety concerns (E.g. Young workers and pregnant women should never handle pesticides see criteria F85 of the Social chapter).

Promoting tolerance on the farm

Farms employing many workers, especially where temporary or migrant labour from far away are involved, or where workers are from different religious or tribal groups etc., must take reasonable steps to ensure that individuals or groups do not feel threatened, intimidated or discriminated against. This may mean that working practices need to be flexible enough to:

- Allow workers to wear religion emblems or clothing (such as crosses, kippot, turbans, modest clothing or veils) if this does not pose a risk to their or others health and safety (e.g. food hygiene requirement and entanglement of chains in equipment);
- Allow time and facilities for prayers and ablutions;
- Enable Sabbath, holy days and mourning periods to be observed; and
- Accommodate fasting and dietary requirements (E.g. if the farm provides canteen facilities).

On large farms and plantations, farmers should evaluate how current practices may be discriminatory and try to find ways to overcome such barriers, for example:

- If not legally required, are food hygiene requirements for "bare below the elbows" necessary in all parts of on-farm processing and packing units, where some workers consider this to be immodest?
- Could work schedules be reorganised and/or facilities provided for prayer?
- Can worker transport arrangements be re-organised to make female workers safer (transport to and from work has been highlighted by the UN¹ as a major cause for concern), and therefore more eligible for promotion to jobs requiring travelling after dark?

No employee should suffer retaliation or be penalised for reporting acts of discrimination (See criterion F179 of this chapter). Allegations of discrimination should always be investigated and appropriate corrective action taken if confirmed.

¹ http://www.un.org/millenniumgoals/pdf/Goal_5_fs.pdf

No pregnancy testing

Pregnancy testing or other forms of health screening that might result in discrimination are not tolerated. Such practices are considered degrading and humiliating, and risk exposure to unfavourable treatment. Mistreatment of pregnant women at work includes reducing wages, harassment and bullying, not being allowed paid time off for antenatal appointments, being given dangerous and risky work, and being made redundant². It is therefore important that women be not subjected to testing and screening, to avoid such incidents taking place.

Health screening

In cases, some forms of health screening are important for certain types of farm work in order to determine where applicants are able to do a job (E.g. Blood tests if workers are at risk of exposure to organophosphate CPPs: See criteria F85 – F89 of the Social chapter). However, there must be no general health screening that might provoke discriminatory action in relation to hiring, compensation, advancement, discipline, termination or retirement.

Smallholders

Clearly, pregnancy testing or health screening is unlikely to be an issue on smallholder farms, and for this reason this criterion can therefore be considered not applicable to smallholders.

² http://www.ilo.org/global/about-the-ilo/newsroom/features/WCMS_193975/lang--en/index.htm

F171

Work is conducted on a voluntary basis (RSP 4)

Under no circumstances will a farm use forced labour, whether in the form of compulsory or trafficked labour, indentured labour, bonded labour or other forms. Mental and physical coercion, slavery and human trafficking are prohibited.

Climate Smart Agriculture

Not applicable

Work is voluntary

There should be hiring policies, procedures and trained staff to ensure that workers are entering into employment freely and equally and that they are never prevented from leaving if they so wish. For smallholder farmers, this may not necessarily be a written document. In all countries, employers should abide by all applicable labour laws and Mandatory requirements of this code to ensure legal and contractual compliance is met.

The policy must be supported by practices that ensure that:

- Employees are free to leave employment after reasonable notice;
- There is no prison labour;
- Any recruitment agencies used must meet any national requirements for such agencies, and must not require workers to sign blank sheets of paper, resignation letters etc. before they can work;
- Procedures are in place that ensure that all farm labour, and labour provided by recruitment agencies, brokers or gang leaders has not involved the worker paying an unreasonable fee or taking out loans that will force him or her to work in order to pay them back;



- This includes monetary deposits for use of work tools, PPE or training
- Even migrant workers who did not use a labour broker may have borrowed money to cover their travel expenses and you should check that they are not in some form of debt bondage; and
- You never accept labour from anyone in return for money they owe you.

Although a written policy is clearly not required for smallholders, it is important for smallholders who supply Unilever to ensure that they, their families or their workers are not involved in debt-bondage arrangements.

Worker freedom of movement

All workers must have freedom of movement outside of the farm premises to move, live and spend time where they choose, within the territory of a country. Restrictions are considered to be in contravention of article 13 of the Universal Declaration of Human Rights. Workers must be allowed to leave the farm when their work shift ends.

No surrender of identity papers

Workers must not be required to surrender their identification papers. Where the retention of identification papers is legally required, arrangements should be made to ensure that workers can access their identification papers, are not prevented from leaving the workplace and that their papers are returned immediately upon cessation of employment. Passports and other identity documents are issued to the holder by the government of their territory, entrusted to these recipients as proof of identity. While authorities such as customs and border control officials, embassies and consulates may require such documents to confirm your identity, employers are not considered equivalent, and shouldn't have a reason to hold workers' papers. Farms should have procedures that ensure that the recruitment of all farm labour, and labour provided by recruitment agencies, has not involved the worker relinquishing their passport or identity card.

F172	All workers are of an appropriate age (RSP 5)
Under no circumstances will a farm employ individuals under the age of 15 or under the local legal minimum age for work or mandatory schooling, whichever is higher. When young workers are employed they must not do work that is mentally, physically, socially or morally dangerous or harmful or interferes with their schooling by depriving them of the opportunity to attend school.	
Climate Smart Agriculture	
Not applicable	

An employment policy should be in place specifying the minimum age for employment, together with effective procedures and means of age verification to implement this policy. Smallholders must understand that they must not employ anyone under the legal minimum age. The minimum age varies from country to country, and in many instances, where some kinds of work is permitted for children of different ages, these laws specify the kind of work considered to be acceptable for a particular age or age range. However, 15 is the minimum age allowed for employment regardless of legislation.

Clarifications and exceptional cases

Apprenticeships and vocational training schemes

Apprenticeship schemes or recognised vocational training programmes will often involve under-age workers. Clearly, such schemes and workers must operate within the law and the guidance provided above (I.e. Ensuring that the work is not hazardous or heavy, or that long hours of work are not involved, and that the work provides a significant element of training). This type of training is particularly important where the minimum age at which children can leave school is lower than the minimum working age in the country concerned.

Family (including smallholder) farms

Children work on their own family farms all over the world. This is not necessarily a "child labour" issue (see ILO conventions 138 and 182) as long as:

- Young children (under 12 years old) do not work except as helpers to family members, under which circumstances they are always supervised;
- Working does not interfere with the child's education;
- Children are only given safe jobs to do, and are not asked to
 - Use sharp or dangerous machines,
 - Come into contact with hazardous materials (e.g. CPPs)
 - Carry heavy loads,
 - Or work at height, on steep slopes, near cliff edges or in dangerous locations such as on riverbanks near dangerous watercourses.
- A responsible adult (usually a parent) is acting in a supervisory role;
- There is an element of training and the child is learning how the farming business works;
- Children do not work at night; and
- There must be strict limitation of the hours spent at work in a day and in a week, and the prohibition of overtime, so as to allow enough time for education and training (including the time needed for homework related thereto), for rest during the day and for leisure activities.

Remedial measures in case of breach

If any breach of the employment policy on minimum age is identified, the case must be documented and remedial measures immediately implemented. However, when child labour has been found on farms, the best solution is not necessarily to take hasty action and remove them from their jobs immediately; this may mean that other dependent family members are immediately plunged into a worse situation, or that the child themselves is forced into more exploitative forms of work.

Zero tolerance of child labour does NOT mean zero responsibility to look after any child who happens to end up in your employ. If you find out that the child is underage, you need to take responsible and appropriate remedial measures. Remedial measures are a means to address cases where workers are of an inappropriate age to work.

Actions

In the event of a breach, circumstances will differ and remedial action must be chosen carefully. Steps to take may include:

- Find out how their age was overlooked in the hiring and appointment process;
- Identify the child's legal guardian (a parent or family member) and consult with them on why the child should not be working, potential risks and consequences;
- Report the matter to your purchasers (including Unilever suppliers) so that they can provide support to resolve the matter;
- If the problem is widespread, attempt to obtain the support of local government purchasers (Unilever suppliers) or a non-profit addressing this issue in the area; and
- Otherwise document the situation and identify appropriate remediation that is acceptable to the child and family involved. It will usually be necessary to help the child or young worker complete schooling or training with an offer to re-employ them afterwards - or even during their training if appropriate. An adult family member may be employable as a substitute during this period.

Unilever works closely with our suppliers and it is in our interest to take action manage such cases the best we can.

What if child labour is normal in the local community?

In developing countries where legal and compliance systems may not be adequate, child labour may be considered acceptable by communities and neither parties may see concern. However, it is unacceptable for child labour to be present on farms that supply into the Unilever supply chain. On all farms, farmers should be made aware by Unilever suppliers of the impacts of child labour, like risks to health

and safety, the implications to their education and as such, future prospects and ability to be socially mobile.

Health and Safety of Young workers

In all circumstances the health and safety of young workers is considered and protected. This protection should preclude them from certain types of work such as hazardous or night work and requires extra care and commitment. Although young workers can be considered above the minimum age in their country, this they are still undergoing physical, emotional and cognitive developmental changes. The period of growth from child to adult is crucial as sexual maturity is achieved and individuals come of a reproductive age. In addition, bone and muscle growth takes place that will carry them through the rest of their adult lives. Young workers must therefore be excluded from hazardous work. The International Labour Organisation recognises hazardous work as labour that jeopardises the physical, mental or mortal well-being of a child, either because of its nature or because of the conditions in which it is carried out³. Night work further places these individuals at risk to workplace accidents, given the low light conditions in which they may be working. Although the youngest workers may often be considered the fittest or most able bodied relative to their older peers, this should not overshadow their state of development, which may not be noticeably evident.

Specifically:

- Young workers must not do any type of work that compromises their health and safety:
 - Specific risk assessments would be available assessing the suitability of tasks for young people. (On large farms and plantation) and appropriate medical monitoring made available if appropriate;
 - Young workers must not handle or apply CPPs (pesticides) or be in areas where they are being applied unless this is specifically allowed by local laws and the young person concerned is formally, individually trained (which would normally involve a certificate being issued by a nationally-recognised training organisation, for example, as in Switzerland), and takes all necessary precautions and use all PPE;
 - Young workers must not carry heavy loads or be involved in the manual handling of heavy;
 - Young workers must not do work that requires physical exertion unsuitable for their age;

3 ILO: A future without child labour, Global Report under the follow-up to the ILO Declaration on Fundamental Principles and Rights and Work (Geneva, 2002).

- Young workers must not work “at height” (E.g. Ladders, cranes, trees, roofs see criterion F93 of the Social chapter) or in confined spaces (See criterion F99 of the Social chapter);
- Young workers must not work on steep slopes or near cliff edges;
- Young workers must not operate or be near noisy or dangerous machinery, equipment or tools unless specifically trained AND machinery guarding is in place.
- Young workers must be under the supervision of a responsible adult;
- Transportation must be provided to and from home if workers have to travel in the dark or in conditions that put their personal safety at risk; and
- Young people will not be on site/working at night (this is usually defined as between 10 p.m. and 6 a.m. but is dependent on local law).

F173	All workers are paid fair wages (RSP 6)
All workers are provided with a total compensation package that includes wages, overtime pay, benefits and paid leave which meets or exceeds the legal minimum standards or appropriate prevailing industry standards, whichever is higher, and compensation terms established by legally binding collective bargaining agreements are implemented and adhered to.	
Climate Smart Agriculture	
Not applicable	

Fair wages

The minimum wage for employees varies based on the country in which a farm is situated. In some countries, the minimum wage is fixed for individuals aged 25 and younger. Farmers should be careful to pay workers at least the minimum wage where such a wage difference exists. Please note that this requirement applies to temporary, seasonal and casual workers as well as long-term employees.

Payslips

Workers should receive a payslip for each pay period clearly indicating the components of the compensation, including exact amounts for wages, benefits, incentives/ bonuses and any deductions. If farmers are illiterate, attempts must be made to institute payslips via any available smallholder “umbrella” organisation. Payslips provide a formal account of the worker’s total pay for a disclosed period of employment, reflecting all factors that have bearing on the amount paid. Such an account, gives workers an understanding as to how their pay is calculated, and assurance that the amount is an accurate and honest reflection of their wage. Payments in the form of seed, fer-

tilisers, land preparation or other inputs, made in advance of the harvest, must always be documented, and payslips (and/or receipts for produce delivered) make it clear when deductions for repayments are in place.

In the case of **smallholder farmers** having poor reading skills, the smallholder “umbrella” organisation must represent the interests of the farmers and may be able to issue payment and documentation to workers on the farmers’ behalf. Clearly the accounting processes for this type of work must be robust and transparent. For casual migrant workers, efforts should be made by farmers to provide an account of the hours worked, the pay rate and total pay issued to workers. Where workers have poor reading skills or do not read the local language, they should be provided with the means to understand their payslip (e.g. a translation, or help of a fellow-worker who is able to translate and explain the payslip). Even where migrant labour travels from farm to farm, good practice would be to provide a short “payslip” showing wages paid and the work done.

All legally-mandated deductions, such as taxes or social insurance, should be deposited each pay period to the legally-stipulated accounts or agencies and as required by law.

Migrant workers’ remittances must be authorised in writing.

Wages to be paid on time and in full

Farms must have systems in place that ensure timely payment of workers. Withholding wages, or wage deductions, must not be used as a form of punishment or as a deterrent (E.g. to discourage people from resigning).

F174	Working hours for all workers are reasonable (RSP 7)
Workers are not required to work more than the regular and overtime hours allowed by the law of the country where the workers are employed. All overtime work by workers is on a voluntary basis.	
Climate Smart Agriculture	
Not applicable	

Working hours

Clear policies should be in place regarding regular and overtime hours of work, with defined procedures for deciding on overtime and securing worker consent. On smallholder farms, the agreement may be verbal. In the absence of law, the supplier should over time implement steps to meet the goals and requirements set out in the International Labour Organization Convention on hours of work and overtime so that the regular working week does not exceed 48 hours and other than in exceptional circumstances, e.g. during harvest periods, the sum of regular and overtime hours in a week does not exceed 60 hours. Where the sum of regular and overtime hours in a week exceeds 60 hours under normal conditions, a plan to implement a step-wise and sustainable reduction toward this goal should be in place.

We recognise that agricultural labour requirements are seasonal, and that many workers work for long hours (particularly during harvest). However it is important to ensure that workers consent to their working hours, and that the working hour demands on workers are not unreasonable. Policies addressing the number of working hours should address the number of full-time hours employees are required to work, the length of the lunch break and the length of other breaks if provided.

Agricultural workers are usually exempt from legislation (e.g. the European Working time Directive) limiting normal working hours. However, the general guidance (which in the absence of law is that workers should not work for more than 48 hours a week on average) is still a useful starting point for discussion.

For more information and guidance on the ILO Convention see <http://ilo.org/global/standards/subjects-covered-by-international-labour-standards/working-time/lang--en/index.htm>

Rest days

Workers should be entitled to at least 24 consecutive hours of rest in every seven-day period. If workers are required to work on a rest day due to a genuine need for continuity of production or service, workers must receive an equivalent

period of compensatory rest immediately following. In most instances, rest days fall over a weekend, however on farms, the timing may vary depending on the season, ploughing and harvesting times and periods of operational intensity. However, fatigue that can occur from periods of intensive work can lead to physical and mental strain and be counterproductive.

In all cases, workers must be fairly compensated in instances that require their time over rest days, in an agreed form (pay or time off), as well as be given rest days equivalent to the ones missed.

Overtime is voluntary

Overtime constitutes time worked beyond normal working hours – those fixed by an employment contract. In many countries, employers do not have to pay workers for overtime. However, employees' average pay for the total hours worked without overtime must not fall below the National Minimum Wage, and overtime must be voluntary.

An employee's employment contract will typically stipulate details of any overtime pay rates and how these are worked out.

Overtime should be an exception rather than a regular occurrence, and must be expressly authorised and accepted.

On smallholder farms there may be a written agreement (unless poor literacy is the case – making verbal agreements acceptable) regarding working hours, but it must be legal and within local norms.

F175	All workers are free to exercise their right to form and/or join trade unions or to refrain from doing so and to bargain collectively (RSP 8)
The rights of workers to freedom of association and collective bargaining are recognised and respected. Workers are not intimidated or harassed in the exercise of their right to join or refrain from joining any organisation.	
Climate Smart Agriculture	
Not applicable	

Freedom of association

Managers and supervisors should be trained to respect each workers' right to associate freely. This is not applicable to smallholders where no smallholders employ unionised labour.

According to the United Nation's Global Compact⁴, freedom of association implies a respect for the right of all employees and all workers to freely and voluntarily establish and join organisations of their own choice. These organisations have the right to carry out their activities in full freedom and without interference, including the promotion and defence of their occupational interests. Employers have the right to freedom of expression if its exercise does not infringe a worker's right to make a free decision on whether or not to join a trade union. Employers should not interfere in an employee's decision to associate, or discriminate against the employee or their representative. "Association" includes activities or rule formation, administration and the election of representatives. Farmers, and managers of plantations or large farms, must not limit worker freedom to join trade unions, debating societies, political parties, religious groups, fraternities, societies or sports clubs.

Collective bargaining

Collective bargaining negotiations should be entered into when requested by legally recognised representative agents, and collective agreements concluded. This is not applicable to smallholders where smallholders do not employ unionised labour.

Collective bargaining refers to a voluntary process or activity through which employees and workers discuss and negotiate their relations, in particular terms and conditions of work and the regulation of relations between employers, workers and their organisations. Participants in collective bargaining include employers themselves or their organisations, and trade unions or, in their absence, representatives freely designated by the workers.

Collective bargaining negotiations must be entered into when requested by an appropriate Trade Union or other legally recognised representative agents. Binding agreements reached by the legally defined collective bargaining process must then be implemented.

Worker rights

Workers must be aware of their rights, communicated through:

- Their employment contract (although this need not reference the actual law or regulation that upholds this right), supplemented by;
- Information provided by Trade Unions to which workers belong, and other types of information made available

to workers by farmers, farm management, the media, government or other sources of information.

F176	All workers have access to fair procedures and remedies (RSP 10)
All workers are provided with transparent, fair and confidential procedures that result in swift, unbiased and fair resolution of difficulties which may arise as part of their working relationship (e.g. unfair treatment of workers).	
Climate Smart Agriculture	
Not applicable	

Remediation

Procedures should be in place that (i) provide effective, accessible channels for workers to complain, make suggestions and lodge grievances and (ii) require the matter to be fully investigated, and result in swift, unbiased and fair resolution. This is applicable to large farms, plantations, co-operatives, farms employing landless/migrant workers and smallholder "umbrella" organisations, but not to individual smallholders.

Complaints and grievances must be investigated fully, without bias, and without the person who raised the concern being victimised. To encourage fast decision-making, a timeframe should ideally form part of the procedure, ensuring all parties responsible in the process are aware of their required commitment to meet deadlines. The process and decisions made must follow an unbiased and fair approach that does not favour particular individuals and achieves outcomes acceptable given the gravity of the matter.

Workers should be aware of and have ready access to information and procedures on how to lay a complaint that is handled confidentially and does not result in retaliation.

For worker concerns relating to business integrity, please see F170 in this Code.

F177	Land rights of communities, including indigenous peoples, will be protected and promoted (RSP 11)
The rights and title to property and land of the individual, indigenous people and local communities are respected. All negotiations with regard to their property or land, including the use of and transfers of it, adhere to the principles of free, prior and informed consent, contract transparency and disclosure.	
Climate Smart Agriculture	
Not applicable	

⁴ <https://www.unglobalcompact.org/what-is-gc/mission/principles/principle-3>

Land Rights and FPIC

Free, Prior and Informed Consent is the principle that a person or community has the right to give or withhold their consent to proposed projects that may affect the lands they customarily own, occupy or use. It is a social instrument geared to recognise the rights of any community whose livelihoods will be affected by external development proposals. Assented for under international law and the United Nations Declaration on the Rights of Indigenous Peoples, it protects the right for indigenous peoples to control their own future and the future of their people⁵. Oxfam describe each element of the concept as follows:

- Free from force, intimidation, coercion, or pressure by any government or company.
- Prior to government allocating land for particular land use and prior to approval of specific projects. Indigenous peoples must be given sufficient time to consider all the information and make a decision.
- Informed means that the community must be given all the relevant information to make its decision about whether to agree to the project or not. Information must be provided in a local language understood by the community, communities must have access to independent information, as well as access to expertise on law and technical issues.
- Consent requires that the people involved in the project allow indigenous communities to say “Yes” or “No” to the project. This should be according to the decision-making process of their choice.

Oxfam’s comprehensive Guide to Free Prior and Informed Consent, can be used to train workers in this regard and is available at this link: https://www.culturalsurvival.org/sites/default/files/guidetofreepriorinformedconsent_0.pdf.

This could be relevant to you now or in the future and we urge you to be proactive and become well informed. Unilever suppliers may be involved in building or extending factories, creating or extending farms, plantations, clearing land, buying and changing the use of land, or changing the access situation for local people (E.g. New access for trucks means driving through a housing estate that was not previously impacted by the site)

The rights of communities and indigenous peoples are important in the local context in which suppliers and their farmers operate their business. New projects, which stand

to introduce some degree of change to the area, should be considered relevant in this regard and carefully planned against these requirements. The following approach provides steps that businesses can take to achieve compliance with the below requirements:

- A business must consider what they would do in the event that land use change/ FPIC becomes relevant to them.
 - Who in the business knows anything about this topic – if no one – who needs to be trained to a) make an assessment, b) take action if/ when required?
 - How can you ensure that the knowledge remains in the business and is current?
- The intention to acknowledge and protect land rights and honour zero land grabbing should be mentioned in a business policy, and if it relevant should be developed into management procedures.
 - How do you assure that your management team/s understand zero tolerance of land grabbing and the principles of FPIC?
- In case and before FPIC becomes relevant, a business must know what action they would take. (E.g., how will they make sure that all of the people impacted are given enough information and there is correct consultation and consent given?)
 - How will a business apply the correct due diligence in an open transparent manner?
- A business needs to have an awareness of their supply chain and the likely impacts that their suppliers may have under this fundamental principle.
 - Do you know where your suppliers are and if any of your suppliers operate in countries with high incidence of land use change or do you know about any of your suppliers who will expand their site in the future?
 - How can you cascade the awareness of the need to acknowledge and protect land rights of those impacted by change/ expansion?+D4

In summary, we are looking for suppliers to acknowledge the seriousness of this topic and be willing to implement a proactive approach to future (definite or possible) requirements. This is a topic of today and the future. We urge a business to think through this and discuss it at a business level – it may not be relevant this year but it might be the next, hence we encourage this topic to be brought into the business agenda.

This criterion is similar to criteria F111 and F112 of the social chapter, which also include the protection of customary rights to ecosystem service provision (E.g. Access to watercourses to obtain drinking water).

⁵ https://www.culturalsurvival.org/sites/default/files/guidetofreepriorinformedconsent_0.pdf

FPIC Training

Where applicable, periodic training on Free, Prior and Informed Consent (FPIC) should be provided to all relevant staff members. This is relevant to large farms and plantations undergoing expansion/land use change, and to any project involving consolidation or reorganisation of smallholder farmland. It is not applicable to individual smallholders.



APPENDIX 1: RISK ASSESSMENT, HACCP, QA, AND TCO

Many Good Practices require a Risk Assessment to be performed and risk-based management systems put in place. In the “Value Chain” section, we ask that all risk assessments be brought together under the general HACCP approach to Quality Assurance (QA).

A1.1 RISK ASSESSMENT - GENERAL PRINCIPLES

Human health and safety, environmental and other social risks must be assessed according to hazard and probability. The basic idea behind risk assessment is to combine assessments of hazards with assessments of probability that the event will occur. See Risk Matrix below.

- The hazard is any source of potential damage, harm or adverse effects. It is assessed in terms of how serious the consequences of any event or behaviour are.
- Probability refers to the likelihood of the event happening at all, or the frequency with which it occurs.

For all risks, the expected exposure routes must be taken into account. Appropriate measures to mitigate risks are then put in place.

A serious hazard, combined with a high likelihood (= highest risk) should be assigned the highest priority for risk management.

Risks should be re-assessed once risk mitigation procedures are put in place, to address the residual risk.

This is a continual process

For suppliers with little experience of risk assessment, we recommend an excellent general introduction and process guide to risk assessment (focused on Health and Safety) available from the source below:

‘Five Steps to a Risk Assessment’: <http://www.hse.gov.uk/risk/fivesteps.htm>

Once a risk assessment approach has been developed for health and safety, it is relatively easy to see how a similar approach to environmental, reputational, quality and other social risks can be achieved.

Other documents, which may help are available at: <http://www.hse.gov.uk/risk/expert.htm>

Risk assessments must be based on relevant and up-to-date expertise.

A1.2 SAFETY AND QUALITY HAZARDS

Typical Crop Safety and Quality Hazards include:

Biological

- Variety;
- Pathogenic bacteria (E.g. E.coli and Salmonella);
- Fungal toxins;
- Plant toxins, (E.g. Glycoalkaloids from solanaceous weeds);
- Fungal bodies or plant berries (E.g. ergot, nightshade);
- Genetically modified materials (derived from GMOs);
- Fungal moulds and bacterial rots (spoilage);
- Plant diseases;
- Insects; and
- Animal or human matter (E.g. Faeces)

Chemical

- CPP residues, (e.g. exceeding MRLs (Maximum Residue Limits) or using CPPs not permitted in destination country);
- Nitrate levels – certain leafy crops such as spinach;
- Heavy metal levels, (e.g. Lead (Pb), cadmium (Cd);
- Mineral oils – lubricants, hydraulic oil, diesel;
- Composition, (e.g. protein, sugars, oil); and
- Dry matter content

Physical

- Glass;
- Metal;
- Stones;
- Wood;
- Extraneous vegetable matter (EVM) – contamination with other plant parts;
- Foreign EVM – contamination with plant parts not from the crop;
- Physical damage and blemishes;
- Size/shape;
- Colour; and
- Soil contamination

A1.3 OTHER RISK ASSESSMENTS

Typical Scope of Risk Assessments

The general risk assessments (i.e. those not specifically linked to quality or contamination where HACCP is the required methodology) must cover **all areas of risk**:

- People (E.g. Operators, neighbours and bystanders);
- Environment (E.g. Soil, water, air and biodiversity)
- Economic (E.g. Profitability) and consider;
- Normal (routine use and management);
- Non-routine or abnormal (E.g. When handling CPPs 'abnormal' means extraordinary but planned situations, such as refilling fuel tanks or change of oil filters) and
- Emergency (e.g. during fire or flooding) circumstances.

For example, properly constructing, bunding and using a tank of diesel will help manage risks during routine activities. Non-routine situations, like replacing a valve, and emergency circumstances, like a fire, may introduce additional risks (spillage, explosion), which are not effectively managed by the above measures.

Non-routine situations can be regularly arising (E.g. Maintenance of equipment or staff exiting a building by a secondary exit instead of the normal exit); or they may never have happened to date, but are theoretically possible (E.g. Power cut or livestock epidemic). Non-routine situations can increase the significance of a risk or introduce additional risks, compared to routine activities.

A1.4 Risk management

Any identified control or mitigation measures must be hierarchical in approach. For risks associated with Nutrients for example, we ask:

1. **Fertiliser choice** Can a formulation be used that reduces the identified risk (e.g. pellets rather than liquid fertilisers, organic fertilisers rather than synthetic inorganic ones, ammonium nitrate rather than urea)?;
2. Can the identified risks for the selected fertilisers be controlled through **engineering approaches to prevent or reduce exposure**? E.g. Bunded storage systems, riparian strips, or enclosed tractor cabs?;
3. What are the best **handling procedures to reduce or minimise exposure**? E.g. Ensuring competent/trained operators, proper calibration of equipment, mixing practices, hygiene practices, etc.; and
4. Finally and only after all other approaches have been assessed, what Personal Protective Equipment (PPE) is necessary to control any residual risk?

For risks associated with **Pest Management**, for example, we ask:

- 1 **Substitution** – can another pest control method be used not involving the application of chemicals?;
- 2 Can a **safer CPP or formulation be used**? The use of Manufacturers Safety Data Sheets or public domain risk assessment tools should be encouraged. E.g. Unilever's PRoMPT system;
- 3 Can the identified risks for the selected CPP be controlled through **engineering approaches to prevent or reduce exposure**? E.g. Improved store security, closed transfer systems, enclosed tractor cabs, CPP formulations in water soluble bags;
- 4 What are the best **handling procedures to reduce or minimise exposure**? E.g. Ensuring competent/trained operators, appropriate nozzle height, mixing practices, hygiene practices, etc.;
- 5 Finally and only after all other approaches have been assessed, what **PPE** is necessary to control any residual risk?; and
- 6 The exposure risks for individuals who spray CPPs must be considered, particularly to determine whether health checks are necessary.

Guidelines (to help inform risk assessments related to the use of Crop Protection Products) on how to deal with CPP poisoning in an emergency can be found on the Crop Life site at: http://croplife.org/wp-content/uploads/pdf_files/Guidelines-for-emergency-measures-in-case-of-crop-protection-product-poisoning.pdf

The management of **Health and Safety at Work** in agriculture must be based on a risk assessment approach, and be accompanied by:

- Input from workers representatives & agreement on priority setting;
- Provision of Health and safety awareness training; and
- Provision of first aid training and first aid kits in the workplace

There are risks to people, the environment, our products and our reputation arising FROM agricultural practices, and risks arising from outside farms and the supply chains TO agricultural operations. This inevitably results in some risks appearing more than once in the Unilever Sustainable Agriculture Code.



