# The Global Farm Metric Framework

Categories, sub-categories and indicators explained


GLOBAL FARM METRIC

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## Overview

The Global Farm Metric team is releasing the latest version of its outcomes-based sustainability framework, designed to help food and farming stakeholders to understand, measure and monitor the state of farming systems globally. It establishes a common language to align existing metrics around a holistic view of farm-level sustainability, enabling the collection of a baseline of data.

The revised framework is the result of a collaborative process led by farmers and informed by farm trials, research and expert consultation. It has been updated to improve clarity, robustness and usefulness, both as a framework to measure the state of the farming system and as a learning resource. Changes include category and subcategory level updates, a full list of indicators and detailed category descriptions.

## What is the Global Farm Metric?

The Global Farm Metric establishes a common language to align existing metrics around a holistic view of farm-level sustainability, enabling the collection of a baseline of data. The framework enables farmers to understand the social, economic and environmental sustainability of their systems in a way that is robust, holistic and independent of any particular farming philosophy.

A common baseline of sustainability data then empowers farmers to communicate farm-level outcomes across the food and farming sector. This supports more informed and transparent decision making, risk management and the avoidance of unintended consequences on-farm, in policy and along the supply chain.

By building a common language, the Global Farm Metric can help shape the policy and economic environment to support sustainable production and drive collective action for nature, climate and people.

The Global Farm Metric is supported by a coalition of over 100 partners, including farmers, advisors, researchers, educators, environmental groups, certifiers, food companies, financial services and government agencies.

Find out more about the GFM here.

## The process of development

The Sustainable Food Trust have been developing the Global Farm Metric framework for the last six years, building on the Public Goods Tool – a collaborative project led by the Organic Research Centre and Natural England to explore how the delivery of public goods could be measured and rewarded. During this time, we have been running annual farm trials and

carrying out research to develop a framework that it is useful to and useable by farmers and the wider food and farming system.

In 2021, the GFM framework was embedded into a research tool that enabled farmers to self-assess their sustainability. In the UK, we ran trials on over 40 farms, collecting feedback from a range of farming scales and systems across the country, and held workshops with farm consultants to explore how a whole-farm framework and sustainability assessment can help farmers transition towards more sustainable systems. The framework has also been adapted and trialled with farmers in the US and Malawi. Through the trials, data from farmers and farm advisors were collected and analysed to inform the revision of the framework and to build our understanding of the practicalities of on-farm assessment. An overview of the trial results can be found in the trials case studies report.

Alongside this, researchers from the Sustainable Food Trust, The Organic Research Centre and the University of Reading undertook desk-based research to revise the existing categories and subcategories and develop sustainability indicators. This included a scoping review of indicators used by existing sustainability frameworks and assessments; a review of recent academic literature; and for the nature category, expert consultation via a Delphi process, involving two rounds of surveys and a one-day workshop. Trial learnings and the presence of practicing farmers in the research team ensured that farmers are at the forefront of the GFM.

From this work, the Global Farm Metric framework has been revised and updated:

- The aims and narratives of categories and subcategories are clarified
- Robust, outcome-based indicators are defined for each subcategory
- Uses and limitations of the GFM are clearly delineated – including its ability to measure the state of farming systems
- The GFM's role in facilitating farm and system level change is outlined

## Highlights

*Indicators to measure the state of the system*

For each sub-category in the GFM framework, the indicators have been updated. These indicators enable measurement of the state of the farm system across the GFM categories and can be monitored over time.

Monitoring the state of a farm system over time will identify changes as they happen and record the outcome of what has happened over the period. The outcomes measured through the GFM framework will arise from range of on-farm and off-farm impacts, historical and current, the state of the system does not in itself imply good or poor practice. Unpicking and understanding the extent to which the outcomes are affected by farming practices or by external factors requires additional impact assessments.

Impact assessments explore the reasons behind the current state of a farming system. An assessment could be as simple as a discussion with a farm advisor about the causes of any issues identified, whether on-farm or external. It could also include formal modelling (e.g. using carbon footprinting or nutrient management tools) to explore the likely efficacy of any potential solutions.

Although impact assessment is beyond the direct scope of the GFM, the GFM framework highlights the potential issues and need for further enquiry across all categories of sustainability and provides the structure for a holistic approach. This helps avoid the unintended consequences that could arise by focusing on just one element of the system.

Additional benefits of a state of the system approach include that it does not require detailed information on farm practices as focus is on the outcome, rather than modelling the potential impacts of those practices). By recognising that actors beyond the farm-gate often have a huge influence on the sustainability of a farm, it highlights the need to explore causes fully before working out what and who needs to change. This creates a more collaborative basis for change as it does not directly attribute responsibilities for the outcomes.

*Category updates*

Category names in the updated GFM wheel have been clarified. Each now refers to a specific part of the system using straightforward language and removing terms which refer to practice (such as 'management'), a desired outcome (such as 'productivity') and abstract concepts (such as 'human'). Each has a clear explanation and aims: if you meet the category aims, the indicators will improve.

The category 'productivity' has been divided into 'production' and 'economics'. This differentiates yield (i.e. food, feed, fuel, and fibre production) from market impacts on costs and the value of produce. The purpose is to bring greater clarity to these two important drivers when considering how a farm can become more viable and resilient.

The category 'climate' – which previously focussed on greenhouse gas emissions and sequestration – now addresses the effects of climate on the farm. This provides relevant, actionable information which the farmer can use to adapt to changing local conditions. Defining climate in this way is in line with the role of the framework as a means of understanding the state of the system. Impact assessments, such as carbon foot-printing, are then important next steps to model scenarios and inform change.

*The GFM framework for learning*

The GFM framework (including the wheel format, categories and subcategories, their aims and descriptions) can be a valuable resource for introducing a holistic view of sustainability and demonstrating the importance of nature and community to sustainable production and the farm business. This can reduce barriers to engagement with a formal assessment and help farmers to make the most of their results. Further educational resources to support its use as a learning tool will be released in 2023.

## Reading the wheel

The revised GFM wheel has been arranged so that the order of the categories reflects their relationship with each other:


**Nature** provides the life support systems that **communities** rely on for sustenance, shelter, and a vast range of health, cultural, and aesthetic benefits. In turn, the natural world is shaped by (and shapes) **climate**. Nature and climate determine the flows and holding of **water** in the environment, for which the health and structure of the **soil** is vital. Soil underpins most farming systems, stores and sequesters carbon, and nurtures crops - including by holding and releasing the **nutrients** required by them. Nutrients are cycled within the farm and additional nutrients are often brought in, along with a range of other **resources**. **Farmers and workers** manage these inputs and shape the natural system to grow **crops and pasture** and raise **animals**. These are the source of food, fuel, and fibre **production**, and the **economic** rewards this brings to the farm and local communities. Farms also deliver a range of other cultural, educational, employment, and health-related benefits to **communities**, and in return are supported by them through local services and social and professional networks.

This ‘story’ can also be clustered into category themes: natural systems supporting farming (nature, climate, water, soil, nutrients), the farming system itself (resources, farmer and workers, crops and pasture, animals), and farming outputs (production, economics and community). Other connections can be made across the wheel, and other stories told.

The fundamental principle of this framework is that no category of sustainability should be considered in isolation. Improvements in one category must take into account trade-offs and benefits for every category.

Finding ways to make improvements across multiple sustainability categories is an innovation challenge for farmers and others in and beyond the sector. In a world where the environmental and human costs of extracting material resources are so high, solutions must focus on practice and system changes that reduce negative impact and drive positive change.

## Next steps

- **Global adaptation**: The Sustainable Food Trust and Global Farm Metric teams are a core partner of Regen10, a multi-stakeholder platform which aims to scale a global model of regenerative food production. As metrics lead within the project, we are contributing research and expertise towards development of a globally accepted framework for regenerative farming, which shares the scope and utility of the GFM. The framework is also currently being tested and trialled in the US and Malawi, and discussions in Laos, Australia, Canada and Europe are underway.
- **Continual development and collaboration**: trials over the next year will continue to test the indicators and application of the framework within supply chains. Research and expert consultations will continue to refine the framework.
- **Education:** Learning resources will be developed in 2023 and made freely available.
- **Transparency**: A report on the uses and limitations of the framework will be released shortly.
- **Self-assessment:** The framework is being translated into an updated self-assessment tool to trial data collection against the full set of indicators. Work is underway to enable this application of the GFM to be embedded into existing farm management tools and assessments via API. This should reduce duplication of data inputting by farmers and progress the mission of a common language and baseline of data for sustainability.
- **In the commons:** the GFM framework will be registered in the commons to ensure that it remains free to access for all.

# Overview framework categories, subcategories and indicators

| Category | Subcategory | Indicators |
|---|---|---|
| Production | Yields | • Amount of crop harvested / livestock slaughtered<br>• Amount of crops and livestock products sold/consumed<br>• Amount of waste produced (including equipment taken out of service) |
| | Quality | • Nutritional profile of products<br>• Livestock products and crops meeting standards of intended buyer |
| | Diversity | • Crop diversity (using the crop diversity index, including temporal diversity)<br>• Animal diversity (using livestock diversity index)<br>• Farming system diversity (e.g. mixed or specialist) |
| Economics | Ownership | • Farm business ownership<br>• Land ownership and tenure<br>• Legal status |
| | Economic returns | • Profit including non-farming enterprises and external funding<br>• Profit excluding non-farming enterprises<br>• Profit excluding external funding<br>• Profit excluding non-farming enterprises and external funding<br>• Ability to invest |
| | Resilience | • Liabilities relative to assets<br>• Number and relative proportion of income streams |
| Community | Local services | • Services and infrastructure |
| | Network | • Connectedness to supporting networks, advice and peers |
| | Engagement | • Activities undertaken |
| Nature | Farm biodiversity | • Indicator species for habitat quality<br>• Species richness |
| | Farm habitats | • Area of habitats (including productive habitats) |
| | Air, soil, and water quality | • Air quality indicator species<br>• Soil toxins and salinity<br>• Water quality indicator species |

| | | |
|---|---|---|
| Climate | Average conditions | • Average temperature<br>• Average rainfall |
| | Extreme events | • No. of extreme precipitation events<br>• No. of days of meteorological drought<br>• No. of days of official heatwave |
| | Growing season | • Length of growing season (timing of frosts) |
| Water | Inputs | • Water added to system (amount by source) |
| | Soil holding | • Amount of water held in soil |
| | Habitat holding | • Water held in farm habitats |
| Soil | Carbon storage and sequestration | • Soil carbon |
| | Health | • Structure (visual evaluation)<br>• Chemistry (soil organic matter)<br>• Biology (indicator species numbers) |
| | Conservation | • Visible erosion signs<br>• Soil vulnerability (shear strength) |
| Nutrients | Inputs | • Amount of nutrients entering farm system |
| | Balance | • Balance of nutrients entering and leaving the farm system (including products, manure and slurry) |
| | Stocks | • Soil macro-nutrient and micro-nutrient levels<br>• Cation exchange capacity of soil |
| Resources | Energy and fuel | • Amount and type of energy and fuel used<br>• Amount of energy generated |
| | Other inputs | • Amount of non-nutrient inputs used<br>• Inventory of equipment |
| | Infrastructure | • Fitness for purpose of buildings and other infrastructure<br>• State of buildings and other infrastructure |

| | | |
|---|---|---|
| Farmer and workers | Health and working conditions | • Occupational injuries and near misses<br>• Number of days of sickness<br>• Remuneration and rewards for work<br>• Workload<br>• Freedoms and rights<br>• Staff turnover |
| | Decision making | • Decision making model<br>• Number of people involved<br>• Inclusivity |
| | Opportunities | • Days of training<br>• Staff promotion (internal or external)<br>• Work role allocation |
| Crops and pasture | Environmental fit | • Species characteristics appropriate to farming system and conditions<br>• Variety characteristics appropriate to farming system and conditions<br>• Genetic characteristics appropriate to farming system and conditions |
| | Lifecycle | • Germination success<br>• Pre-harvest loss of standing crop<br>• Re-seeding/re-planting interval |
| | Health | • Species richness of unsown grasslands<br>• Species-specific field test of crop health |
| Animals | Environmental fit | • Species characteristics appropriate to farming system and conditions<br>• Breed characteristics appropriate to farming system and conditions<br>• Genetic characteristics appropriate to farming system and conditions (at herd/flock level) |
| | Lifecycle | • Fertility<br>• Mortality<br>• Longevity |
| | Health and welfare | • Species-specific measures of welfare (physical, behavioural)<br>• Species-specific measures of quality of life |

# Production

Yields | Quality | Diversity

**Production outcomes:**

- Maintain and improve the yields of crop and animal products from the farm
- Maintain and improve the quality of these crop and animal products
- Maintain and improve the resilience of production

As the world population rises, and climate change and biodiversity loss destabilise yields and affect food nutritional quality, food security has become a pressing global challenge. In this context, food producers have a fundamental role to play in sustaining the human population. Both yield and product quality must be monitored to ensure that we can feed a growing population and reward farmers for producing safe and nutritious foods. In the context of increasing climate-related shocks, monitoring the resilience of farm production is also essential. Growing and producing a diversity of crops and animals in sustainable systems is one way of increasing the resilience of farm production.

To sustain production, we need to think holistically about all aspects of sustainability and go beyond producing food with reduced impacts towards, wherever possible, producing food with positive impacts on the social and natural systems which enable us to farm.

**Subcategory indicators:**

Yields

- Amount of crop harvested / livestock slaughtered
- Amount of crops and livestock products sold / consumed
- Amount of waste produced (including equipment taken out of service)

Quality

- Nutritional profile of products
- Livestock products and crops meeting standards of intended buyer

Diversity

- Crop diversity (using the crop diversity index, including temporal diversity)
- Animal diversity (using livestock diversity index)
- Farming system diversity (e.g. mixed or specialist)

# Economics

Ownership | Economic Returns | Resilience

**Economic outcomes:**

- Improve financial viability of production – including farms managed on a not-for-profit basis
- Increase resources available to improve sustainability and adapt to immediate and long-term challenges
- Diversify income streams to spread risk in the context of volatile markets for farm produce

Farms need to provide a long-term secure living for farmers, their families, and workers. While the aim might not always be to make or maximise profit, the business will need to break even or provide enough produce to compensate the time spent on production. Sufficient resources must be in place to enable the adoption of more sustainable practices, respond to immediate challenges, and adapt to projected long-term change. The model of ownership of both the land and the farm business creates the context for decision making on-farm, underpins its viability and is a key determinant of how economic rewards are distributed.

A farm that is not financially viable cannot produce the food, fuel, and fibre which society requires. It may also struggle to provide the resources needed to improve performance in other sustainability categories, or to adapt to change and maintain productivity in the long-term or at the optimum level.

**Subcategory indicators:**

Ownership:

- Farm business ownership
- Land ownership and tenure
- Legal status

Economic returns:

- Profit including non-farming enterprises and external funding
- Profit excluding non-farming enterprises
- Profit excluding external funding
- Profit excluding non-farming enterprises and external funding
- Ability to invest

Resilience:

- Liabilities relative to assets
- Number and relative proportion of income streams

## Community

Local Services | Network | Engagement

**Community outcomes:**

- Improve the health, well-being and resilience of farmers and their families through local support and services for the farming system
- Improve connectivity, as well as the support, knowledge and resource sharing needed to adapt to challenges
- Improve the relationship between the farm and community to create a mutually supportive and thriving environment

Farms are at the heart of rural communities, contributing to the local economy through expenditure and workers' wages; supporting and continuing rural culture and traditions; managing cultural, historic or geologically important sites and landscapes; providing access to nature, hosting education events and farm visits; and protecting crop and animal genetic diversity in heritage breeds and crop landraces. At the same time, the availability of local services – such as farm suppliers, abattoirs, veterinary centres and financial services, as well as schools, doctors' surgeries and local transport - is vital both for farming and for the lives of those who work in the agricultural sector. Professional networks and engagement with peers and others in joint initiatives are also vital aspects of farm resilience, providing knowledge, insights, support, and advice when it is needed.

Good relations with the local community are important to the health, well-being and resilience of farmers and their families and can create a positive atmosphere in which local people support, and even help the farmer achieve, their goals. Simultaneously, financially thriving, sustainable farms are more likely to deliver social and environmental outcomes than farms which are struggling due to costs, prices, or degradation of the functions of nature, water, soil, and climate.

**Subcategory indicators:**

Local services:

- Services and infrastructure

Network:

- Connectedness to initiatives, advice, and peers

Engagement:

- Activities undertaken (including employment, school visits, events, community projects, rights of way management, care for cultural, historic or geologically important sites and landscapes, and protection of rare breeds and crop landraces)

## Nature

Farm Biodiversity | Farm Habitats | Soil, Air and Water Quality

**Nature outcomes:**

- Increase biodiversity and protect threatened organisms and habitats within productive and non-productive agricultural land
- Increase the area, suitability and connectivity of habitats for species naturally found in the farm's location
- Improve ecosystem health and reduce pollution

Biodiversity and wildlife are in rapid decline. Climate change is forcing organisms to relocate for survival, while air, soil, and water quality issues threaten the health of individual species and their habitats, as well as the farm's productive capacity. To maintain food production and essential ecosystems services, it is vital to identify and respond to biodiversity threats that occur on and off farm, and recognise that farming can be part of the solution to these challenges. Productive farming systems can provide vital habitat, cover, and resources for organisms. In return, healthy ecosystems buffer production from extreme events; provide pollination and natural pest control; support healthy water and soil systems; and create a pleasant working environment for farmers and workers. However, biodiversity must be conserved and enhanced in more than just specific locations: providing habitat 'stepping-stones' or 'nature corridors' across and within all landscapes - including the agricultural fields themselves - give organisms the space to move and mix according to their instincts and physical requirements.

Nature, diversity and functioning ecosystems are essential for human existence and underpin every category in the Global Farm Metric framework. Living organisms play intrinsic roles in long-term food production, water quality and flood and drought prevention. They form and shape the characteristics of soil, provide resilience to climate change, and are key determinants of human, animal, and crop health. Nature and natural landscapes are also central to thriving communities and cultures.

**Subcategory indicators:**

Farm biodiversity:

- Indicator species for habitat quality
- Species richness

Farm habitats:

- Area of habitats (including productive habitats)

Air, soil, and water quality:

- Air quality indicator species
- Soil toxins and salinity
- Water quality indicator species

# Climate

Average Conditions | Extreme Events | Growing Season

**Climate outcomes:**

- Improve knowledge of changes in the climate, weather and length of growing season in a farm's location
- Enable timely adaptation of farming systems and practices to changing climate conditions
- Improve resilience of production, natural and social systems and reduce the impacts of extreme events

To take advantage of new opportunities offered by climate change, it is important to identify changes in average climatic conditions and the length of the growing season over time. This highlights the adaptations needed to maintain a good fit between crops and livestock and the changing environment. Monitoring extreme weather events relating to precipitation, windspeeds and temperature from year to year, helps build awareness and resilience to shocks and stresses.

The build-up of greenhouse gases, such as carbon dioxide, in the atmosphere is causing long term shifts in temperatures and weather patterns. As well as destabilising ecosystems and natural processes, climate change is a major threat to the sustainability of production and human populations. To estimate the greenhouse gases emitted and sequestered on farm, you will need to use a separate carbon calculator – this would form part of an impact assessment.

**Subcategory indicators:**

Average conditions:

- Average temperature
- Average rainfall

Extreme events:

- Number of extreme precipitation events
- Days of meteorological drought
- Days of official heatwave

Growing season:

- Length of growing season (timing of frosts)

# Water

Inputs | Soil Holding | Habitat Holding

**Water outcomes:**

- Reduce water use overall and reliance on mains and extracted water
- Increase use of recycled and grey water
- Improve the natural water holding capacity of soil and habitats in both agriculturally productive and non-productive areas
- Increase the availability of fresh water and functioning of natural water systems, as well as resilience to flood and drought

Fresh water is vital for human life and for the functioning of natural systems – but water scarcity is becoming a major challenge across the globe. Reducing reliance on water includes decreasing the amount of water inputs and reducing reliance on mains water and water extraction to support the farm. Improvement may involve practice changes (such as fixing leaks and using grey water) and system level adaptations (such as choosing crops and animals that are suited to local water availability and conditions). Improving soil structure and maintaining habitats to hold more water can buffer the effects of extreme precipitation or drought, both on-farm and off-farm.

Water management, availability, extraction, use and holding have important implications for many sustainability categories, including productivity, nature, soil, crops and pasture, animals, and nutrient management, with implications for energy and resources too. Flooding and drought carry risks for the farmer and workers, while excessive use and poor water management affect the community and other rural businesses, including fishers, fish-farms, swimmers, water mills and hydro-electric power plants.

**Subcategory indicators:**

Inputs:

- Water added to system (amount by source)

Soil holding:

- Amount of water held in soil

Habitat holding:

- Water held in farm habitats

*Water quality and biodiversity are covered in the ‘Nature’ category, this category measures water as a resource.

## Soil

Carbon Storage and Sequestration | Health | Conservation

**Soil outcomes:**

- Maximise soil carbon storage and sequestration and reduce carbon loss to the atmosphere
- Improve soil health, biodiversity and functionality
- Improve soil conservation
- Increase the resilience, long-term sustainability and quality of production on-farm

Healthy soil maximises carbon sequestration and improves carbon stores in the ground. Soil structure, chemistry, and biology are together key determinants of health, affecting which crop and pasture species can grow, how they grow, how resilient they will be to environmental conditions including pests and diseases, and their nutritional quality. Conservation is key to reducing soil and nutrient loss, as well as subsequent damage to water quality and biota (including from mud slides and dust storms).

Soil is a vital component and driver of the state of nature and biodiversity. Poor soil health will decrease average yields and reduce resilience to changes in environmental conditions, with implications for farm viability, greenhouse gas emissions, and water quality and biota. Putting or leaving animals on degraded soils can cause animal health problems (such as foot conditions) and reduce pasture productivity. Soil erosion compromises the nutrients it relies on and thus the medium in which crops are grown, as well as impacting local communities indirectly (through the impacts on other categories above) and directly (through flooding, mudslides, dust storms and related hazards).

**Subcategory indicators:**

Carbon storage and sequestration:

- Soil carbon

Health:

- Structure (visual evaluation of soil structure)
- Chemistry (soil organic matter content)
- Biology (earthworm count)

Conservation:

- Visible erosion signs
- Soil vulnerability (shear strength)

* The nutrients held in soil are considered within the ‘Nutrients’ category.

# Nutrients

Inputs | Balance | Nutrient Stocks

**Nutrients outcomes:**

- Minimise the importation of nutrients to the system in feed or chemical fertilisers
- Reduce the movement, waste loss of nutrients to the environment
- Improve the amount and mix of nutrients held in soils on-farm and the ability of the soil to store them
- Reduce the environmental and business costs associated with the production, transportation, use and pollution of artificial fertilisers

The production, transportation and use of artificial fertilisers carry high environmental costs. Inputs such as the nutrient value of animal excreta, nitrogen fixation by crops, and atmospheric nitrogen deposition are also important to recognise. Equalising the difference between nutrient inputs (livestock manure and fertilisers) and nutrient outputs (uptake for crop and pasture production) maximises production and limits economic and environmental costs. It increases efficiency and reduces imbalances in nutrient levels across regions and countries, which can cause pollution in areas importing feed, fertilisers and food products, and nutrient deficits in areas exporting them. Understanding the amount and composition of nutrients held in the soils on-farm and the ability of the soil to store them, is vital for efficient management of nutrient supplies to meet the needs of crops and pastures.

Considered nutrient application is essential to achieving high yields and good nutritional quality for crop and livestock products, while maximising crop resilience to weather conditions, disease and pests. The high cost of fertilizers and feed highlights the importance for farm viability. Nutrient losses will have consequences for local communities, water, soil, and air quality and for nature.

**Subcategory indicators:**

Inputs:

- Amount of nutrients entering farm system

Balance:

- Balance of nutrients entering and leaving the farm system (including products, manure and slurry)

Soil stocks:

- Soil macro-nutrient and micro-nutrient levels
- Cation exchange capacity of soil

## Resources

Energy and Fuel | Other Inputs | Infrastructure

**Resources outcomes:**

- Reduce external inputs and the impacts that arise from their extraction, processing, manufacture, transport and use
- Identify aspects of infrastructure needing attention and reduce risk of deteriorating or inappropriately used infrastructure
- Improve production efficiency; farmer, worker and visitor safety; and product safety and quality

Farming, like every production system, uses a range of inputs which all carry environmental, social and economic costs. These costs arise from the extraction of raw materials, their processing, manufacture into products, transport, and use. The amount, type, and sources of inputs relied on by the farm affect its level of vulnerability to off-farm problems. Deteriorating, unsuitable or poorly planned infrastructure (e.g., unsafe or leaking slurry stores or poorly ventilated livestock housing) will cause problems for the efficiency and economic viability of the farm, and potentially pose risks for farmers and workers, farm visitors, livestock, the surrounding environment and community.

The use of energy and resources has economic costs for the farm, and environmental impacts across nature, water, soil, and air and climate. Local impacts (such as pollution of the local countryside) affect local communities and workers, the immediate environment, production and product quality. Many impacts of resource use are off-farm and distant. For example, climate change and the loss of biodiversity will affect production through less predictable growing conditions, increased disease risks, and more volatile input availability and prices.

**Subcategory indicators:**

Energy and fuel:

- Amount and type of energy and fuel used
- Amount of energy generated

Other inputs:

- Inventory of non-nutrient inputs used
- Amount of energy generated

Infrastructure:

- Fitness for purpose of buildings and other infrastructure
- State of buildings and other infrastructure

* Nutrient inputs (fertilisers, seeds, natural bedding, animal feed) are included in ‘Nutrients’.

## Farmer and workers

Health & Working Conditions | Opportunities | Decision Making

**Farmer and workers outcomes:**

- Improve working conditions for farmers, their families and workers (including volunteers, temporary and permanent) - irrespective of age, disability, gender, faith or ethnicity
- Provide freedom from discrimination, bullying, physical and psychological harm
- Improve opportunities for representation, skills development and career pathways
- Improve the effectiveness of decision-making

As employers of permanent and temporary staff, and as workers themselves, farmers are responsible for the conditions, pay, and tasks undertaken by workers, including risk management and support services. Provision of positive working conditions, opportunities for professional and personal development, financial security and freedom from discrimination can improve the health and wellbeing of the workforce and increase productivity. When practical, drawing on a wider pool of knowledge from within the workforce can increase the effectiveness of decision-making and subsequent changes.

Sustainability in this category will positively impact production and economics by increasing productivity and staff retention. A skilled workforce that contributes towards decision-making will also be empowered to contribute towards the sustainability aims of the farm, with additional benefits to the local community and rural economies.

**Subcategory indicators:**

Health and working conditions:

- Occupational injuries and near misses
- Number of days of sickness
- Remuneration and rewards for work
- Workload
- Freedoms and rights
- Staff turnover

Opportunities

- Days of training
- Staff promotion (internal or external)
- Work role allocation

Decision making

- Decision making model
- Number of people involved
- Inclusivity

## Crops and pasture

Environmental Fit | Lifecycle | Health

**Crops and pasture outcomes:**

- Improve the health of crops and pasture for efficient, resilient and high-quality production
- Minimise the interventions required to achieve and maintain health, including fit between crop species and varieties and the environment
- Improve the lifespan of crops and pasture (including grasslands and orchards), reducing pre-harvest losses and frequency of re-planting

A good fit between the species and varieties of crops grown fit with local environmental conditions can minimise the interventions required to keep crops healthy. Maximising the intervals between re-sowing or re-planting and maximising the lifespan of trees, vines, or permanent grasslands also has economic and environmental benefits. Sowing species rich grasslands can reduce impacts from pests, disease, or weather conditions and improve health, while species-specific field tests will be required to monitor crop health.

The health of crops and pasture is essential for the long-term productivity and viability of the farm, as well as the health and welfare of any animals dependent on what is grown. Chemical and nutrient inputs –their production, transportation, use and entry to the environment – directly impact ecosystem services and communities.

**Subcategory indicators:**

Environmental fit:

- Species characteristics appropriate to farming system and conditions
- Variety characteristics appropriate to farming system and conditions
- Genetic characteristics appropriate to farming system and conditions

Lifecycle:

- Germination percentage
- Pre-harvest loss of standing crop
- Re-seeding/re-planting interval

Health:

- Species richness of unsown grasslands
- Species-specific field test of crop health

# Animals

Environmental Fit | Lifecycle | Health and Welfare

**Animals outcomes:**

- Improve farm animal health and welfare and reduce incidence of disease
- Enable expression of natural behaviours and improve quality of life
- Reduce the interventions required to maintain health and welfare

Choosing farm animals suited to the local environment, farming system, infrastructure and husbandry practices reduces the interventions required to maintain health and makes it easier to meet the needs of animals. This reduces the environmental and societal costs associated with interventions, such as anti-microbial resistance. Considering farm animals' reproductive health and mortality rate, as well as their productive lifespan, can start to build up a picture of animal health and welfare on the farm. While measures of health, welfare and quality of life will be species-specific, animals should have the freedom, and the physical and mental capacity, to express their natural behavioural repertoires.

Animal health and welfare not only affects farm viability through the costs of avoiding or rectifying health issues, but also through the multiple impacts of ill-health on animal productivity and product quality. The production and overuse of treatments affects natural (and farmed) systems and, in the case of antibiotics, increases the threat of anti-microbial resistance to humans and animals. High welfare animal systems, on the other hand, increase production efficiency, provide a good quality of life, and contribute to the culture, traditions and relationships in farming and rural communities.

**Subcategory indicators:**

Environmental fit:

- Species characteristics appropriate to farming system and conditions
- Breed characteristics appropriate to farming system and conditions
- Genetic characteristics appropriate to farming system and conditions (at herd/flock level)

Lifecycle:

- Fertility
- Mortality
- Longevity

Health and welfare:

- Species-specific measures of welfare (physical, behavioural)
- Species-specific measures of quality of life

* Treatments costs are included in 'Economics', while medicine residues in the environment is covered in 'Nature'.