

CONTEXT 1

GRAZING DRY- PASTORAL (RUMINANTS) SYSTEMS



CONTENTS

Introduction to the ISL Guide | Structure of ISL Tool Guidance | Overview of Context 1 | ISL Tool Guidance: Context 1

This brief provides an overview of the Investing in Sustainable Livestock (ISL) Tool and the full application of the accompanying ISL Tool to dry, grazing pastoral (ruminant) systems (referred to below as Context 1).

CONTEXT 1: GRAZING DRY-PASTORAL (RUMINANTS) SYSTEMS

INTRODUCTION TO THE ISL GUIDE

The online ISL Guide (www.sustainablelivestockguide.org) is an information resource for designing and implementing environmentally sound livestock development projects. The guide has an interactive tool that provides context-specific guidance, suggested activities, and indicators to help livestock projects contribute to environmental sustainability; it also includes references for further investigation.

The ISL Guide is grounded in tested theory and evidence organized in seven principles for sustainability in the livestock sector. The World Bank and the Food and Agriculture Organization of the United Nations (FAO) specifically developed the following principles for the guide:

1. Contribute to a sustainable food future
2. Enhance carbon stocks
3. Increase productivity at animal and herd levels
4. Source feed sustainably
5. Couple livestock to land
6. Minimize fossil fuel use
7. Foster an enabling environment

Because the ISL Tool understands “sustainability” in a broad sense, it will eventually comprise elements not only of the environment but also of animal health and welfare, public health, and equity issues such as gender and inclusion. Thus, in due course, the World Bank and FAO will expand the scope of the tool to include guidance for addressing these issues in livestock projects.

STRUCTURE OF THE ISL TOOL

The ISL Tool provides guidance for improving the environmental outcomes of livestock projects in the following 6 contexts, which cover the different livestock farming systems found worldwide:

- Context 1: Grazing dry - Pastoral (ruminants)
- Context 2: Grazing temperate (ruminants)
- Context 3: Grazing sub-humid (ruminants)
- Context 4: Mixed crop-livestock, dry (ruminants)
- Context 5: Mixed crop-livestock, humid (monogastrics)
- Context 6: Intensive (ruminants and monogastrics)

The guidance provided for each of these contexts is organized according to objectives and interventions that are typically found in livestock investment projects. A broad review of projects funded by the World Bank Group and other Financial Institutions allowed for identification of:

- Five broad objectives that livestock sector development commonly seeks to achieve: (i) improved productivity of livestock, (ii) improved market access and development of value chains, (iii) improved input and services delivery, (iv) climate change resilience and emergency response, and (v) strengthened policies, knowledge, and information.
- For each of these five objectives, a series of project interventions typically implemented (e.g. “improve animal health and welfare” for the objective “ improved productivity of livestock”), as well as more specific project activities that might be implemented under each intervention (e.g. “undertake vaccination campaigns”). For each objective, the identified interventions and activities differ according to the context of the project.

For every combination of context and intervention, the ISL Tool provides context-specific guidance for improving the environmental outcomes, as well as suggested indicators for project monitoring and evaluation. The guidance integrates the trade-offs that may occur between environmental objectives where relevant and considers compromises among these trade-offs that can lead to submaximal environmental outcomes.

CONTEXT 1: GRAZING DRY-PASTORAL (RUMINANTS) SYSTEMS

OVERVIEW OF CONTEXT 1: GRAZING DRY-PASTORAL (RUMINANT) SYSTEMS

Context 1 covers systems found on communal grasslands where the climate is too dry, hot, or cold to support crops. Animals are mobile and generally low productivity, with herders moving their animals according to the season, resource availability, and market access.

Description of typical situation

Pastoral systems are characterized by mobility, grazing of the natural vegetation as the main source of feed, and predominant use of communal lands. Herders move with their animals for feed and water to avoid diseases and to access markets. Examples of these systems are found in Sub-Saharan Africa (the Sahel, Horn of Africa), Central Asia (Mongolia) and high-altitude lands around the world. Various forms of pastoralism are distinguished: Nomadic pastoralism is defined as pastoralism with constant movement, and transhumance is pastoralism with seasonal movement often between well-defined territories. Pastoralists combining crop production at a homestead with the movement of livestock during part of the year are referred to as agro-pastoralists. Pastoral systems are found on grasslands of all continents. Herders move with species, such as reindeer, camelids, sheep, goat, and cattle in mountainous and arctic regions of Latin America, Europe, and Asia, where it is generally too cold for crop production. Most other vast grassland regions are found in tropical semiarid and arid climates, where it is too dry (most regions have < 1000 mm of precipitation annually) and too hot for crop production. So, pastoralist systems are land use systems adapted to conditions unfavorable for crop production.

For pastoralists, livestock have multiple functions: They are a store of wealth; a source of food, such as dairy products and meat; a source of draft power; a sign of social status; and a source of marketable commodities, including live animals and manure. Pastoralism is thus considered to be a livelihood strategy as well as a way of life as it completely determines the social and economic organization of the people involved and for many centuries has been an important cultural heritage of mankind. West Africa has a high number of pastoralists and will be presented as an example of pastoralism in this context. It is estimated that the world has approximately 120 million pastoralists of which 50 million reside in Africa, with 20 million living in West Africa. Since a sustainable herd size is approximately three to four cows per person, the livestock population in pastoralist herds is between 60 million and 80 million in West Africa. In West Africa, the transhumance system is the predominant form of pastoralism. The West African pastoralists generally graze their livestock (mainly ruminants and camels) on the savannah grasslands during the rainy season to benefit from the nutritious biomass and to avoid cropped areas which are mostly dedicated to agriculture and mixed crop-livestock systems.

During the dry season, the availability and quality of grass in the savannahs become insufficient for livestock feeding, and herders move with their livestock to crop-producing regions to have them feed on the crop residues that remain on the land after harvest. This crop residue grazing has reciprocal benefits for the crop farmer as manure from the animals is deposited directly on the fields. This traditional symbiosis between pastoralists and crop farmers is presently confronting several challenges: reduced availability of grazing land due to the expansion of croplands, reduced access to croplands for dry season grazing because of intensified cropping (e.g. because of dry season cropping on residual water), loss of the value of manure as it is being substituted by synthetic fertilizers in intensified crop production, and reduced access to the corridors along which pastoralist move as a result of policies to curtail pastoralism, cropland expansion, and infrastructure expansion. International borders are also becoming increasingly difficult to cross for herders and their animals. As a result, crop farmers and pastoralists compete for the use of corridors, grazing lands, and croplands; conflict between them is common.

Common environmental issues

Generally, (agro-)pastoral systems are considered to be in balance with the unfavorable conditions and thus contributing to food security from very marginal lands. At the same time, pastoralist grazing is often mentioned as a risk factor for grassland degradation. Grassland degradation is observed as vegetation cover is altered (reduced or even entirely eliminated, or evolving from grass to shrub), and signs of soil erosion appear. Such degradation reduces production potential but also biodiversity, the amount of carbon stored in soils, and replenishment of aquifers. However, pastoralist herders generally take their herding decisions based on the availability and quality of the grassland vegetation to

CONTEXT 1: GRAZING DRY-PASTORAL (RUMINANTS) SYSTEMS

sustain their livestock's needs. This results in a type of grazing management in which herders generally move to new grazing areas before the regenerative capacity of the vegetation is affected by the grazing. Nevertheless, in the case of land access restrictions and times of prolonged droughts, when herds gather around water bodies and watering points as a last resort for survival, severe local overgrazing may occur (Principles 2, 3 and 5).

In many dryland regions, watering points are dug as a water source for pastoral herds. This has affected traditional moving patterns in the sense that herds may stay longer around the watering points, increasing the pressure on grazing lands surrounding the watering points and the chances for overgrazing. This mostly occurs during prolonged droughts. During regular years, however, the vegetation beyond a radius of 1 km from watering points is generally not notably affected (Principles 2, 3 and 5).

Another environmental issue is the relatively high greenhouse gas (GHG) emission intensity associated with the pastoralist production of meat and milk. Livestock productivity in pastoral systems is low because of the variable- and often low-quality feeds, the high energy expenditure on walking and grazing, and the large herd sizes. Methane is the most important GHG emitted. Other contributors to GHG emissions, such as manure deposition on grasslands, land use change, manure storage and application in agro-pastoral systems, and fossil fuel use, are of marginal importance in pastoral systems. In addition, pastoralists tend to keep large herds as a coping strategy against prolonged droughts as the chances of animals surviving a long drought are higher for a larger than for a smaller herd. This coping strategy is associated, therefore, with higher emissions of overall GHGs. These higher emissions should, however, be attributed in part to the coping strategy and other services provided by the herd (e.g., transport and fiber) as opposed to the production of edible meat and milk products (Principles 2 and 3).

ISL TOOL GUIDANCE: CONTEXT 1 GRAZING DRY-PASTORAL (RUMINANTS) SYSTEMS

The section below includes guidance for improving the environmental outcomes of five broad objectives that livestock development projects commonly seek to achieve. Typical interventions and specific activities are suggested under each objective, as well as guidance and indicators for improving environmental outcomes and monitoring and evaluating progress toward these outcomes. The guidance also references relevant Principles of Investment in Sustainable Livestock (Principles 1 – 7 or “P1” through “P7”) for further reading.

OBJECTIVE 1: IMPROVE THE PRODUCTIVITY OF LIVESTOCK

INTERVENTION: IMPROVE ANIMAL HEALTH AND WELFARE

ACTIVITIES

- Undertake vaccination campaigns.
- Improve disease prevention and control.
- Avoid spread of antimicrobial resistance (AMR).
- Improve livestock welfare.

GUIDANCE

- P3 Livestock health and welfare improvements already contribute to sustainability by reducing morbidity and mortality as well as stress on the animal. This, in turn, boosts productivity, reduces incentives to increase herd size to compensate for livestock losses, and consequently lowers GHG emissions and other environmental impacts. [FAO 2011](#), [FAWC 2009](#), [FAO 2013b](#).
- P3 Livestock productivity improvements may incentivize herd growth and increase overall demand for feed. Evaluate the potential implications of any foreseen increase in livestock numbers on water and land resource management. [LEAP 2018a](#), [LEAP 2016f](#), [LEAP 2016a](#).
- P7 Raise awareness among pastoralists on the environmental benefits of improving livestock health and welfare.

INDICATORS

Reduced net GHG emissions (CO₂-eq) per unit (kg) of product for selected agricultural commodities (e.g., milk, meat, and eggs) — Percentage. This indicator measures the climate impact — i.e., net greenhouse gas (GHG) emissions, including soil carbon sequestration — of agricultural commodity production. It measures the change in the net emission of GHG per unit of agricultural product, including sources and sinks along the supply chain. GHG emissions are converted to carbon dioxide (CO₂) equivalent using standard global warming potential values. Quantification can be performed using IPCC [2006 Guidelines](#), calculators (e.g., [GLEAM-i](#), [Cool Farm Tool](#)). The team may consider using certified methodologies, such as the [Gold Standard Small Holder Dairy Methodology](#) to generate tradeable GHG mitigation outcomes as well as the [LEAP 2018 guidelines for assessing environmental performance in pig supply chains](#) and in [large ruminant supply chains](#).

- Quantification may be undertaken at the start of the project, at medium term, and during terminal evaluation, using dedicated surveys to parameterize models, together with activity data from the monitoring system.

Farmers/extension agents/service providers trained on environmental issues and options in the livestock sector — Number. This indicator measures the number of stakeholders along the supply chains that have been made aware of and trained on environmental issues in the livestock sector, for instance, through the inclusion of environmental issues and options **in curriculums, extension manuals, capacity development programs, etc.**

- Quantification may be undertaken annually or at the start of the project, at medium term, and during terminal evaluation, using dedicated surveys.

OBJECTIVE 1

OBJECTIVE 2

OBJECTIVE 3

OBJECTIVE 4

OBJECTIVE 5

OBJECTIVE 1: IMPROVE THE PRODUCTIVITY OF LIVESTOCK

INTERVENTION: IMPROVE ANIMAL GENETICS

ACTIVITIES

- Select for improved genetics within the existing herd.

GUIDANCE

- P3 Improving animal genetics already contributes to sustainability by avoiding the GHG emissions and other environmental impacts associated with less-productive animals and the presence of nonproductive animals in the herd, i.e., the breeding overhead. [FAO 2010](#), [ILRI 2017b](#), [IAEA 2007](#). Consider the effect of this intervention on the resilience of the system to deal with short- and long-term perturbations, such as droughts, floods, warfare, and climate change.
- P4 Cross-breeding with high-productivity breeds may require more and higher-quality feed, potentially increasing the environmental impacts of feed production. Ensure that any increased demand for higher-quality feed is met sustainably. [LEAP 2016b](#).

INDICATORS

Reduced net GHG emissions (CO₂-eq) per unit (kg) of product for selected agricultural commodities (e.g., milk, meat, and eggs) — Percentage. This indicator measures the climate impact — i.e., net greenhouse gas (GHG) emissions, including soil carbon sequestration — of agricultural commodity production. It measures the change in the net emission of GHG per unit of agricultural product, including sources and sinks along the supply chain. GHG emissions are converted to carbon dioxide (CO₂) equivalent using standard global warming potential values. Quantification can be performed using IPCC [2006 Guidelines](#), calculators (e.g., [GLEAM-i](#), [Cool Farm Tool](#)). The team may consider using certified methodologies, such as the [Gold Standard Small Holder Dairy Methodology](#) to generate tradeable GHG mitigation outcomes as well as the [LEAP 2018 guidelines for assessing environmental performance in pig supply chains](#) and in [large ruminant supply chains](#).

- Quantification may be undertaken at the start of the project, at medium term, and during terminal evaluation, using dedicated surveys to parameterize models, together with activity data from the monitoring system.

INTERVENTION: IMPROVE MANAGEMENT OF AND ACCESS TO FODDER AND WATER RESOURCES

ACTIVITIES

- Develop integrated land management approaches to restore and maintain rangeland and pasture productivity.
- Promote adaptive grazing based on small land units in ranches.
- Build capacity in natural resource management planning at community and local levels.
- Develop water resources and distribution in underexploited rangelands.
- Establish dedicated migration corridors (short- and long-distance), rest areas along corridors, pasture reserves, and dedicated dry season grazing areas

OBJECTIVE 1

OBJECTIVE 2

OBJECTIVE 3

OBJECTIVE 4

OBJECTIVE 5

OBJECTIVE 1: IMPROVE THE PRODUCTIVITY OF LIVESTOCK

GUIDANCE

- P3 Improving rangeland and pasture productivity already contributes to reducing greenhouse gas (GHG) emission intensities by boosting livestock productivity and augmenting carbon stocks in soil and biomass.
- P2, P7 Provide pastoralists with technical assistance, financing options, and knowledge-sharing mechanisms on integrated land management planning. Such planning will optimize grazing on marginal lands; grazing or feed production in higher productivity areas; and imported feed, thus contributing to rangeland and pasture productivity while also enhancing carbon stocks and reducing pressure on land and water resources. WB 2016, [VSFG 2008](#).
- P2, P7 When developing integrated grassland (pastures and rangelands) management plans, ensure that environmental objectives, such as biodiversity conservation, carbon sequestration, and water resources replenishment, are included among the objectives of the plans. [LEAP 2016a](#), [LEAP 2016e](#), [LEAP 2016f](#), [FAO 2009](#), [International Land Coalition 2013](#), [Chambers et al. 2001b](#).
- P3 Livestock productivity improvements may incentivize herd growth and increase overall demand for feed. Evaluate the potential implications of any foreseen increase in livestock numbers on water and land resources. To moderate this incentive, activities to improve feeding should include incentives to control growth in the overall number of animals. [LEAP 2018a](#).
- P2, P7 Raise awareness and provide technical assistance on mainstreaming carbon sequestration objectives in natural resource management planning at the communal and/or local level.
- P2, P7 Provide technical assistance for enhancing carbon stocks in underexploited rangelands (conserving and restoring natural habitats, increasing biomass per unit area). Assess the resilience of proposed underutilized areas to climate change impacts and weather/seasonal variability.
- P2 Assess the impacts of concentrated livestock populations on carbon stocks and land and water resources (e.g., in corridors, rest areas, and dry season grazing areas) and manage livestock numbers accordingly. Conserve and restore natural habitats and increase biomass per unit area where possible.
- P4 Develop sustainable feed production and/or sourcing for rest areas. Assess the resilience of migration corridors, rest areas, pasture reserves, and dry season grazing areas to climate change impacts and weather/seasonal variability.

INDICATORS

Reduced net GHG emissions (CO₂-eq) per unit (kg) of product for selected agricultural commodities (e.g., milk, meat, and eggs) — Percentage. This indicator measures the climate impact — i.e., net greenhouse gas (GHG) emissions, including soil carbon sequestration — of agricultural commodity production. It measures the change in the net emission of GHG per unit of agricultural product, including sources and sinks along the supply chain. GHG emissions are converted to carbon dioxide (CO₂) equivalent using standard global warming potential values. Quantification can be performed using IPCC [2006 Guidelines](#), calculators (e.g., [GLEAM-i](#), [Cool Farm Tool](#)). The team may consider using certified methodologies, such as the [Gold Standard Small Holder Dairy Methodology](#) to generate tradeable GHG mitigation outcomes as well as the [LEAP 2018 guidelines for assessing environmental performance in pig supply chains](#) and in [large ruminant supply chains](#).

→ Quantification may be undertaken at the start of the project, at medium term, and during terminal evaluation, using dedicated surveys to parameterize models, together with activity data from the monitoring system.

Grazing land area where sustainable land management practices have been adopted as a result of the project — Hectare (ha). This indicator measures the adoption of sustainable grassland (rangeland and pasture) management in project intervention areas. The adoption of sustainable land management practices aims to ensure that grazing pressure is in line with productivity and resilience of pasture and rangelands, and with the generation of other ecosystem services (e.g., carbon sequestration, biodiversity, replenishment of aquifers). Positive lists of sustainable land management practices vary according to rangeland biology, climate, and livestock species and

OBJECTIVE 1

OBJECTIVE 2

OBJECTIVE 3

OBJECTIVE 4

OBJECTIVE 5

OBJECTIVE 1: IMPROVE THE PRODUCTIVITY OF LIVESTOCK

may be provided in project documents. They may include land use regimes, agronomic and vegetative measures, and structural measures. Teams may consider using [LEAP 2016 guidelines for assessing the impacts of livestock on biodiversity](#).

- Quantification may rely on a field-based survey based on semi-structured interviews with producers, ranchers, pastoralists, and agro-pastoralists on the change in behavior related to the use of their grassland in targeted zones of the project.

Farmers/extension agents/service providers trained on environmental issues and options in the livestock sector — Number.

This indicator measures the number of stakeholders along the supply chains that have been made aware of and trained on environmental issues in the livestock sector, for instance, through the inclusion of environmental issues and options in curriculums, extension manuals, capacity development programs, etc.

- Quantification may be undertaken annually or at the start of the project, at medium term, and during terminal evaluation, using dedicated surveys.

Irrigation water used in feed production — Cubic meter per unit of feed. This indicator measures the amount of irrigation water used for feed production (e.g., expressed in cubic meter per unit of dry matter or cubic meter per unit of digestible energy).

- Quantification may be reported annually based on sampling and direct measurements following a predefined protocol. [LEAP 2016 Environmental performance of animal feeds supply chains](#).

Pesticides used in feed production — Amount per unit of feed. This indicator measures the amount of pesticides used for feed production (e.g., expressed per unit of dry matter or per unit of digestible energy).

- Quantification may be reported annually based on sampling and direct measurements following a predefined protocol. [LEAP 2016 Environmental performance of animal feeds supply chains](#).

Natural habitat restored/protected — Ha. This indicator measures the area of forest, natural grassland, and other natural areas that remain protected or are restored under the project.

- Quantification may be reported annually based on the sampling and direct measurements following a predefined protocol. [LEAP 2016 A review of indicators and methods to assess biodiversity](#) and [LEAP 2016 Principles for the assessment of livestock impacts on biodiversity](#).

Competition with food production — Share. This indicator reports the change in the portion of feed consumed by livestock in the project that is not directly human-edible or is produced on land not suited for crop production.

- Quantification may be undertaken annually or at the start of the project, at medium term, and during terminal evaluation, using dedicated survey

OBJECTIVE 1

OBJECTIVE 2

OBJECTIVE 3

OBJECTIVE 4

OBJECTIVE 5

OBJECTIVE 2: IMPROVE MARKET ACCESS AND DEVELOP VALUE CHAINS

INTERVENTION: DEVELOP PRODUCER ORGANIZATIONS AND PRODUCTIVE ALLIANCES

ACTIVITIES

- Establish and/or build the capacity of new/existing producer organizations.
- Provide financing for subprojects under productive alliances.

GUIDANCE

- P7 Raise awareness among producer organizations about environmental issues related to pastoralist livestock systems.
- P7 Provide producers and producer organizations with training on developing environmental management plans, gaining access to climate and environmental finance, embedding environmental objectives in business plans, and monitoring and evaluating environmental benefits.
- P7 Include environmental criteria in subproject selection. Establish a line of credit for activities with additional environmental benefits.

INDICATORS

Farmers/extension agents/service providers trained on environmental issues and options in the livestock sector — Number.

This indicator measures the number of stakeholders along the supply chains that have been made aware of and trained on environmental issues in the livestock sector, for instance, through the inclusion of environmental issues and options in curriculums, extension manuals, capacity development programs, etc.

- Quantification may be undertaken annually or at the start of the project, at medium term, and during terminal evaluation, using dedicated surveys.

INTERVENTION: CONSTRUCT/UPGRADE POST-FARM-GATE FACILITIES

ACTIVITIES

- Construct and/or upgrade roads between production, processing, and market areas.
- Improve transport and storage capacity.
- Construct and/or upgrade processing plants, slaughterhouses, dairy processing, and (wet) markets.

GUIDANCE

- P2 Assess the resilience of roads, buildings, and other infrastructure to damaging climate and weather events.
- P6 Provide technical assistance and financing options for incorporating energy-efficient machinery and equipment into technical design and financial analysis. Incorporate renewable energy production where possible. [IEE 2007](#).

OBJECTIVE 1

OBJECTIVE 2

OBJECTIVE 3

OBJECTIVE 4

OBJECTIVE 5

OBJECTIVE 2: IMPROVE MARKET ACCESS AND DEVELOP VALUE CHAINS

INDICATORS

Processing plants and markets that have adopted a waste management plan — Number or percentage. This indicator measures the number of slaughterhouses, dairies and other processing units, animal gathering points, and markets that have received project support to develop and implement liquid and solid waste management plans. At a minimum, plans should address the reduction of waste streams, waste collection, storage, and treatment.

→ Quantification may be reported annually using project advancement reports.

Energy-saving and renewable energy production devices and plans supported by the project — Number. This indicator measures the number of energy-saving and renewable energy production devices installed by the project, either directly or indirectly (through policies and energy pricing). Energy-saving investments may include systems for energy recovery in milk cooling; upgraded thermic insulation; efficient burners; and energy use efficiency plans at the company level. Renewable energy production includes solar panels, biodigesters, solar panels, wind power, and micro-hydropower.

→ Quantification may be undertaken annually or at project start, mid-term, and terminal evaluation, using dedicated surveys.

Reduction of pollution discharge into waterways — Percentage. This indicator measures the reduction in nitrate, phosphates, and BOD and E. Coli discharge (a) at the end of the pipe of the individual farms or community and (b) at critical downstream locations to be defined in the monitoring and evaluation (M&E) plan.

→ Quantification may be reported annually based on sampling and direct measurements following a predefined protocol. [LEAP 2018 Nutrient Flows and associated environmental impacts in livestock supply chains. Guidelines for assessment.](#)

INTERVENTION: CREATE OPPORTUNITIES ALONG THE VALUE CHAIN

ACTIVITIES

- Raise awareness among consumers of products produced under the project.
- Establish livestock market information systems and support livestock trade associations to access import markets.

GUIDANCE

P7 Pastoral livestock production systems can be a strong market entry point for sustainable products that contribute to grassland ecosystem conservation. Establish and promote labeling and/or certification schemes for niche products that are environmentally sustainable.

INDICATORS

Amount of animal source food in diet — Grams per capita per day — variation in percentage. This indicator measures the increase or decrease in animal source food in human diets, within a beneficiary population (kilogram intake per capita per year). It distinguishes populations having low or high baseline consumption, for instance, by using national dietary recommendations as a reference.

→ Quantification may be undertaken annually or at the start of the project, at medium term, and during terminal evaluation, using dedicated surveys.

OBJECTIVE 1

OBJECTIVE 2

OBJECTIVE 3

OBJECTIVE 4

OBJECTIVE 5

OBJECTIVE 2: IMPROVE MARKET ACCESS AND DEVELOP VALUE CHAINS

INTERVENTION: DEVELOP LIVESTOCK FATTENING ACTIVITIES

ACTIVITIES

- Undertake territorial planning to identify and develop reproductive regions (drier) and fattening regions (wetter).
- Develop transportation networks to transport livestock to and from fattening areas.
- Optimize the offtake rate (the proportion of the herd that is sold or consumed each year).
- Create a market demand for products of fattening activities.

GUIDANCE

- P3 Optimizing the offtake rate in pastoral herds, i.e., removing young males for fattening in higher-productivity areas, already contributes to sustainability by reducing GHG emissions and other environmental impacts associated with large pastoral herds.
- P2, P7 Provide technical assistance for territorial planning for the development of fattening activities. Assess the resilience of proposed underutilized areas to climate change impacts and weather/seasonal variability. [WB 2016](#), [LEAP 2016a](#).
- P4, P2 Provide technical assistance and financing options for sustainable feed production and/or sourcing to sustain fattening areas, especially with regard to water withdrawals and water use efficiency. [LEAP 2016b](#), [LEAP 2016f](#).
- P5 Provide technical assistance and financing options for managing manure from fattening activities: collection, storage, and appropriate timing and dosing of application. [Teenstra et al. 2014](#), [CCAC 2015](#), [FAO 2013a](#), [Chambers et al. 2001b](#), [Chambers et al. 2001c](#).
- P3 Developing fattening activities may incentivize growth in overall livestock numbers. Evaluate the potential implications of increasing livestock numbers on water and land resources. [LEAP 2018a](#), [LEAP 2016f](#), [LEAP 2016a](#).
- P6 Provide technical assistance and financing options to reduce fossil fuel consumption in livestock transport. [LEAP 2016f](#).
- P3 Develop guidelines for livestock health and welfare during transport. [FAWC 2009](#), [FAO 2013b](#).

INDICATORS

Energy-saving and renewable energy production devices and plans supported by the project — Number. This indicator measures the number of energy-saving and renewable energy production devices installed by the project, either directly or indirectly (through policies and energy pricing). Energy-saving investments may include systems for energy recovery in milk cooling; upgraded thermic insulation; efficient burners; and energy use efficiency plans at the company level. Renewable energy production includes solar panels, biodigesters, solar panels, wind power, and micro-hydropower.

- ➔ Quantification may be undertaken annually or at project start, mid-term, and terminal evaluation, using dedicated surveys.

OBJECTIVE 3: IMPROVE INPUT AND SERVICES DELIVERY

INTERVENTION: DEVELOP PUBLIC AND PRIVATE EXTENSION SERVICES

ACTIVITIES

- Provide extension agents with training and capacity building.
- Develop extension manuals and curricula.

GUIDANCE

P2, P7 Train extension agents to evaluate and advise herders on sustainable rangeland and pasture management and on sustainable use of water resources.

P7 Train extension agents to collect data on grassland degradation, water management, and other environmental issues from pastoral systems that they serve.

INDICATORS

Farmers/extension agents/service providers trained on environmental issues and options in the livestock sector — Number.

This indicator measures the number of stakeholders along the supply chains that have been made aware of and trained on environmental issues in the livestock sector, for instance, through the inclusion of environmental issues and options in curriculums, extension manuals, capacity development programs, etc.

- Quantification may be undertaken annually or at the start of the project, at medium term, and during terminal evaluation, using dedicated surveys.

INTERVENTION: IMPROVE PUBLIC AND PRIVATE ANIMAL HEALTH SERVICES

ACTIVITIES

- Provide veterinarians and livestock health workers with training and capacity building.
- Develop veterinary and livestock health manuals and curricula.

GUIDANCE

P7 During training, raise awareness among veterinarians and livestock health workers about environmental issues and their links to livestock health and welfare.

P7 Introduce links to natural resource management issues and options in animal health manuals and curricula.

OBJECTIVE 1

OBJECTIVE 2

OBJECTIVE 3

OBJECTIVE 4

OBJECTIVE 5

OBJECTIVE 3: IMPROVE INPUT AND SERVICES DELIVERY

INDICATORS

Farmers/extension agents/service providers trained on environmental issues and options in the livestock sector — Number.

This indicator measures the number of stakeholders along the supply chains that have been made aware of and trained on environmental issues in the livestock sector, for instance, through the inclusion of environmental issues and options in curriculums, extension manuals, capacity development programs, etc.

- Quantification may be undertaken annually or at the start of the project, at medium term, and during terminal evaluation, using dedicated surveys.

INTERVENTION: STRENGTHEN PROVISION OF INPUT AND SERVICES

ACTIVITIES

- Provide private service and input providers with training and seed financing.
- Foster the development of new services where gaps exist.

GUIDANCE

P4, P5, Assess demand and provide seed financing for services that contribute to sustainability: green economy (renewable energy P7 installation construction and maintenance). [IEE 2007](#), [SNV Biogas](#).

P7 Develop markets for sustainable inputs, such as sustainably sourced feed, organic fertilizers, and organic pesticides.

INDICATORS

Energy-saving and renewable energy production devices and plans supported by the project — Number. This indicator measures the number of energy-saving and renewable energy production devices installed by the project, either directly or indirectly (through policies and energy pricing). Energy-saving investments may include systems for energy recovery in milk cooling; upgraded thermic insulation; efficient burners; and energy use efficiency plans at the company level. Renewable energy production includes solar panels, biodigesters, solar panels, wind power, and micro-hydropower.

- Quantification may be undertaken annually or at project start, mid-term, and terminal evaluation, using dedicated surveys.

Proportion of surplus nutrients sold for use as organic fertilizer. For those farms with nutrient surpluses that are greater than 10-20%, this indicator measures the proportion of the surplus nutrients that is sold for use as organic fertilizer. This indicator is quantified by calculating the total surplus, the amount of that surplus that is applied to crop production on the farm, and the proportion of the remaining surplus that is sold for use as organic fertilizer.

- Quantification may be reported annually based on the production unit management data or surveys. [LEAP 2018 Nutrient Flows and associated environmental impacts in livestock supply chains. Guidelines for assessment.](#)

OBJECTIVE 1

OBJECTIVE 2

OBJECTIVE 3

OBJECTIVE 4

OBJECTIVE 5

OBJECTIVE 3: IMPROVE INPUT AND SERVICES DELIVERY

Farmers/extension agents/service providers trained on environmental issues and options in the livestock sector — Number.

This indicator measures the number of stakeholders along the supply chains that have been made aware of and trained on environmental issues in the livestock sector, for instance, through the inclusion of environmental issues and options in curriculums, extension manuals, capacity development programs, etc.

- Quantification may be undertaken annually or at the start of the project, at medium term, and during terminal evaluation, using dedicated surveys.

Irrigation water used in feed production — Cubic meter per unit of feed. This indicator measures the amount of irrigation water used for feed production (e.g., expressed in cubic meter per unit of dry matter or cubic meter per unit of digestible energy).

- Quantification may be reported annually based on sampling and direct measurements following a predefined protocol. [LEAP 2016 Environmental performance of animal feeds supply chains](#).

Pesticides used in feed production — Amount per unit of feed. This indicator measures the amount of pesticides used for feed production (e.g., expressed per unit of dry matter or per unit of digestible energy).

- Quantification may be reported annually based on sampling and direct measurements following a predefined protocol. [LEAP 2016 Environmental performance of animal feeds supply chains](#).

Competition with food production — Share. This indicator reports the change in the portion of feed consumed by livestock in the project that is not directly human-edible or is produced on land not suited for crop production.

- Quantification may be undertaken annually or at the start of the project, at medium term, and during terminal evaluation, using dedicated surveys.

OBJECTIVE 1

OBJECTIVE 2

OBJECTIVE 3

OBJECTIVE 4

OBJECTIVE 5

OBJECTIVE 4: CLIMATE CHANGE RESILIENCE AND EMERGENCY RESPONSE

INTERVENTION: IMPROVE MANURE, NUTRIENTS, AND WASTE MANAGEMENT

ACTIVITIES

- Improve integrated manure management in areas where livestock is concentrated.
- Develop territorial approaches to improving the nutrient balance.

GUIDANCE

- P5 Develop manure collection and storage plans to ensure recycling of organic matter and nutrients in cropped areas. [Teenstra et al. 2014](#), [CCAC 2015](#), [FAO 2013a](#), [Chambers et al. 2001b](#).

INDICATORS

Reduced net GHG emissions (CO₂-eq) per unit (kg) of product for selected agricultural commodities (e.g., milk, meat, and eggs) — Percentage. This indicator measures the climate impact — i.e., net greenhouse gas (GHG) emissions, including soil carbon sequestration — of agricultural commodity production. It measures the change in the net emission of GHG per unit of agricultural product, including sources and sinks along the supply chain. GHG emissions are converted to carbon dioxide (CO₂) equivalent using standard global warming potential values. Quantification can be performed using IPCC [2006 Guidelines](#), calculators (e.g., [GLEAM-i](#), [Cool Farm Tool](#)). The team may consider using certified methodologies, such as the [Gold Standard Small Holder Dairy Methodology](#) to generate tradeable GHG mitigation outcomes as well as the [LEAP 2018 guidelines for assessing environmental performance in pig supply chains](#) and in [large ruminant supply chains](#).

- Quantification may be undertaken at the start of the project, at medium term, and during terminal evaluation, using dedicated surveys to parameterize models, together with activity data from the monitoring system.

Grazing land area where sustainable land management practices have been adopted as a result of the project — Hectare (ha). This indicator measures the adoption of sustainable grassland (rangeland and pasture) management in project intervention areas. The adoption of sustainable land management practices aims to ensure that grazing pressure is in line with productivity and resilience of pasture and rangelands, and with the generation of other ecosystem services (e.g., carbon sequestration, biodiversity, replenishment of aquifers). Positive lists of sustainable land management practices vary according to rangeland biology, climate, and livestock species and may be provided in project documents. They may include land use regimes, agronomic and vegetative measures, and structural measures. Teams may consider using [LEAP 2016 guidelines for assessing the impacts of livestock on biodiversity](#).

- Quantification may rely on a field-based survey based on semi-structured interviews with producers, ranchers, pastoralists, and agro-pastoralists on the change in behavior related to the use of their grassland in targeted zones of the project.

Processing plants and markets that have adopted a waste management plan — Number or percentage. This indicator measures the number of slaughterhouses, dairies and other processing units, animal gathering points, and markets that have received project support to develop and implement liquid and solid waste management plans. At a minimum, plans should address the reduction of waste streams, waste collection, storage, and treatment.

- Quantification may be reported annually using project advancement reports.

OBJECTIVE 1

OBJECTIVE 2

OBJECTIVE 3

OBJECTIVE 4

OBJECTIVE 5

OBJECTIVE 4:

CLIMATE CHANGE RESILIENCE AND EMERGENCY RESPONSE

Livestock production units that have adopted a manure management plan — Number. This indicator measures the number of production units that have received project support to develop and implement manure management plans. Improved manure management practices and plans should be defined in the project document and address, at a minimum, manure collection, storage, and the recycling schedule. Manure processing and recording of manure transfer may also be included, if relevant.

→ Quantification may be undertaken annually, using project advancement reports.

Proportion of production units for which nutrient flows are balanced — Percentage. This indicator measures simple nitrogen and phosphorus balances at the production unit level, as the difference between inputs (e.g., fertilizer, feed) and outputs (e.g., animal and crop products, manure exports). Nutrient flows are considered when the difference between inputs and outputs does not exceed 10-20%.

→ Quantification may be reported annually based on the production unit management data or surveys. [LEAP 2018 Nutrient Flows and associated environmental impacts in livestock supply chains. Guidelines for assessment.](#)

Proportion of surplus nutrients sold for use as organic fertilizer. For those farms with nutrient surpluses that are greater than 10-20%, this indicator measures the proportion of the surplus nutrients that is sold for use as organic fertilizer. This indicator is quantified by calculating the total surplus, the amount of that surplus that is applied to crop production on the farm, and the proportion of the remaining surplus that is sold for use as organic fertilizer.

→ Quantification may be reported annually based on the production unit management data or surveys. [LEAP 2018 Nutrient Flows and associated environmental impacts in livestock supply chains. Guidelines for assessment.](#)

Reduction of manure and waste discharge — Percentage. This indicator measures the reduction percentage of production units that discharge waste, manure, and slurry into waterways or unmanaged/unlined lagoons.

→ Quantification may be undertaken annually or at the start of the project, at medium term, and during terminal evaluation, using dedicated surveys.

Reduction of pollution discharge into waterways — Percentage. This indicator measures the reduction in nitrate, phosphates, and BOD and E. Coli discharge (a) at the end of the pipe of the individual farms or community and (b) at critical downstream locations to be defined in the monitoring and evaluation (M&E) plan.

→ Quantification may be reported annually based on sampling and direct measurements following a predefined protocol. [LEAP 2018 Nutrient Flows and associated environmental impacts in livestock supply chains. Guidelines for assessment.](#)

INTERVENTION: DEVELOP EARLY WARNING INFORMATION SYSTEMS AND FEED BUDGETING

ACTIVITIES

- Strengthen early warning systems in remote pastoral areas.
- Develop pastoral crisis response plans.
- Develop seasonal assessments to forecast potential crises.

OBJECTIVE 1

OBJECTIVE 2

OBJECTIVE 3

OBJECTIVE 4

OBJECTIVE 5

OBJECTIVE 4: CLIMATE CHANGE RESILIENCE AND EMERGENCY RESPONSE

GUIDANCE

- P7 Harmonize early warning information systems with information systems on livestock, climate, and weather. Harness systems to monitor and evaluate environmental management in pastoral areas. Harmonizing livestock, climate, weather, and early warning information systems can improve the resilience of pastoralists by enabling destocking, redistribution, or other actions to avoid loss in livestock value in anticipation of crises.
- P7 Embed basic environmental management practices in training and capacity-building programs on pastoral crisis management planning. [LEGS](#), [FAO 2016](#).
- P7 As part of seasonal assessments, evaluate the status of rangelands and pastures degradation and needed action to improve their sustainable management.

INDICATORS

Contingency fund for livestock emergencies created and operational — Yes/no. This indicator measures the creation and funding of a contingency fund for livestock emergencies related to drought, disease, and other hazards.

- Quantification may be reported annually using project advancement reports.

INTERVENTION: ESTABLISH EMERGENCY RESERVES AND DISTRIBUTION SYSTEMS

ACTIVITIES

- Develop strategic feed reserves for use in drought and other climate- and/or weather-related emergencies.
- Develop strategic reserves of vaccines, antibiotics, and other disease prevention and control material for use in livestock health emergencies.
- Undertake rapid destocking (and restocking) in anticipation of drought.
- Carry out livestock distribution for rapid recovery.

GUIDANCE

- P3 Emergency reserves already contribute to sustainability by avoiding the GHG emissions and other environmental impacts associated with livestock losses.
- P2 Rapid destocking already contributes to sustainability by avoiding rangeland and pasture degradation during drought.
- P5 In destocking, if livestock is held in confined spaces and/or slaughtered, ensure proper waste management and sustainable use of land and water resources.
- P7 Include resources in the contingency fund for assessing and addressing the implications of destocking and restocking initiatives on land and water resources.

OBJECTIVE 1

OBJECTIVE 2

OBJECTIVE 3

OBJECTIVE 4

OBJECTIVE 5

OBJECTIVE 4: CLIMATE CHANGE RESILIENCE AND EMERGENCY RESPONSE

INDICATORS

Contingency fund for livestock emergencies created and operational — Yes/no. This indicator measures the creation and funding of a contingency fund for livestock emergencies related to drought, disease, and other hazards.

→ Quantification may be reported annually using project advancement reports.

INTERVENTION: DEVELOP RISK MANAGEMENT PROGRAMS AND PRODUCTS

ACTIVITIES

- Establish an emergency contingency fund.
- Establish a livestock insurance scheme (to compensate for lost animals).

GUIDANCE

- P7 Natural resource index-based insurance schemes can improve the environmental footprint of pastoral systems by moderating the size of pastoral herds according to feed and water availability.
- P7 Link safety net transfers to programs for alternative livelihoods and pastoral livelihood diversification. Promoting alternative pastoral livelihoods and livelihood diversification can improve the resilience of pastoral communities by making them less vulnerable to climate change impacts and weather/seasonal variability.

INDICATORS

Contingency fund for livestock emergencies created and operational — Yes/no. This indicator measures the creation and funding of a contingency fund for livestock emergencies related to drought, disease, and other hazards.

→ Quantification may be reported annually using project advancement reports.

OBJECTIVE 1

OBJECTIVE 2

OBJECTIVE 3

OBJECTIVE 4

OBJECTIVE 5

OBJECTIVE 5: STRENGTHEN POLICIES, KNOWLEDGE, AND INFORMATION

INTERVENTION: DEVELOP AND HARMONIZE LIVESTOCK POLICIES, PLANS, REGULATIONS, AND PROGRAMS

ACTIVITIES

- Develop a national livestock master plan.
- Establish regulations for the zoning of livestock grazing and mobility (transhumance) areas.
- Improve equity of grazing and water use rights within pastoralist communities.
- Pilot programs to enable pastoralists to access donor and other multinational financing.

GUIDANCE

- P7 In the context of resource-scarce pastoral environments, improving equity in land and water use contributes to the resilience of smaller-scale and more vulnerable livestock keepers.
- P7 Ensure that integrated approaches to land and water resource management are embedded in national livestock development planning. Include targets for water management and reduced GHG emissions. Make provision for targeting the areas and type of producers where progress toward environmental sustainability can be established most cost-effectively. Develop timelines for the progressive introduction of environmental policies.
- P7 Develop programs that generate environmental benefits (e.g., a national payments for environmental services scheme [IIED 2013](#) tailored to sustainable rangeland and pasture management, international climate finance for carbon credits, and linking to nationally determined contributions under the Paris Agreement). [FAO 2017a](#).
- P2, P7 When developing integrated grassland (pastures and rangelands) management plans, ensure that environmental objectives, such as carbon sequestration and water resources replenishment, are included among the objectives of the plans.
- P7 Formalize and protect pastoralist access to corridors, rangelands, and pastures. While potentially conflicting with the principles of communal land management, formalizing pastoralist access to grazing areas will enable a more complete use of available feed resources in a resource-scarce pastoral environment.

INTERVENTION: DEVELOP LIVESTOCK INFORMATION SYSTEMS

ACTIVITIES

- Develop livestock identification and performance recording.
- Include livestock data in the agriculture census.

OBJECTIVE 1

OBJECTIVE 2

OBJECTIVE 3

OBJECTIVE 4

OBJECTIVE 5

OBJECTIVE 5: STRENGTHEN POLICIES, KNOWLEDGE, AND INFORMATION

GUIDANCE

- P7 Include data on range degradation, pressure on water resources, and other environmental performance indicators in pastoral livestock information systems.
- P7 Include training and resources for the collection of census data that can enable environmental performance assessment.

INTERVENTION: IMPROVE CAPACITIES AT CENTRAL AND LOCAL GOVERNMENT LEVELS

ACTIVITIES

- Assess and fill capacity gaps in relevant government ministries.
- Develop early warning and decision support systems and tools.

GUIDANCE

- P7 Provide technical assistance, capacity building, and financial resources for monitoring, policy, and extension work, especially focusing on integrated land management planning in pastoral systems.
- P7 Provide relevant ministries (e.g., agriculture, livestock, water, environment, rural development, finance, energy) with capacity building on pastoralism and sustainable rangeland and pasture management.
- P7 Develop early warning and decision support systems and tools for sustainable rangeland and pasture management.

INDICATORS

Environment (or natural resource) management unit created within the ministry (department) of livestock — Yes/No. This indicator measures the creation, staffing, and funding of a unit dedicated to environmental management. Its functions may include environmental monitoring, assessments, awareness raising, capacity development among public servants and private sector, administration of environmental funds, and development of policies and regulations.

- Quantification may be reported annually using project advancement reports.

INTERVENTION: ESTABLISH RESEARCH GRANTS AND EDUCATIONAL PROGRAMS

ACTIVITIES

- Provide financing options for research and education in livestock development issues.

OBJECTIVE 1

OBJECTIVE 2

OBJECTIVE 3

OBJECTIVE 4

OBJECTIVE 5

OBJECTIVE 5: STRENGTHEN POLICIES, KNOWLEDGE, AND INFORMATION

GUIDANCE

- P7 Include calls for science and policy research proposals on, for example, integrated land management planning, sustainable water management, and enhancement of carbon stocks in pastoral livestock systems.
- P7 In local universities and professional schools, develop educational programs on sustainable pastoral systems.

INTERVENTION: ESTABLISH PROGRAMS TO DIVERSIFY PASTORAL LIVELIHOODS AND PROMOTE ALTERNATIVE LIVELIHOODS

ACTIVITIES

- Provide smaller-scale livestock keepers with options on alternative sources of income through tailored vocational training and subprojects that generate sustainable employment opportunities.
- Provide livestock keepers with options on diversifying livelihoods.

GUIDANCE

- P7 Enabling smallholder exits from the livestock sector may reduce pressure on land and water resources and provide more stable livelihoods that are more resilient to climate change and weather variability.
- P7 Livelihood diversification will enable producers to subsist on alternative sources of income during shocks, increasing their resilience to climate change and weather variability.

OBJECTIVE 1

OBJECTIVE 2

OBJECTIVE 3

OBJECTIVE 4

OBJECTIVE 5