WORLD BANK

Food and Agriculture Organization of the United Nations

CONTEXT 3

GRAZING SUB-HUMID (RUMINANTS) SYSTEMS

CONTENTS

This brief provides an overview of the Investing in Sustainable Livestock (ISL) Guide and the full application of the accompanying ISL Tool to grazing sub-humid (ruminants) systems (referred to below as Context 3).

CONTEXT 3: GRAZING SUB-HUMID (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 to identify :

- 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 -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 3: GRAZING SUB-HUMID (RUMINANTS) SYSTEMS

OVERVIEW OF CONTEXT 3: GRAZING SUB-HUMID (RUMINANTS) SYSTEMS

Context 3 covers commercially oriented systems established on land that has been converted from natural vegetation (forest) to pasture. The low productivity of land and animals often limits productivity.

Description of typical situation

Many global beef production systems and some dairy and small ruminant production systems have been established on rangelands and pastures that were formerly covered with forest. Such deforested lands, which have become grazing lands are found in a wide array of climates across Latin America and the Caribbean (Neotropics), in Sub-Saharan Africa (RCA, Cameroon), and in Asia (Vietnam, China). In the northern part of South America, Central America, Sub-Saharan Africa, and Asia, semiarid forests (savannahs) are common, while sub-humid and humid forests are widespread across the South American continent — for instance, in the Amazon region and in the Pacific flatlands — in sub-Saharan Africa, and in South East Asia. Deforestation of these forests has been considerable and is still continuing, although some jurisdictions have been able to curb the process. Forests may have been cleared for cropland and later on turned into grazing lands due to economic reasons or declining soil fertility, though forests may also have been cleared with the immediate aim to establish rangelands and pasture; alternatively, cattle may have been introduced on cleared land to secure land ownership. Generally, it is difficult to maintain soil fertility on deforested land in these climates due to deficient management and loss of soil carbon after deforestation. The limited soil fertility causes low grassland productivity and low forage quality which subsequently results in low beef and dairy productivity. Rainfall seasonality and extreme climatic events also constrain productivity by limiting forage yields. Access to markets is another limiting factor as commercially oriented grazing systems are often found in regions with relatively limited population densities. Commercialization in local markets is limited, and production, therefore, tends to target markets located far away and for export. Smaller-scale beef and dairy farmers may thus operate at a disadvantage and be relatively poor; these types of producers may keep livestock rather as a way to store capital and to sell quickly for cash in case of an emergency. Once such smaller-scale farmers sell their herds, it can be challenging to rebuild them.

As an example, in Latin America and the Caribbean, grazing systems on deforested land are generally extensive beef production systems. Such beef systems, whether small- or medium-scale, are often market-oriented. Some grass-based dairy production is found. While intensification in the fattening stage, i.e., finishing of animal in feedlots, is being promoted, only a small proportion of beef comes from such feedlots. While potentially leading to lower land requirements and reduced direct GHG emissions per unit of product, the shift to such systems requires more concentrate feed. This may, in turn, accelerate the conversion of pasture and forest to cropland, leading, in turn, to higher climate and biodiversity impacts. In recent years, livestock systems are being developed to restore tree cover, improve grassland productivity, and contribute to carbon capture, soil health, and biodiversity recovery. Such “silvopastoral” systems purposively combine fodder plants, such as grasses and leguminous herbs, with shrubs and trees for animal nutrition, protection, and complementary uses. The trees in the combined system may be fodder trees but can also produce timber or agricultural products, such as fruits or nuts. Such combination of tree and grassland production can be established both in semihumid and dry tropics as long as the species used are adapted to the environmental and soil conditions.

Common environmental issues

The past and present deforestation results in large quantities of carbon lost from soils and aboveground biomass and significant GHG emissions. Deforestation also reduces biodiversity and the replenishment of aquifers. Livestock grazing in grassland regions with unfavorable conditions and low soil fertility carries the risk of overgrazing. Grassland degradation can result as vegetation cover is altered (reduced or even entirely eliminated, or evolving from grass to shrub), and signs of soil erosion appear. This reduces production potential but also the amount of biodiversity, carbon stored in soils, and the replenishment of aquifers (Principles 2, 3 and 4).

Extensive meat production from cattle also has high direct GHG emission intensities due to low animal productivity. Livestock system intensification and, in particular, the rise in beef fattening may reduce these direct emissions but will, on the other hand, increase the use of feeds, such as maize, soy, wheat, and barley. These crops are generally grown on arable land suited for food crops. The resulting competition for land and water between human-edible food and livestock feed production is an important issue associated with the intensification of livestock production in these regions (Principle 1 and 4).

CONTEXT 3: GRAZING SUB-HUMID (RUMINANTS) SYSTEMS

ISL TOOL GUIDANCE TABLE: CONTEXT 3: CONTEXT 3: GRAZING SUB-HUMID (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.

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, increases productivity, may diminish incentives to increase herd size to compensate for low productivity, and consequently can lower 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 land use change and water management. LEAP 2018a, LEAP 2016f, LEAP 2016a.

P7 Raise awareness among farmers about 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

INTERVENTION: IMPROVE ANIMAL GENETICS

ACTIVITIES

- Select for improved genetics within the existing herd.
- Develop breeding programs with exotic and local genetic resources.

GUIDANCE

P3 Improving livestock genetics already contributes to sustainability by avoiding GHG emissions and other environmental impacts associated with less-productive animals. FAO 2010, ILRI 2017b, IAEA 2007.

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.

P3 Promote improvements to breeding and livestock genetics that allow for reducing the number of animals in the reproductive herd, avoiding the GHG emissions and other environmental impacts associated with such animals. 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.

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 silvopastoral systems to integrate livestock production with partial reforestation.
- Develop integrated land management approaches to restore and maintain rangeland and pasture productivity.
- Build capacity in natural resource management planning at community and local levels.

OBJECTIVE 1: IMPROVE THE PRODUCTIVITY OF LIVESTOCK

GUIDANCE

P3 Grassland productivity already contributes to reducing greenhouse gas (GHG) emission intensities by improving livestock productivity.

P2, P3, P7 Provide farmers with technical assistance, financing options, and knowledge-sharing mechanisms to develop silvopastoral systems. The combination of pasture, fodder production, and trees in such systems contributes to carbon capture, soil and biodiversity recovery, and the provision of high-quality feeds to livestock, improving productivity. IDB 2016, VSFG 2008.

P2, P7 When developing integrated grassland 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. To moderate this incentive, activities to improve feeding should include incentives to control growth in the overall number of livestock and related pasture expansion. Evaluate the potential implications of any foreseen increase in livestock numbers on water resources and land use change. LEAP 2018a.

P2, P7 Raise awareness and provide technical assistance to ensure that environmental objectives, such as enhancing carbon stocks and preserving biodiversity, are included in natural resource management planning.

P2, P7 Provide technical assistance for reducing degradation and enhancing carbon stocks in natural grassland areas (conserving and restoring natural habitats, increasing biomass per unit area). Assess the resilience of grasslands 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 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.

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.

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 of 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.

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 livestock production.

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 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 for products produced under the project.
- Establish livestock market information systems and support livestock trade associations in accessing import markets.

GUIDANCE

P7 Silvopastoral 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.

INTERVENTION: DEVELOP LIVESTOCK FATTENING ACTIVITIES

ACTIVITIES

- Optimize the beef value chain of calf production, intermediate fattening, and finishing.
- Undertake territorial planning to identify and develop reproductive regions (drier) and fattening regions (wetter).
- Develop transportation networks to transport livestock within the meat value chains.
- 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 productivity losses.

P3, P4, P7 Meat production systems for beef cattle and small ruminants are often organized in separate stages: the production of young fattening animals at breeder farms (where the reproductive herd is kept), final fattening at intensive farms (feedlots), and in some cases an intermediate stage (semi-intensive, referred to as a feeder farm). These various stages in the fattening chain may be integrated or not. Design a configuration of the supply chain which minimizes environmental impacts along the chain while also taking care of other sustainability issues. The size of the reproductive herd, the amount and quality of feed used in each stage, and the duration of each step should be optimized. LEAP 2016b, LEAP 2016f.

P2, P7 Provide technical assistance on territorial planning for the development of fattening activities which considers available natural resources. Assess the resilience of grassland regions 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 activities, especially with regard to 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 land use change and water resources. LEAP 2018a, LEAP 2016f, LEAP 2016a.

P6 Provide technical assistance and financing options for reducing fossil fuel emissions from 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.

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 producers on the development of silvopastoral systems, sustainable rangeland and pasture management, and sustainable use of water resources.

P7 Train extension agents to collect data on grassland degradation, biodiversity, and other environmental indicators.

P7 Embed environmental management practices in animal production training courses and manuals.

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 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.

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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, P7 Assess demand and provide seed financing for services that contribute to sustainability: green economy (renewable energy 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 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.

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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 of cubic meter per unit of digestible energy).

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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).

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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.

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, as well as nutrient management 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 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.
- Develop crisis response plans.

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 grazing areas. Harmonizing livestock, climate, weather, and early warning information systems can improve the resilience of grazing systems 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 crisis management planning. LEGS, FAO 2016.

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 AND HARMONIZE LIVESTOCK POLICIES, PLANS, REGULATIONS, AND PROGRAMS

ACTIVITIES

- Develop a national livestock master plan.

GUIDANCE

P7 Ensure that approaches to land and water resource management are embedded in national livestock development planning. Include targets for biodiversity, water management, and GHG emission reduction. 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, revision of public subsidy schemes, 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 biodiversity conservation, carbon sequestration, and water resources replenishment, are included among the objectives of the plans.

INTERVENTION: DEVELOP LIVESTOCK INFORMATION SYSTEMS

ACTIVITIES

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

GUIDANCE

P7 Include data on land use change, rangeland and pasture degradation, and environmental performance.

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 silvopastoral systems and integrated land management planning.

P7 Improve collaboration between ministries in charge of controlling deforestation and the ministry of livestock. Design land use change control systems and authorities.

P7 Provide relevant ministries (e.g., agriculture, livestock, water, environment, rural development, finance, energy) with capacity building on 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.