WORLD BANK

Food and Agriculture Organization of the United Nations

ANIMAL HEALTH COMPLETE GUIDANCE FOR MIXED CROP-LIVESTOCK, HUMID (MONOGASTRICS)

Commercially oriented smallholder mixed crop-livestock (pig, poultry, and waterfowl) systems in the humid tropics

This document provides the complete Animal Health Guidance for Mixed Crop-Livestock, Humid (Monogastrics) systems as part of the Investing in Sustainable Livestock (ISL) Guide.

ANIMAL HEALTH COMPLETE GUIDANCE FOR MIXED CROP-LIVESTOCK, HUMID (MONOGASTRICS)

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The online ISL Guide (www.sustainablelivestockguide.org) is an information resource and interactive platform for designing and implementing sustainable livestock development projects. The guide's interactive component provides context-specific guidance, suggested activities, and indicators to help livestock projects contribute to sustainable development outcomes; it also includes references for further investigation.

ANIMAL HEALTH COMPLETE GUIDANCE FOR MIXED CROP-LIVESTOCK, HUMID (MONOGASTRICS)

Introduction to the ISL Guide

The ISL Guide is grounded in tested theory and evidence organized into 12 principles for sustainability in the livestock sector (the Theory Behind the Guide). These principles serve as a framework for assessing the sustainable performance of livestock production systems as well as opportunities for livestock to contribute to sustainability outcomes (see table below). The principles have relevance for project conceptualization (Principle 1), technical project design (Principles 2 through 6), and the broader socio-cultural, political, and economic context in which the project will be implemented (Principle 7).

The ISL Guide takes into consideration a variety of geographic contexts and tailors its guidance to different project objectives and interventions. So, if you are designing or implementing a project that involves livestock, it has detailed recommendations for you. Since the ISL Guide understands sustainability in a broad sense, it will eventually comprise elements not only relating to the environment and animal health and welfare, but also to equity issues such as gender and inclusion. The World Bank and FAO will expand the guide to integrate these issues in due course.

PRINCIPLE 1	
Contribute to a Sustainable Food Future	
ENVIRONMENT GUIDE	**ANIMAL HEALTH GUIDE**
PRINCIPLE 2	**PRINCIPLE 2**
Enhance Carbon Stocks	Prevent & Control Animal Diseases
PRINCIPLE 3	**PRINCIPLE 3**
Improve Efficiency at Animal & Herd Levels	Ensure the Welfare of Animals
PRINCIPLE 4	**PRINCIPLE 4**
Source Feed Sustainability	Healthy Animals for Safer Food
PRINCIPLE 5	**PRINCIPLE 5**
Couple Livestock to Land	Reduce Risk of Zoonosis
PRINCIPLE 6	**PRINCIPLE 6**
Minimize Fossil Fuel Use	Prudent & Responsible Use of Antimicrobials
PRINCIPLE 7	
Foster an Enabling Environment	

Structure of the ISL Guide

OBJECTIVE:
Improve the productivity of livestock

INTERVENTIONS:
- Feed resources and balance
- Access to fodder and water
- Animal health and welfare
- Animal genetics

OBJECTIVE:
Improve input and services delivery

INTERVENTIONS:
- Develop public and private extension services
- Improve public and private animal health services
- Strengthen provision of input and services

OBJECTIVE:
Strengthen policies, knowledge, and information

INTERVENTIONS:
- Develop and harmonize livestock policies, plans, regulations, and programs
- Develop livestock information systems.
- Improve capacities at central and local government levels.
- Establish research grants and educational programs
- Establish programs to diversify pastoral livelihoods and promote alternative livelihoods

OBJECTIVE:
Improve market access and develop value chains

INTERVENTIONS:
- Producer organizations and alliances
- Post-farm gate facilities
- Value chain opportunities
- Develop livestock fattening activities

OBJECTIVE:
Climate change resilience and emergency response

INTERVENTIONS:
- Improve manure, nutrients, and waste management
- Ensure resilience of buildings and equipment to extreme weather events
- Develop early warning information systems and feed budgeting
- Establish emergency reserves and distribution systems
- Develop risk management programs and products

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

- Grazing Dry - Pastoral (Ruminants)
- Grazing Temperate (Ruminants)
- Grazing Sub-Humid (Ruminants)
- Mixed Crop-Livestock, Dry (Ruminants)
- Mixed Crop-Livestock, Humid (Monogastrics)
- Intensive (Ruminants and Monogastrics)

The guidance provided for each of these contexts is organized according to objectives that are typically found in livestock investment projects (see Process). Each objective is tied to a series of interventions. Those common objectives are:

- Improve the Productivity of Livestock
- Improve Market Access and Develop Value Chains
- Improve Input and Service Delivery
- Climate Change Resilience and Emergency Response
- Strengthen Policies, Knowledge and Information

For every combination of objective and intervention, the ISL Guide provides context-specific guidance for improving the sustainable outcomes, as well as suggested indicators for project monitoring and evaluation.

Overview of Mixed Crop-Livestock, Humid (Monogastrics)

This context covers mixed crop-livestock systems characterized by high integration of livestock, crops, and of¬ten aquaculture. These systems are found in areas where high rainfall supports both crops and livestock and typically produce for both the household and market.

DESCRIPTION OF TYPICAL SITUATION

In large parts of Asia, mixed crop-livestock systems integrate rice production, livestock (poultry, ducks, geese, and pigs), aquaculture, fruits and vegetables, and cash crops. These systems are, for example, found in Bangladesh, China, India, Indonesia, Malaysia, Thailand, Myanmar, and Vietnam. Such farming systems are known as integrated farming systems, referring to the high level of integration among farm activities and inputs - byproducts of one vale chain are being used as inputs in another value chain, for examples, crop residues and milling byproducts as feed for livestock.

Despite a global trend toward specialization of farming systems, these integrated, smallholder mixed-crop livestock systems continue to be found in regions with high water availability, i.e., river deltas and regions with high precipitation. Farms are small (0.5–3 ha), labor is predominantly provided by household members, land for farm extension is limited, and farm activities are generally market-oriented, though production of rice for household consumption is an important objective. Integration of the different components of the system is achieved through the recycling of nutrients and organic matter: Livestock manure is either applied or deposited directly to (on) the crops or used to fertilize fish ponds, with the sediment of the ponds used as a fertilizer. Crop residues and household wastes may be used for livestock feeding. For example, in the Mekong Delta of Vietnam, these integrated farming systems developed from subsistence-oriented rice monoculture, where the livestock component grew rapidly in response to the market demand for livestock products, fruit and vegetables, and cash crops. The farm activities in such integrated systems are quite labor-intensive and are intensifying in response to increasing market demands and the need to support livelihoods.

COMMON ANIMAL HEALTH ISSUES

There is a strong link between the occurrence of livestock diseases and the environment in which the animals are raised and kept, particularly related to the pig and poultry production systems and farm size. Smallholders production systems are usually linked to poor hygiene and low biosecurity with few barriers to prevent contacts between other animals, humans and wildlife. Particular biosecurity challenges arise from the fact that animals are reared outdoors, which increases the chances of contact with disease vectors including wild birds, rodents, and insects. his facilitates disease transmission from wildlife to livestock, from livestock to livestock, and livestock to human. A typical example of zoonotic disease affecting smallholders is trichinosis, a parasitic disease circulating in wild and domestic animals such as rats, pigs, and wild pigs, and occasionally infecting human through the consumption of inadequately cooked, infected pork. Another example is avian influenza occurrence in small holders in South East Asia, potentially via mixing of wild and domestic birds and amplification and spread of highly pathogenic strains in poultry with production and public health impacts (Principle 5).

Increased animal density in commercially oriented systems can also compromise hygiene and increase the use of excessive antimicrobials, contributing to AMR (Principle 6).Other biosecurity challenges arise from the fact that livestock manure may introduce enteric foodborne pathogens to the soil, which could contaminate fresh produce (Principle 4).

These systems have potential for recycling nutrients and improving the soil, and are frequently associated with organic systems. However, although animals outdoor may express their natural behaviors, they are frequently kept without shelter or protection from predators which compromise animal welfare recommendations (Principle 3). It is important keep in mind that these situations typically involve new or intensifying species interactions between wild and domestic animals, with new opportunities and lack of protective immunity. Animals at stress tend to have reduced resistance to disease,

which can exacerbate pathogen flare-up and even spillover to humans as emerging infectious diseases. Strengthening networks on disease preparedness and diagnostic capacities are key elements to ensuring the protection of animal health. Understanding animal value chains within the country and with neighboring countries is essential for improved risk management and assessing entry points for stakeholders in the network to play a role in risk reduction (Principle 7).

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OBJECTIVE 1:
IMPROVE PRODUCTIVITY OF LIVESTOCK

INTERVENTION:
Feed resources and balance

ACTIVITIES

- Develop on-farm feed resources.
- Source (ingredients for) concentrate feed.
- Improve feed ration balancing.
- Extend stall-feeding.

GUIDANCE

P2 | P3
Improved feed availability and quality may not only increase animal productivity but also incentivize increases in herd size . These activities should be followed by an evaluation of the potential implications of any expected increase in animal numbers on animal health and welfare, such as overcrowding or lack of veterinary care and supplies.

P2 | P4 | P5
Certain changes in feeding practices, such as moving to stall-feeding systems might affect husbandry practices and contribute to the occurrence/worsening of animal disease and zoonoses. Therefore, it is important that any changes in feeding system are accompanied by adequate training in best practices for husbandry and disease monitoring.

INDICATORS

Livestock production units that have adopted an Animal Welfare management plan — Number/proportion
This indicator measures the number of livestock units, slaughterhouses, dairies and other processing units; animal gathering points; and markets that have received project support and developed and implemented animal welfare management plans. As a minimum, plans should address the Five Freedoms: freedom from hunger and thirst; freedom from discomfort; freedom from pain, injury, or disease; freedom to express normal behavior; and freedom from fear and distress. This indicator should be broken down by farm size, species and type of farm, where possible.

➔ Reported annually using project advancement reports

Farmers/extension agents/service providers— Number
This indicator measures the number of farmers/ extension agents/service providers along the supply chains that have been made aware of and trained on animal health issues in the livestock sector, for instance, through the inclusion of animal health issues and options in curriculums, extension manuals, capacity development programs, etc. In addition, the indicator should break down the kind of training received, differentiating between "light training", such as talks and webinars, "structural modules" (e.g. those of a week in duration), and more robust training based on longer, more in-depth courses.

➔ Undertaken using dedicated surveys annually; or at the start of the project, at medium term, and during terminal evaluation.

Data management and information system developed — Yes/No or on a scale from 0-4
This indicator measures the ability to generate or compile, analyze and disseminate data in ways that serve to define health strategies, review results or endorse the status of a country. Establishment of fully functional systems can be reported as "Yes/No", or scaled in levels, for example, level 0 if no system is in place; level I if data is only collected and compiled; level II if this data is analysed; level III if outputs are disseminated adequately; or level IV if overall quality control is included.

➔ Reported annually using project advancement reports.

INTERVENTION:
Animal health and welfare

ACTIVITIES

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

GUIDANCE

P2 | P5
Disease programs should include plans for emergency preparedness, prevention, control and eradication, and surveillance, according to risk assessment.

P2 | P4 | P5
Vaccination campaigns should promote adequate selection of the vaccine type, pathogen match and source, and account for chain distribution according to the speciation of the product (e.g. food chain) (OIE, 2020).

P2 | P4 | P5
Disease programs require an appropriate disease and livestock information system that includes traceability.

P2 | P7
When culling animals for disease prevention and control, incentives for notification and compensation should be developed to support disease programs (FAO, 2013; OECD, 2012).

P3 | P6
In order to promote sustainability, farmer awareness programs should accompany these activities.
Such programs should cover the animal and public health impacts and economic consequences of the inappropriate use of antimicrobials; the need to record the use of antimicrobials for monitoring purposes; and the benefits of improving livestock health and welfare (World Bank, 2019; World Bank, 2017; WHO 2016; OIE 2020).

INDICATORS

Animal diseases control program— Number
This indicator measures the number of programs developed and funded for the control and eradication of pertinent animal diseases. Such programs reflect a shortlist of target diseases at the regional or national level and are based on analysis of risk and country priorities.
➔ Reported annually using project advancement reports.

Data management and information system developed — Yes/No or on a scale from 0-4
This indicator measures the ability to generate or compile, analyze and disseminate data in ways that serve to define health strategies, review results or endorse the status of a country. Establishment of fully functional systems can be reported as "Yes/No", or scaled in levels, for example, level 0 if no system is in place; level I if data is only collected and compiled; level II if this data is analysed; level III if outputs are disseminated adequately; or level IV if overall quality control is included.
➔ Reported annually using project advancement reports

Contingency fund for livestock emergencies created and operational — Yes/No
This indicator measures the creation of a contingency fund for livestock emergencies related to drought, disease, and other hazards. Establishing such a fund requires well-documented contingency action plans for specific, high-priority, emergency diseases, together with a series of generic plans for activities or programs common to these plans (e.g. setting up national and local animal disease control centers). These also need to have resource and financial plans and appropriate legislative backing for all actions. In addition, contingency plans need to be considered and agreed upon in advance by all major stakeholders, including the political and bureaucratic arms of government and the private sector, particularly livestock farmer organizations. Plans should be refined through simulation exercises

and personnel should be trained in their individual roles and responsibilities.

➔ Reported annually using project advancement reports.

Farmers/extension agents/service providers— Number
This indicator measures the number of farmers/ extension agents/service providers along the supply chains that have been made aware of and trained on animal health issues in the livestock sector, for instance, through the inclusion of animal health issues and options in curriculums, extension manuals, capacity development programs, etc. In addition, the indicator should break down the kind of training received, differentiating between "light training", such as talks and webinars, "structural modules" (e.g. those of a week in duration), and more robust training based on longer, more in-depth courses.

➔ Undertaken using dedicated surveys annually; or at the start of the project, at medium term, and during terminal evaluation.

Disease early warning system and emergency preparedness in place— Yes/No
This indicator measures the creation of an early warning system that builds on the added value of combining and coordinating cross-sectorial alert mechanisms between relevant government ministries, including protocols and a chain of command. It refers to the surveillance system and alert and response strategy to face emerging diseases, including zoonotic diseases, for which a contingency plan should be implemented, widely known across relevant stakeholder, rehearsed, for example, through simulation exercises. This indicator also measures the improved resilience of pastoralists by enabling destocking, redistribution, or other actions to avoid the loss of livestock value in the event of a crisis.

This indicator can be rated according to the level of development and implementation. Level I would indicate that there is a strategy for developing a disease early warning system and an emergency preparedness plan; level II would indicate that the strategy has been implemented; and level III would indicate that the strategy has been trialed.

➔ Reported annually using project advancement reports

INTERVENTION: **Animal genetics**

ACTIVITIES

- Select for improved genetics within the existing herd.

GUIDANCE

P2 | P3 | P1 | P7
Choosing genetic diversity and the adequacy of the breed, race or strains could better prevent and control animal diseases and adaptation of the animals to the environment, weather and to optimize water and feed consumption.

INDICATORS

Farmers/extension agents/service providers— Number
This indicator measures the number of farmers/ extension agents/service providers along the supply chains that have been made aware of and trained on animal health issues in the livestock sector, for instance, through the inclusion of animal health issues and options in curriculums, extension manuals, capacity development programs, etc. In addition, the indicator should break down the kind of training received, differentiating between "light training", such as talks and webinars, "structural modules" (e.g. those of a week in duration), and more robust training based on longer, more in-depth courses.

➔ Undertaken using dedicated surveys annually; or at the start of the project, at medium term, and during terminal evaluation.

Livestock production units that have adopted an Animal Welfare management plan — Number/ proportion
This indicator measures the number of livestock units, slaughterhouses, dairies and other processing units; animal gathering points; and markets that have received project support and developed and implemented animal welfare management plans. As a minimum, plans should

address the Five Freedoms: freedom from hunger and thirst; freedom from discomfort; freedom from pain, injury, or disease; freedom to express normal behavior; and freedom from fear and distress. This indicator should be broken down by farm size, species and type of farm, where possible.

➔ Reported annually using project advancement reports.

Data management and information system developed — Yes/No or on a scale from 0-4

This indicator measures the ability to generate or compile, analyze and disseminate data in ways that serve to define health strategies, review results or endorse the status of a country. Establishment of fully functional systems can be reported as "Yes/No", or scaled in levels, for example, level 0 if no system is in place; level I if data is only collected and compiled; level II if this data is analysed; level III if outputs are disseminated adequately; or level IV if overall quality control is included.

➔ Reported annually using project advancement reports.

OBJECTIVE 2:
IMPROVE MARKET ACCESS AND DEVELOP VALUE CHAINS

INTERVENTION:
Producer organizations and alliances.

ACTIVITIES

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

GUIDANCE

P3 | P4 | P6
The opportunity should be taken to raise awareness amongst producer organizations about issues related to livestock systems, including food safety, animal welfare, and antimicrobial resistance (FAO, 2016; FAO, 2020).

P2 | P7
Training on developing management plans for animal diseases should be provided to producers and producer organizations.

P3 | P4 | P5 | P7
Include One Health criteria in project selection activities, for example, antimicrobial resistance management between feed producers and farmers (OIE, 2008; Gall et al., 2018; WHO, 2016; OIE, 2020).

INDICATORS

Farmers/extension agents/service providers— Number
This indicator measures the number of farmers/ extension agents/service providers along the supply chains that have been made aware of and trained on animal health issues in the livestock sector, for instance, through the inclusion of animal health issues and options in curriculums, extension manuals, capacity development programs, etc. In addition, the indicator should break down the kind of training received, differentiating between "light training", such as talks and webinars, "structural modules" (e.g. those of a week in duration), and more robust training based on longer, more in-depth courses.

➔ Undertaken using dedicated surveys annually; or at the start of the project, at medium term, and during terminal evaluation

Coordination mechanisms under the One Health approach — Number
This indicator measures the number of coordination mechanisms implemented by governments that explicitly include the concept of One Health and which aim to be intersectoral across public health, human health and environment. This indicator can also include initiatives from the private sector.

➔ Reported annually using project advancement reports.

INTERVENTION:
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 or wholesale) markets.

GUIDANCE

P2
Foster systems for data collection, monitoring and traceability, to enable the implementation of checkpoints.

P2
Ensure that proper quarantine facilities are built where necessary and according to risk assessments. Ideally, these should be linked to major country livestock

accesses and in livestock gathering facilities (e.g., markets).

P2 | P3
Promote the development and distribution of guidelines for livestock health and welfare during transport (OIE, 2020; FAO, 2001).

P4
Consult with food safety specialists to ensure any processing plant, slaughterhouse construction or market to meet the food safety standards.

P5
Contact should be established with public health and environment agencies to support development of an integrated information system for the One health approach (Gall et al., 2018).

INDICATORS

Data management and information system developed — Yes/No or on a scale from 0-4
This indicator measures the ability to generate or compile, analyze and disseminate data in ways that serve to define health strategies, review results or endorse the status of a country. Establishment of fully functional systems can be reported as "Yes/No", or scaled in levels, for example, level 0 if no system is in place; level I if data is only collected and compiled; level II if this data is analysed; level III if outputs are disseminated adequately; or level IV if overall quality control is included.

➔ Reported annually using project advancement reports

Farmers/extension agents/service providers— Number
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Coordination mechanisms under the One Health approach — Number
This indicator measures the number of coordination mechanisms implemented by governments that explicitly include the concept of One Health and which aim to be intersectoral across public health, human health and environment. This indicator can also include initiatives from the private sector.

➔ Reported annually using project advancement reports

INTERVENTION:
Value chain opportunities

ACTIVITIES

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

GUIDANCE

P2 | P4
Foster systems for data collection, monitoring and traceability.

P4 | P5
The opportunity should be taken to raise the awareness of farmers about food safety measures, good farming practices, and biosecurity, to reduce the risk of animal diseases and zoonoses (OIE-FAO, 2009).

INDICATORS

Data management and information system developed — Yes/No or on a scale from 0-4
This indicator measures the ability to generate or compile, analyze and disseminate data in ways that serve to define health strategies, review results or endorse the status of a country. Establishment of fully functional systems can be reported as "Yes/No", or scaled in levels, for example, level 0 if no system is

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➔ Undertaken using dedicated surveys annually; or at the start of the project, at medium term, and during terminal evaluation.

Livestock production units that have adopted Good Animal Husbandry Practices (GAHP)— Percentage
This indicator measures the percentage of livestock units that have implemented GAHPs. It should be broken down by farm size, species and type of farm, where possible.

➔ Reported annually using project advancement reports.

OBJECTIVE 3:
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

P6
Consider effective treatment of wastes to reduce and eliminate residual antimicrobials and pathogens.

INDICATORS

Farmers/extension agents/service providers— Number
This indicator measures the number of farmers/ extension agents/service providers along the supply chains that have been made aware of and trained on animal health issues in the livestock sector, for instance, through the inclusion of animal health issues and options in curriculums, extension manuals, capacity development programs, etc. In addition, the indicator should break down the kind of training received, differentiating between "light training", such as talks and webinars, "structural modules" (e.g. those of a week in duration), and more robust training based on longer, more in-depth courses.

➔ Undertaken using dedicated surveys annually; or at the start of the project, at medium term, and during terminal evaluation.

Livestock production units that have adopted an antimicrobial resistance (AMR) management plan — Number/proportion
This indicator measures the number of livestock production units with AMR management plans that have the objective of decreasing antimicrobial use in animals (measured in kilograms per livestock production unit per year). Management plans should include improving hygiene, and improving wastewater and sludge management in food production, under the One Health approach. National monitoring systems for antimicrobial use can also be used as indicators, in line with antimicrobial surveillance and monitoring capacity .

➔ Undertaken using dedicated surveys annually; or at the start of the project, at medium term, and during terminal evaluation,

Coordination mechanisms under the One Health approach — Number
This indicator measures the number of coordination mechanisms implemented by governments that explicitly include the concept of One Health and which aim to be intersectoral across public health, human health and environment. This indicator can also include initiatives from the private sector.

➔ Reported annually using project advancement reports.

INTERVENTION:
Ensure resilience of buildings and equipment to extreme weather events

ACTIVITIES

- Develop industry wide crisis response plans.
- Develop seasonal assessments to forecast potential crises.

GUIDANCE

P2
Develop policies for contingency relating to animal health emergencies and perform simulation exercises to assess this tool, with the aim of improving emergency preparedness.

P2
Develop protocols for the proper disposal of carcasses to avoid pollution.

P3
Develop animal welfare guidelines for culling animals for disease control.

INDICATORS

Disease early warning system and emergency preparedness in place— Yes/No
This indicator measures the creation of an early warning system that builds on the added value of combining and coordinating cross-sectorial alert mechanisms between relevant government ministries, including protocols and a chain of command. It refers to the surveillance system and alert and response strategy to face emerging diseases, including zoonotic diseases, for which a contingency plan should be implemented, widely known across relevant stakeholder, rehearsed, for example, through simulation exercises. This indicator also measures the improved resilience of pastoralists by enabling destocking, redistribution, or other actions to avoid the loss of livestock value in the event of a crisis.

This indicator can be rated according to the level of development and implementation. Level I would indicate that there is a strategy for developing a disease early warning system and an emergency preparedness plan; level II would indicate that the strategy has been implemented; and level III would indicate that the strategy has been trialed.
➔ Reported annually using project advancement reports.

Contingency fund for livestock emergencies created and operational — Yes/No
This indicator measures the creation of a contingency fund for livestock emergencies related to drought, disease, and other hazards. Establishing such a fund requires well-documented contingency action plans for specific, high-priority, emergency diseases, together with a series of generic plans for activities or programs common to these plans (e.g. setting up national and local animal disease control centers). These also need to have resource and financial plans and appropriate legislative backing for all actions. In addition, contingency plans need to be considered and agreed upon in advance by all major stakeholders, including the political and bureaucratic arms of government and the private sector, particularly livestock farmer organizations. Plans should be refined through simulation exercises and personnel should be trained in their individual roles and responsibilities.
➔ Reported annually using project advancement reports.

Livestock production units that have adopted an Animal Welfare management plan — Number/ proportion
This indicator measures the number of livestock units, slaughterhouses, dairies and other processing units; animal gathering points; and markets that have received project support and developed and implemented animal welfare management plans. As a minimum, plans should address the Five Freedoms: freedom from hunger and thirst; freedom from discomfort; freedom from pain, injury, or disease; freedom to express normal behavior; and freedom from fear and distress. This indicator should be broken down by farm size, species and type of farm, where possible.
➔ 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

P2
Include the development of protocols and provision of funds for the proper disposal of carcasses to avoid pollution.

P2
Develop workshops to raise awareness about protocols for obtaining compensation, including guidelines for the humane culling of animals (OECD, 2012; FAO, 2013;).

INDICATORS

Livestock production units that have adopted Good Animal Husbandry Practices (GAHP)— Percentage
This indicator measures the percentage of livestock units that have implemented GAHPs. It should be broken down by farm size, species and type of farm, where possible.

➔ Reported annually using project advancement reports.

Contingency fund for livestock emergencies created and operational — Yes/No
This indicator measures the creation of a contingency fund for livestock emergencies related to drought, disease, and other hazards. Establishing such a fund requires well-documented contingency action plans for specific, high-priority, emergency diseases, together with a series of generic plans for activities or programs common to these plans (e.g. setting up national and local animal disease control centers). These also need to have resource and financial plans and appropriate legislative backing for all actions. In addition, contingency plans need to be considered and agreed upon in advance by all major stakeholders, including the political and bureaucratic arms of government and the private sector, particularly livestock farmer organizations. Plans should be refined through simulation exercises and personnel should be trained in their individual roles and responsibilities.

➔ Reported annually using project advancement reports.

Farmers/extension agents/service providers— Number
This indicator measures the number of farmers/ extension agents/service providers along the supply chains that have been made aware of and trained on animal health issues in the livestock sector, for instance, through the inclusion of animal health issues and options in curriculums, extension manuals, capacity development programs, etc. In addition, the indicator should break down the kind of training received, differentiating between "light training", such as talks and webinars, "structural modules" (e.g. those of a week in duration), and more robust training based on longer, more in-depth courses.

➔ Undertaken using dedicated surveys annually; or at the start of the project, at medium term, and during terminal evaluation.

Disease early warning system and emergency preparedness in place— Yes/No
This indicator measures the creation of an early warning system that builds on the added value of combining and coordinating cross-sectorial alert mechanisms between relevant government ministries, including protocols and a chain of command. It refers to the surveillance system and alert and response strategy to face emerging diseases, including zoonotic diseases, for which a contingency plan should be implemented, widely known across relevant stakeholder, rehearsed, for example, through simulation exercises. This indicator also measures the improved resilience of pastoralists by enabling destocking, redistribution, or other actions to avoid the loss of livestock value in the event of a crisis.

This indicator can be rated according to the level of development and implementation. Level I would indicate that there is a strategy for developing a disease early warning system and an emergency preparedness plan; level II would indicate that the strategy has been implemented; and level III would indicate that the strategy has been trialed.

➔ Reported annually using project advancement reports.

OBJECTIVE 4:
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

P2 | P3 | P4 | P5 | P6
A national livestock master plan should include activities to address animal diseases, animal welfare, food safety, zoonosis and antimicrobial resistance.

P7
Where available, use the OIE PVS reports, including those relating to legislation and gap analysis to assess relevant gaps (OIE, 2019).

INDICATORS

National livestock strategies developed and endorsed— On a scale from 0-2
This indicator measures the creation of a national livestock strategy. Such a strategy includes protocols and standard operating procedures to define national priorities for animal health and welfare that can sustainably increase livestock productivity and achieve diversification, commercialization and competitiveness of the livestock subsector. The indicator reflects whether such a strategy is absent (0) or developed and endorsed at sub-national level (1) or national level (2).

➔ Reported annually using project advancement reports.

New regulations adopted— Number of regulations
This indicator measures the number of new regulations adopted or amended to effectively support the activities of relevant fields, such as controlling transboundary and emerging zoonotic and animal diseases; ensuring food safety; and controlling AMR. Tools such as the World Organisation for Animal Health's Performance of Veterinary Services Pathway (known as the OIE PVS Pathway) can be used to define the baseline and gaps, particularly the Veterinary Legislation Support Programme.

➔ Reported annually using project advancement reports.

Pastoralists with ongoing, financed projects — Number of projects
This indicator measures the numbers of pilot projects that enable pastoralists to access donor and other multinational financing, as well as other financed projects to improve equity relating to grazing and water-use rights within pastoralist communities.

➔ Undertaken using dedicated surveys annually; or at the start of the project, at medium term, and during terminal evaluation.

INTERVENTION:
Develop livestock information systems

ACTIVITIES

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

GUIDANCE

P3 | P6
Include data on the use of antimicrobials, and animal welfare indicators, in livestock information systems.

P2 | P4
Include data on animal diseases and treatment, including for zoonosis.

P2 | P7
Include training and resources for the collection of data that enable disease risk assessment, including information on the transport of animals.

P7
Make provisions for training on the use of the information system, including epidemiological surveillance and risk assessment.

INDICATORS

Data management and information system developed — Yes/No or on a scale from 0-4
This indicator measures the ability to generate or compile, analyze and disseminate data in ways that serve to define health strategies, review results or endorse the status of a country. Establishment of fully functional systems can be reported as "Yes/No", or scaled in levels, for example, level 0 if no system is in place; level I if data is only collected and compiled; level II if this data is analysed; level III if outputs are disseminated adequately; or level IV if overall quality control is included.

➔ Reported annually using project advancement reports.

Livestock production units that have adopted an Animal Welfare management plan — Number/ proportion
This indicator measures the number of livestock units, slaughterhouses, dairies and other processing units; animal gathering points; and markets that have received project support and developed and implemented animal welfare management plans. As a minimum, plans should address the Five Freedoms: freedom from hunger and thirst; freedom from discomfort; freedom from pain, injury, or disease; freedom to express normal behavior; and freedom from fear and distress. This indicator should be broken down by farm size, species and type of farm, where possible.

➔ Reported annually using project advancement reports.

Livestock production units that have adopted an antimicrobial resistance (AMR) management plan — Number/proportion
This indicator measures the number of livestock production units with AMR management plans that have the objective of decreasing antimicrobial use in animals (measured in kilograms per livestock production unit per year). Management plans should include improving hygiene, and improving wastewater and sludge management in food production, under the One Health approach. National monitoring systems for antimicrobial use can also be used as indicators, in line with antimicrobial surveillance and monitoring capacity .

➔ Undertaken using dedicated surveys annually; or at the start of the project, at medium term, and during terminal evaluation,

Farmers/extension agents/service providers— Number
This indicator measures the number of farmers/ extension agents/service providers along the supply chains that have been made aware of and trained on animal health issues in the livestock sector, for instance, through the inclusion of animal health issues and options in curriculums, extension manuals, capacity development programs, etc. In addition, the indicator should break down the kind of training received, differentiating between "light training", such as talks and webinars, "structural modules" (e.g. those of a week in duration), and more robust training based on longer, more in-depth courses.

➔ Undertaken using dedicated surveys annually; or at the start of the project, at medium term, and during terminal evaluation.

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
Where available, use the OIE PVS reports, including those relating to legislation and gap analysis to assess relevant gaps (OIE, 2019).

P7
In Particular, address technical assistance, capacity building, and financial resources for monitoring, policy, and extension work, with a special focus on disease prevention, preparedness and control.

P7
Provide relevant government ministries (e.g., agriculture, livestock, water, environment, rural development, finance, energy) with capacity building on integrated management (the One Health approach) (Gall et al., 2018).

P7
Develop protocols for emergencies, including lines of communication and focal points in each government ministry.

INDICATORS

Disease early warning system and emergency preparedness in place— Yes/No
This indicator measures the creation of an early warning system that builds on the added value of combining and coordinating cross-sectorial alert mechanisms between relevant government ministries, including protocols and a chain of command. It refers to the surveillance system and alert and response strategy to face emerging diseases, including zoonotic diseases, for which a contingency plan should be implemented, widely known across relevant stakeholder, rehearsed, for example, through simulation exercises. This indicator also measures the improved resilience of pastoralists by enabling destocking, redistribution, or other actions to avoid the loss of livestock value in the event of a crisis.

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➔ Reported annually using project advancement reports.

Coordination mechanisms under the One Health approach — Number
This indicator measures the number of coordination mechanisms implemented by governments that explicitly include the concept of One Health and which aim to be intersectoral across public health, human health and environment. This indicator can also include initiatives from the private sector.

➔ 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.

GUIDANCE

P7
Promote the creation of think tanks focused on identifying the domestic needs of knowledge and their priorities.

P7
Include calls for science and policy research proposals, for example, on livestock waste management, nutrient balancing, zoning, feed resources and feed-use efficiency, animal welfare, labor conditions in production and processing units, and climate-smart livestock development.

INDICATORS

Promotion of R&D in livestock development initiatives— Number of initiatives

This indicator measures the number of research initiatives (e.g. grants or projects) involving technical personnel or researchers from the country in areas that are relevant to livestock development and sustainability. Such areas include livestock waste management; nutrient balancing; zoning; local and natural feed resources and feed-use efficiency; animal welfare; labor conditions in production and processing units; climate-smart livestock development; local breeds; and local natural resource feed.

➔ Undertaken annually; or at the start of the project, at medium term, and during terminal evaluation.