

INTRODUCTION TO THE INVESTING IN SUSTAINABLE LIVESTOCK (ISL) GUIDE



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This brief provides an overview of the Investing in Sustainable Livestock (ISL) Guide and the indicators that the accompanying ISL Tool recommends using to monitor and evaluate environmental performance in livestock development projects.

INTRODUCTION TO THE ISL GUIDE

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

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

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

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

STRUCTURE OF THE ISL TOOL

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

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

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

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

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

ENVIRONMENTAL ISSUES IN LIVESTOCK PRODUCTION AND RELATED OPTIONS

GHG emissions

While estimates vary, emissions from livestock sector supply chains have been estimated to contribute 14.5% of global anthropic emissions. By emissions type, methane is the most emitted GHG from livestock supply chains, about 44% (expressed in CO₂-eq), with the remaining parts about equally shared between nitrous oxide at 29% and carbon dioxide at 27%. On a global scale, emissions from livestock supply chains account for 44% of anthropogenic methane, 53% of anthropogenic nitrous oxide, and only about 5% of carbon dioxide emissions.

There are four major sources to GHG emissions from livestock:

1. Emissions from the production, processing, and transport of feed. These account for almost half of all livestock value chains emissions at about 45%.
2. Emissions associated with land use change, i.e., when natural vegetation, such as forest, is being turned into grassland or cropland for the production of feed crops. Natural vegetation and the soils it grows on often contain much greater carbon stock than agricultural soils. The organic matter degraded during the transition of land use causes carbon dioxide and methane losses. Less than 10% of livestock value chains emissions are related to land use change.
3. Emission of methane from the rumen of cattle, sheep, and goats during the digestion of feeds. Enteric fermentation represents about 40% of all GHG value chain emissions, mostly emitted from cattle (77%).
4. Manure storage and handling phases. They generate methane and more importantly nitrous oxide emissions, amounting to about 10% of GHG emitted by livestock value chains globally.

Across the above processes, emissions associated with fossil fuel use (e.g., inputs production, transport, mechanization) amount to about 20% of the GHG emissions. Livestock production systems have opportunities to contribute to renewable energy economies by incorporating on-farm production of energy through technologies such as wind or solar. Biogas can also be a major source of renewable on-farm energy production.

Several production decisions can reduce GHG emissions across supply chains. Increasing production efficiency through improved animal health, nutrition, and herd management, while maintaining or decreasing herd size, and increasing soil carbon sequestration through better land management practices are two examples that both reduce emissions and also provide added on-farm benefits.

Nitrogen and phosphorus losses to the environment

The nitrogen and phosphorus losses to the environment from livestock production are either directly associated with animal manure management or the fertilization of crops and grasslands for feed production. Nitrogen and phosphorus are important nutrients for crops, grassland, and livestock.

In agricultural systems, nitrogen and phosphorus flow from soil to crop and grass, then to livestock via feed, and then again to the soil via manure. Ideally, such nutrient cycling would be with minimal losses. When substantial, losses cause nitrogen and phosphorus pollution that can result in i) eutrophication (excessive growth of algae in water) through the accumulation of nutrients in bodies of water which may lead to “dead zones” in aquatic systems, and ii) acidification of the environment (acidic compounds in rain and soils). Acidification of the environment may affect vegetation (e.g., forests) and aquatic life.

Nitrogen and phosphorus losses generally take place in three stages:

1. Manure collection and storage. Manure comprises livestock feces and urine. Both fractions can be collected either separately or as a mixture referred to as slurry. The urine fraction and the slurry are occasionally directly discarded into the environment, causing severe pollution of water, air, and soils. Manure is generally collected and stored for processing and/or recycling. During collection and storage of manure, gaseous components, such as ammonia, and nitrous oxide may be formed and volatilize from uncovered manure heaps or basins. Nutrients may also leach through the bottom of lagoons and storage facility or be washed away by rain and floods.

2. Collected manure and slurry can be processed in different ways, e.g., separation of solid and liquid fractions, drying, composting, biogas production, mixing into compound fertilizers, incineration, aerobic treatment in which nitrogenous components in manure are converted to harmless nitrogen gas. These processes can all improve the nitrogen and phosphorus recycling options and thus be beneficial to the environment. If done improperly, they may, however, contribute to increased nitrogen and phosphorus losses.
3. Applying manure, as well as synthetic fertilizer, to crops and grassland, may result in losses of nitrogen and phosphorus through leaching and runoff, and in volatilization of nitrogen compounds, such as ammonia and nitrous oxide. The higher the rate of application of manure and synthetic fertilizer per hectare of land, and the less it is phased with plant uptake, the higher the risk of losses. This may happen on production units or watersheds with high animal density, but also where manure application is not adequately dosed and timed.

Because of the many factors that can potentially influence pollution processes, the variability in nitrogen and phosphorus pollution per kg of animal product is high. On a general level, studies have shown that the production of pork and beef showed higher risks of pollution, and higher variability of those risks than chicken meat, cattle milk, and egg production. Globally, nitrogen losses in pork value chains are estimated at 14.7 Teragrams. With a contribution of 76%, feed production is the primary contributor to total nitrogen losses, whereas losses from pig housing and manure management contribute 22% to total nitrogen losses, and post-farm activities contribute only 2%.

Proper manure management and application of manure and synthetic fertilizer can promote better cycling of nutrients and limit nutrient volatilization, leaching, and run-off to water bodies. Such practices increase farm efficiency and can reduce the costs of inputs, such as fertilizer. Frequent collection of feces and urine, concrete storage platforms, sheds, lined lagoons, and covered storage help preventing losses of nutrients to the environment. At farms with high stocking densities, measures can be taken to reduce nitrogen and phosphorus pollution, such as minimizing the nitrogen and phosphorus imports through feed and exporting manure (e.g. after processing into products with added value), whereas precision fertilization of manure and synthetic fertilizer can reduce losses after application to crops.

Impacts on land and water

Within the agricultural sector, livestock production is the largest user of land and water resources. The sector uses most of the world's grasslands and more than a third of the world's arable land for feed production, as well as the irrigation and rainwater used on those lands. Livestock uses land and water sources predominantly for feed production, with four broad pathways of impact:

First, forests and other natural vegetation may be cleared and converted to feed cropland and pasture. Such land use changes result in the release of GHG, and they negatively affect biodiversity and replenishing of aquifers.

Second, livestock may compete with food crops for land and water. Livestock production is generally less efficient regarding the use of arable land to produce human food than crop production and may thus lower the land and water use efficiency of the food systems, resulting in an increased amount of those resources drawn into food production versus other potential functions. For example, livestock uses most of the world's 2 billion hectares of grassland, of which 700 million hectares could potentially be used as cropland. The production of livestock feed uses approximately 10 % of annual rainfall, which corresponds to about a third of agricultural water use. Irrigation of feed crops can be of local significance but is globally limited.

Third, livestock production can cause land degradation. Overgrazing is a frequent cause of degradation, affecting vegetation cover (reducing it, changing it from grass to shrub, or even entirely eliminating it) and potentially resulting in soil erosion, carbon losses, and adverse impacts on biodiversity and water cycles. Overgrazing occurs when the stocking density (and associated removal of biomass by animals) and its management is disconnected from biomass production on the land. Such production, and its variations over seasons and during extreme weather events are driven by the nature of vegetation and by climate. Land degradation can also be a long-term process: Through grazing and through crop growth for feed production, nutrients are removed from soils. If these are not replenished (e.g., if no fertilization occurs), soil fertility may slowly decline, affecting yields and ultimately resulting in land degradation.

Fourth, livestock production and processing may impact water and land resources through pollution: losses of nutrients and other substances, e.g., pesticides and chemicals. Losses eventually migrate into the ecosystems through the food chain and through water flows and affect the fauna and the flora, as well as fisheries, recreation, and drinking water.

A range of practices, mostly related to the management of grasslands and the production of feed crops can contribute to reducing land and water impacts, e.g., adaptive grazing, integrated pest management, farm nutrient management plans, organic production. Broader approaches, such as reducing food wastes, feeding food wastes and by-products to animals, or shifting to species and foods whose production requires comparatively less land and water, are further ways to reduce pressure on land and water resources.

ADDRESSING TRADE-OFFS

To be sustainable, livestock development must address trade-offs, which can occur between environmental objectives and other sustainability objectives (economic, social, cultural, health, equity) as well as among different environmental objectives themselves. This tool attempts to address trade-offs between development objectives by considering the broader development contexts in which project design occurs, and integrating economic and social concerns in the recommendations made. As health and equity concerns are integrated into the tool, a more systematic articulation of trade-offs and related management options will be developed.

The multiple dimensions of environmental sustainability, and trade-offs between environmental objectives and are explored in the contexts of the seven principles and six contexts. Guidance and indicators are proposed as a bundle for each context, to address trade-offs in an integrated way. The tool is designed to help teams strengthen synergies and resolve trade-offs between the seven principles of environmental sustainability. The tool also considers places where compromises will have to be made,

BACKGROUND AND OVERVIEW

The global livestock sector today faces a significant challenge: How to continue contributing to the development of societies and at the same time contribute to environmental sustainability? While development institutions around the world are making higher levels of commitment to environmental objectives, project teams often lack information and tools to do the same in livestock investment projects on the ground.

Providing this support to teams is the aim of the Investing in Sustainable Livestock (ISL) Guide.

WHAT IS IT?

The ISL Guide offers a structured, flexible, web-based approach to “guide” project teams to embed environmental objectives into livestock projects. This inaugural version of the guide focuses on environmental aspects of sustainability and is based on the identification of seven principles of environmental sustainability in livestock production and processing. Drawing on these principles, the guide provides practical advice for six categories of livestock farming systems. The guide also links to resources and tools from partners that provide more detailed guidance on designing, implementing, and measuring environmental interventions in livestock projects. Over time, the guide will be expanded to include recommendations addressing the public health and equity dimensions of sustainability.

WHY DO WE NEED IT?

Environmental performance largely depends on production and processing decisions, such as the choice of specie, feeding system or equipment. Consequently, choices made during the design and implementation of investment projects have a major influence on the future environmental impacts of livestock value chains: environmental categories, intensity, and positive/negative nature of the impact. In making these decisions, the options project teams can select from - and the implications of these choices- vary widely according to contexts: from smallholder and pastoralist systems to larger-scale, commercial production. Economic and institutional conditions and climatic zones are also factors.

The guide helps teams navigate this diversity and complexity. Together, investors can address the growing global demand for livestock products while also addressing sustainability. The below figure illustrates the ISL Guide’s theory of change: how a user utilizes the tool with expected results and outcomes.

WHO IS IT FOR?

The intended users of the ISL Guide are project designers, managers, and implementers in both public and private sector institutions who are either preparing new projects or implementing existing projects that involve livestock.

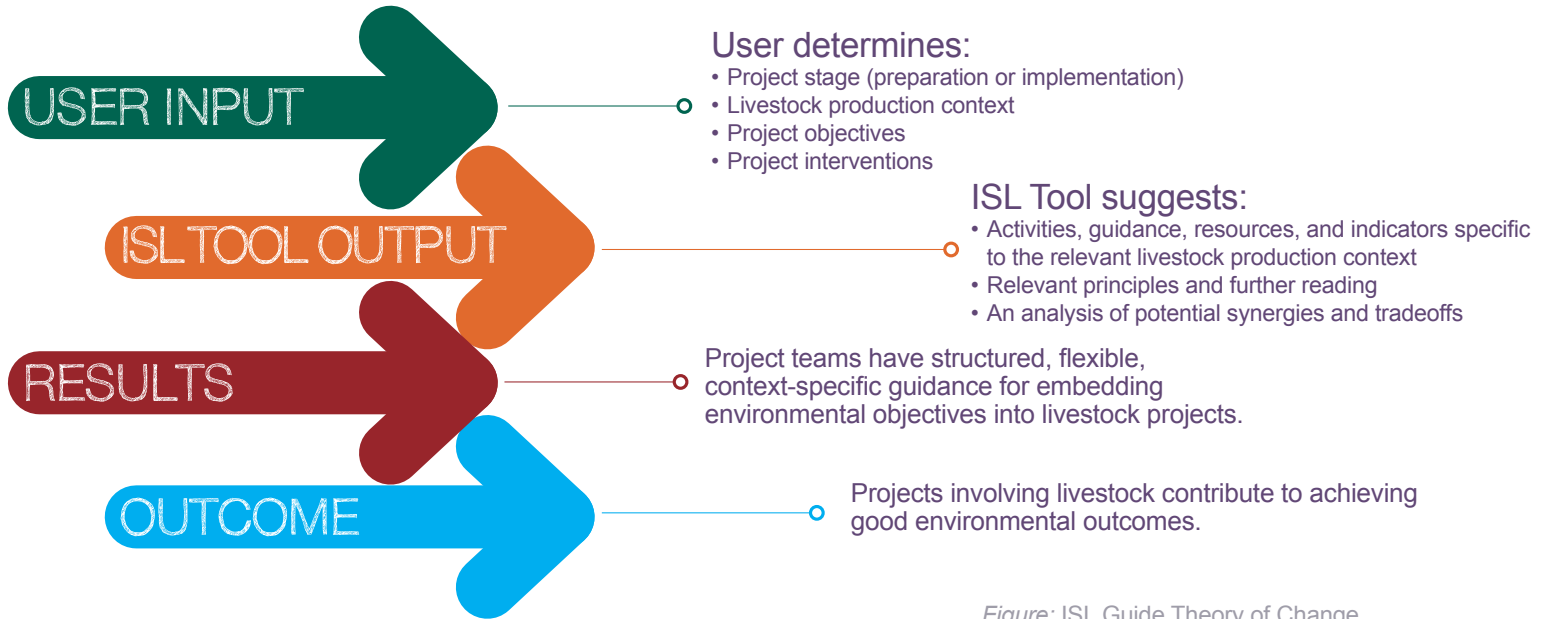


Figure: ISL Guide Theory of Change

WHERE IS IT APPLICABLE?

The ISL Guide is relevant globally and includes guidance for each of the world's major livestock systems and broad livestock operations objectives and interventions. It can be accessed with an internet connection from anywhere in the world and offers downloadable PDFs that can be printed and used offline. The below figure illustrates how the ISL Guide can be used at different stages of the project's cycle.

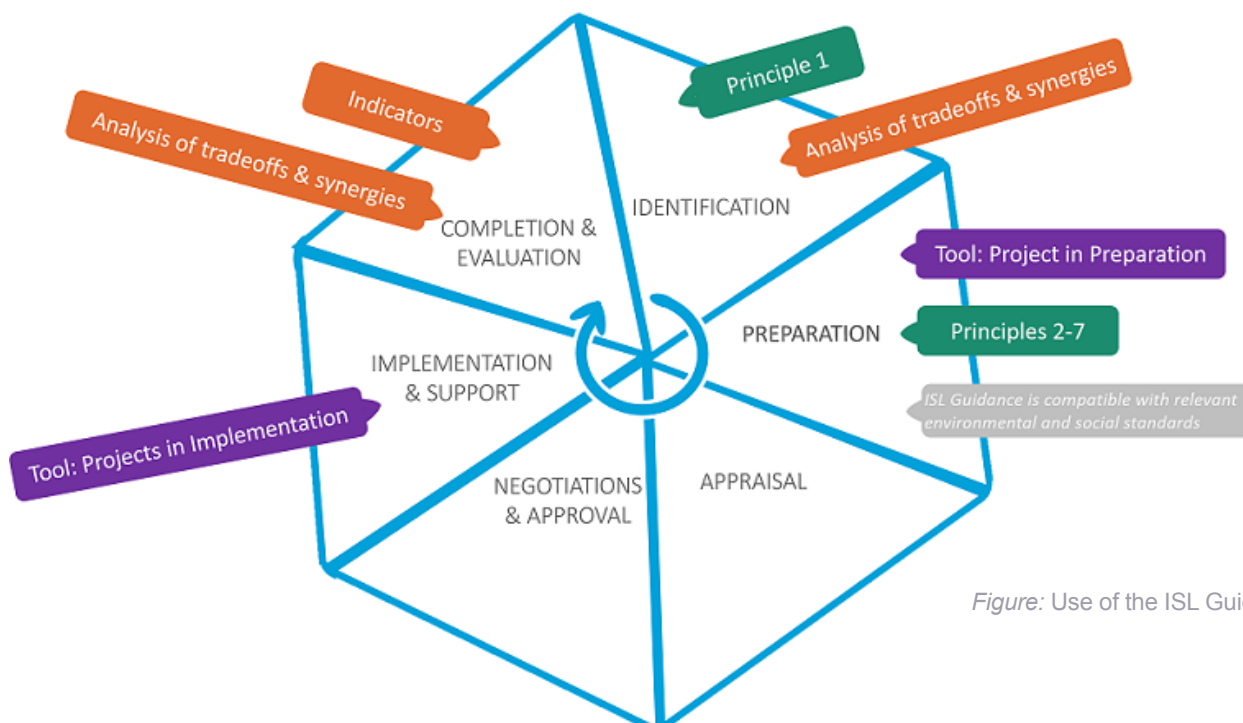


Figure: Use of the ISL Guide along the project cycle

PROCESS

Livestock are playing an increasing role in the global sustainable development agenda. A strong entry point for improving livestock sector contributions to sustainability is through better incorporation of environmental objectives in livestock sector investments, leading to improved environmental performance.

Recognizing this opportunity, project teams at the World Bank and the Food and Agriculture Organization of the United Nations (FAO) began developing the ISL Guide in 2017, launching it to the public in June 2019. The preparation of this guide placed strong emphasis on understanding the needs of project teams and the challenges they face in preparing and implementing development projects that involve livestock. To that end, five learning and sharing events were organized in 2017 and 2018 involving more than 100 potential users (policymakers, non-governmental organizations, the private sector, academia) in Asia (Myanmar), Latin America (Costa Rica), and Africa (Ethiopia), and at a global meeting of the Global Agenda for Sustainable Livestock in Mongolia.

The below figure represents the outcomes of stakeholder discussions about the desired elements of the tool – processes, impacts, and activities.

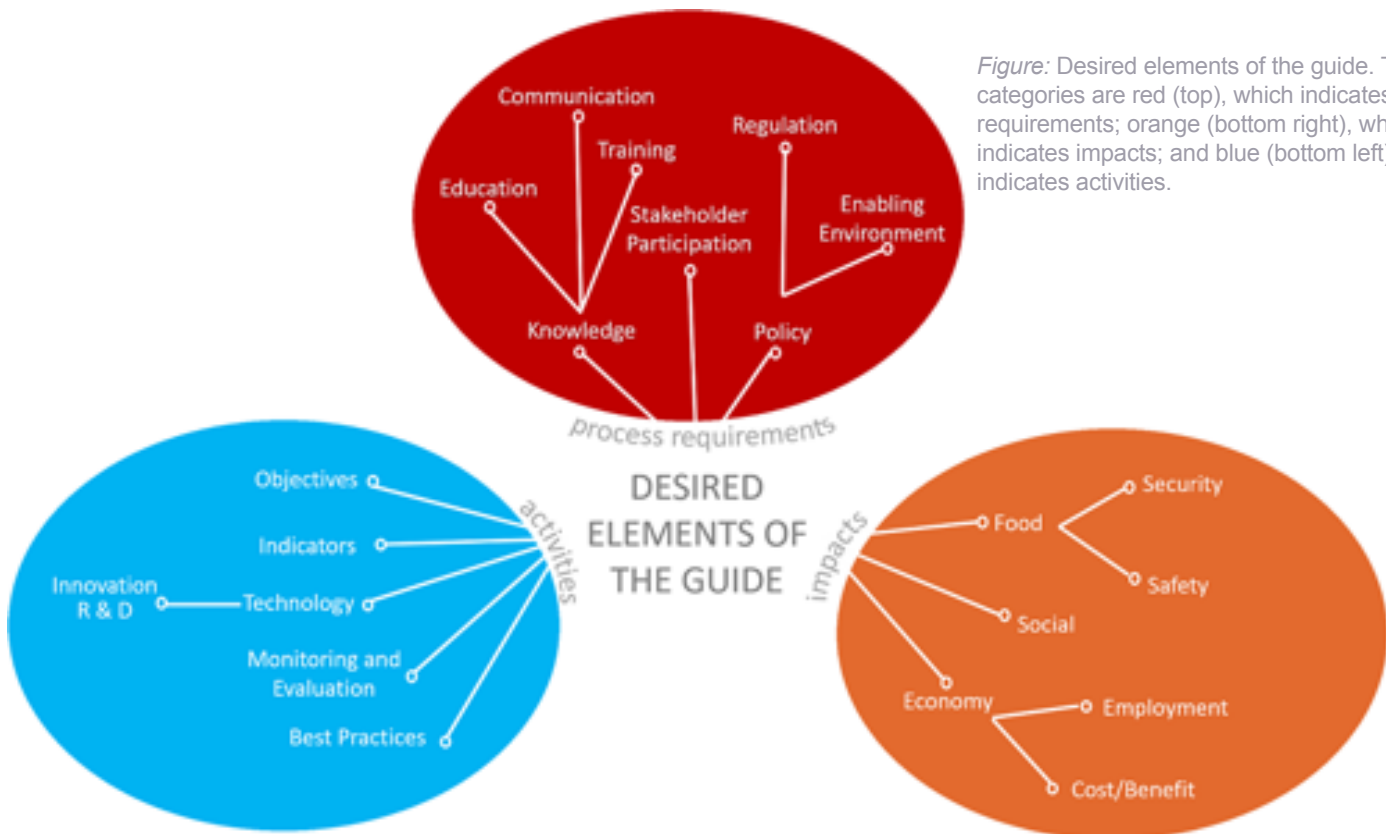


Figure: Desired elements of the guide. The three categories are red (top), which indicates process requirements; orange (bottom right), which indicates impacts; and blue (bottom left), which indicates activities.

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