Investing in Livestock and Animal Source Food Systems

U.S. Government's Global Food Security Strategy Activity Design Guidance

This is one of several Activity Design Guidance documents for implementing the U.S. Government's Global Food Security Strategy. The full set of documents is at www.feedthefuture.gov and www.agrilinks.org.

Introduction

The livestock sector constitutes 30 percent of the agricultural gross domestic product (GDP) in the developing world, and is one of the fastest-growing sub sectors in agriculture.[1] Investments in livestock production and animal source foods (ASF) market systems support the three U.S. Government's Global Food Security Strategy (GFSS) goals of (1) inclusive and sustainable agricultural-led economic growth, (2) strengthened resilience among people and systems, and (3) a well-nourished population, especially women and children.

A total of 1.2 billion people have livestock sector-related livelihoods. This includes 600 million livestock-keeping smallholder farmers,[2] the majority of whom are women,[3] and a substantial and growing number of off-farm, input, and output market participants and service providers.

However, the economic contributions of the livestock sector are frequently underestimated by development agencies, policymakers, and planners. The sector's growth presents an opportunity for sustainable economic development, inclusive employment, wage labor, and women's empowerment.[4] Population increase, urbanization, and income growth have stimulated surging consumer demand for ASF. This is driving trade and expansion of the livestock sector, fueled by available production-enhancing technologies, including investment in ASF processing and market and nutritional transformations. There are, however, important environmental and health externalities (e.g., greenhouse gas emissions, land use change, and animal-to-human disease transmission) that need to be mitigated.

Ownership of productive livestock assets and linkages to ASF markets also contribute to household-, community-, and system-level resilience capacities[5,6] and can support the development of social capital, for example, through inter-household livestock gifts and loans. Well-managed livestock build a household's asset base, reduce risks (by facilitating livelihood diversification), and effectively serve as a form of financial services (e.g., insurance against crop failure, investment capital, and savings).

ASFs are nutrient-dense components of diversified diets, providing highly bioavailable macronutrients (i.e., protein and fats) and micronutrients (e.g., iron and Vitamins A and B12) that are critical for health, particularly for adolescents and women of reproductive age, as well as for infant and child growth (including critical contributions to cognitive development).[7] Livestock contributes to nutritional outcomes through three key pathways: direct consumption of self-produced ASF, indirectly through income from the sale of ASF produced, and through women's economic empowerment and sharing of household decision-making.[8] While the contribution of livestock is broadly positive, livestock also bring environmental health and food safety risks that need to be carefully addressed in designs.

Terminology and Context

Livestock: Includes sheep, goats, cattle, buffalo, swine, camelids, equids (donkeys and horses), yaks, poultry (including chickens, ducks, geese, and turkeys), and microstock (e.g., rabbits, guinea pigs, and insects).

Animal Source Foods (ASF): Includes milk, other dairy products, poultry, eggs, red meat, and fish.

Livestock Production Systems:[9] Designs should consider differing agroecological, production, and marketing characteristics of four broad categories of production systems that are interlinked:

- Rangelands (including pastoral, agropastoral, grasslands, and agro-silvopastoral systems)
- Rural Mixed Crop-Livestock
- Small-Scale Urban/Peri-Urban
- Intensive/Large-Scale, Highly Commercial

Multifunctionality: Animals play multiple roles in supporting the livelihoods of the poor. These roles are context- and culture-specific and need to be supported to achieve GFSS objectives.[10,11] Conventional, output-based economic analysis routinely underestimates the socioeconomic contribution of the livestock sector (Box 1).

Greenhouse Gas (GHG) Emissions Intensity: The level of GHG emissions per unit of output, for example, the emissions related to one kilo of meat or milk produced.

One Health: A collaborative, transdisciplinary approach that recognizes the interdependence among the health of the environment, wild and domestic animals, and humans to achieve resilient and sustainable outcomes across complex systems from local to global levels.

Box 1: Different Functions Played by Livestock

- **Provide nutrient-dense ASF** within diversified diets
- **Generate income** through markets for animals, ASF, and other animal products (hides, skins, manure, and fibers) and services (e.g., traction)
- **Offer financial and risk management services**, such as liquid capital assets to address urgent cash needs; provide insurance (e.g., against crop failure); offer financing for diversification of productive livelihoods that spread risks; promote savings; and secure informal credit
- **Enhance crop production** through animal traction, threshing, expanding the cropping area, and improving soil fertility nutrient cycling via manure
- **Provide transportation** (water, people, and goods), expand market access, and reduce labor inputs
- **Build social capital and informal safety nets** to strengthen formal and informal networks

Designing Activities

It is imperative that integrated approaches are pursued. Due to space limitations, designers are strongly encouraged to refer to other relevant GFSS design guidance documents in conjunction with this guidance. Impactful design will be built on a contextual understanding of challenges and opportunities facing livestock production and marketing systems. Consider livestock ownership patterns and the roles different livestock species play for different segments of the target population. Approaches should utilize resources efficiently and sustainably, facilitating adoption of appropriate production technologies and management practices enabling livestock keepers to organize to respond to consumer demand, to improve access and connections to markets, to strengthen their negotiating position, and to reduce costs for traders and processors.

To stimulate inclusive and sustainable agriculture-led economic growth, designs should focus on increasing productivity through: identifying specific policy constraints and strengthening of the enabling policy environment;[12] good management practices, including appropriate breed improvement programs; adoption of market-linked technologies; strengthening market systems,[13] including input markets (e.g., veterinary pharmaceutical, animal feed, and forage seed systems); access to finance, animal health, extension, and advisory services; strengthening weather and market information systems; research and innovation; and integration with cropping systems. Designs should also guarantee inclusivity and equity by ensuring that women, youth, and marginalized groups have equal access to inputs and resources and share the benefits of engagement in livestock systems.

To strengthen resilience, designs should consider strengthening animal health and advisory services and access to input and output markets. They should focus on diversifying and integrating livestock functions into broader livelihood approaches, understanding traditional risk management and coping strategies, and integrating them into social protection and emergency programs. Designs should also promote good natural resource governance and management (including sound policies) by users that assure critical mobility for pastoral groups, sustained rangeland productivity, animal feeds, and water accessibility, and conserve advantageous genetic traits, germplasm, and biodiversity more broadly. Designs should identify environmental, market and other shocks and measures that will mitigate impact.

To improve nutritional outcomes, designs should be deliberate about targeting the livestock nutrition pathways and address trade-offs between the sale of ASF and home consumption, follow best practices for nutrition-sensitive agricultural development, and promote frequent consumption of modest amounts of ASFs (especially milk and eggs). Consider food safety risk management (foodborne pathogens), including sanitary handling and processing of raw ASF and effective cold chains. Reduce human exposure to zoonotic diseases, including environmental enteric dysfunction, through appropriate housing and application of good production and hygiene practices, as well as applying measures to reduce risk of exposure to foodborne pathogens after harvest (adopting a risk assessment approach).

Process Map to Guide the Design of Livestock Investments

Multisectoral design teams should consider five key technical steps described below to ensure designs are focused on poverty, have strong theories of change, and address the context-specific objective(s). The steps present a linear flow; in reality, design processes benefit from iteration between steps.

- **Step 1:** Analyze the livestock/ASF market system, services, policies, sector plans, local stakeholders (including enterprises in the market system and consumers), institutions, and their respective capacities.
- **Step 2:** Describe livestock production systems (Table 1), their interlinkages, integration with crops, agroecology, and constraints on productivity.
- **Step 3:** Integrate crosscutting themes, especially gender, and consider synergies and trade-offs.
- **Step 4:** Describe livestock related livelihood strategies of the poor, livestock-specific links to development objectives, and impediments to sustainable development outcomes.
- **Step 5:** Analyze and manage climatic variability, risks, shocks, and other key drivers of systems change.

Livestock Production Systems

Design considerations for livestock investments vary by the production system. Table 1 provides illustrative details on production system-specific opportunities and approaches for designers to consider.

*Table 1***:** *Investment opportunities and approaches categorized by livestock production system.*

Rangelands (pastoral, agropastoral, silvopastoral, and extensive grasslands)	
System characteristics	• Arid and semi-arid zones, predominantly large and small ruminants • Rainfall-dependent animal nutrition, producer focus on risk management • Economic and political exclusion, often involving Indigenous groups, resulting in inequalities[14] • Growing population pressure in the context of a limited and finite natural resource base • Limited but improving infrastructure, weak service provision, and regulatory environment • Significant losses to animal disease through weak animal health and advisory services • Rapidly commercializing with evolving market system dynamics in many contexts • Strong social networks, but exposed to conflict dynamics
Design opportunities and approaches	• Adopt a twin track approach enhance productive pastoral livelihoods (stepping up) as well as support households that are transitioning away from livestock-keeping livelihoods (stepping out)[15,16] • Pay attention to policy and inclusive governance, including customary institutions and local administrations (and capacity strengthening)[17,18] • Enhance land tenure, land-use management, and rangeland productivity[19] • Improve mobility and movement corridors, improve access to water, and reduce conflict • Consider integrated landscape/watershed approaches, including sustainable extensification and promotion of silvopastoral systems • Focus on building resilience capacities at household, community, and system levels; enhance asset protection, risk assessment, and management • Embed drought cycle management in development programming; invest in strengthening local and regional market linkages, early warning/prevention, and market-sensitive emergency assistance[20] • Recognize environmental limits on sustainable intensification; smooth and buffer vegetation variability through strengthened grazing and rangeland management, development and

	integration of animal feed and forage systems and supplemental feeding, and link pastoral systems with fattening and finishing services in other agricultural systems • Consider options to combine livestock production with ecosystem and wildlife habitat development, biodiversity, and carbon sequestration and approaches for ecosystem services payments • Promote climate-adapted approaches, including use of drought-adapted fodder, forages, and browse; use of arid-adapted breeds, water catchment, and harvesting; set up systems to support commercial offtake and destocking when deteriorating conditions indicate • Strengthen animal health systems[21] (public and private) and increase market orientation and animal trade • Develop on- and off-farm livelihood diversification; promote and strengthen urban-rural linkages and resource flows[22] • Foster important livestock-human nutrition linkages, notably increasing milk consumption using livestock productivity enhancement and behavioral approaches
Rural Mixed Crop-Livestock	
System characteristics	• The predominant livestock system (diverse subsystems, context is critical) • Ruminant meat and milk (and pork where culturally appropriate) plus micro-stock • Pro-poor role of backyard poultry whose eggs and meat are in high demand[23] • Integrated, multifunctional roles of livestock (variable but often low productivity) • Limited access to inputs, services, and markets, but systems are rapidly transforming
Design opportunities and approaches	• Support livestock production best practices and appropriate sustainable intensification (improve resource use efficiency and nutrient cycling, integrating crops and livestock)[24] • Integrate crop and livestock production, promoting nutrient cycling and other synergies • Consider how livestock production can be climate adapted and resilient, and generate lower GHG emissions per unit of output, mitigating heat stress and applying other climate-smart approaches and low emission pathways (GFSS Climate Smart Agriculture Design Guidance) • Consider the role of climate finance to support programming, as well as opportunities presented by emerging voluntary carbon markets and potential biodiversity payments • Adopt conventional measures of herd/flock productivity that reflect commercial orientation and efficient use of natural resources; consider improved breeding practices, genetic products, and services, where appropriate • Mediate sector transition for smallholders through improved land tenure and support to producer organizations and input markets; strengthen linkages to urban market demand • Support animal health and disease control, extension services, and improved genetics • Support expansion of animal feed sector dual purpose crops, safe use and processing of crop and agro-processing by-products, fodder production, and conservation, as well as optimisation of balanced feed composition • Develop incremental pathways to engage formal markets and meet quality standards • Improve food safety and zoonotic disease control (particularly in dairy sector) • Support producer groups, aggregation structures (e.g., milk collection centers), contract farming models to support smallholders, and inclusive sector development • Support expansion of smallholder dairy sector[25] and inclusive fattening operations as well as post-farm small and medium enterprises recognizing the role they play in value addition and rural employment
Small Scale Urban /Peri-Urban	
System characteristics	• Poultry, dairy, small ruminants, pigs, micro-stock, and fattening systems predominate • Small scale, limited land, use of locally available food processing by-products, value addition, and off-farm employment generation

	• Potential food safety and environmental health, including waste management challenges
Design opportunities and approaches (see also Rural Mixed Crop-Livestock)	• Strengthen the important role of value chains and markets supplying perishable ASF products at household and local and regional levels • Address challenges of land availability and animal feed supply, land use zoning/plans, agri by-product use, feeding practices, and feedlots/finishing systems • Support producer groups and product aggregation to reduce transaction costs for traders and processors • Provide access to improved genetics and animal breeding services • Support animal and veterinary public health, extension services, and improved genetics • Support employment potential and value addition, focusing on poverty, youth, and gender potential • Embed climate-smart approaches to build resilience to climate impacts, tapping into climate change financing mechanisms for agriculture • Address environmental, sanitary, and veterinary public health issues
Intensive, Commercial Livestock Production	
System characteristics	• Typically pig/poultry predominate but ruminant fattening and large-scale feedlots may also be present • Production provides access to affordable ASF through productivity efficiencies • Capital intensive, labor variable per unit of output • Significant public health and environmental externalities • Often underpinned by contracts between producers/growers and processors (including externally sourced feed, such as soybean, maize, and fodder) • Need for enabling policies and public infrastructure, such as roads, electricity grids, and water and sewerage infrastructure
Design opportunities and approaches	• Use output contracts to provide access to capital, feeds, and services • Cultivate private sector and public-private partnerships • Increase sustainable production of crops for animal feeds, and expand the feed sector • Address environmental challenges: water, land use, and waste management, and put in place a tracking system to monitor environmental footprints • Increase productivity to improve affordability of animal source foods and reduce GHG emission intensity • Address antimicrobial resistance and emerging disease externalities • Foster inclusive employment generation potential (including ASF processing) • Improve animal welfare (frame as a co benefit when addressing increased productivity) • Improve productivity and food safety through good agriculture and processing practices

Activity Design Principles

(The appropriateness and relative importance will depend upon context).

1. **Conduct a livestock sector analysis**;[26] disaggregate analysis by wealth group and gender; incorporate market system dynamics (including rural-urban linkages), trade flows, policies,[27] and sector development plans;[28] and identify opportunities for engagement and employment of poor livestock keepers and other market system participants into expanding ASF systems.
2. **Characterize agroecological contexts and livestock production systems** and relate these to market opportunities through sustainable natural resource management, good practices for adaptive agriculture,[29,30] and delivery of ecosystem services.
3. **Integrate designs with crop agriculture** (including fodder, forage, and feed production), land

use, and natural resource management, and consider landscape-level approaches and opportunities to improve the circular bioeconomies and nutrient cycling of integrated production systems.

4. **Undertake a nutrition analysis.** Identify direct consumption, indirect income, and women's empowerment pathways through which livestock and ASF contribute to gender empowerment and improving nutritional outcomes, noting in particular the contribution to essential nutrients but also the challenges of affordability of ASFs.[31]
5. **Facilitate development of local ASF markets** and increase availability, accessibility, and safety of ASF for nutritionally challenged households (improve the food environment, including support to retail outlets) and consider how to create on- and off-farm employment opportunities.
6. **Strengthen trade in ASFs**, addressing infrastructure, food safety, and other barriers.
7. **Understand the role of livestock in strengthening household, community, and system resilience** through asset protection and risk management (animal health, improved mobility, and insurance), increased livestock productivity, and engagement of households with markets.
8. **Address ASF-related food safety issues**, including linkages to hygiene and animal health.
9. **Integrate gender, youth, and employment analysis** within livestock system assessments. Understand gender-disaggregated livestock ownership patterns and related power dynamics.
10. **Design an integrated package of interventions** considering best livestock production practices, including breeding programs, animal health, and animal welfare,[32] and assessing innovations for their ability to fit within the local context.
11. **Build the capacity** of public and private agricultural research, extension, advisory, and animal health services; ASF production input suppliers; and financial services.
12. **Apply pro-poor market systems design approaches**,[18,33] engaging broad stakeholder participation in the design process, and consider all market system stakeholders (See the GFSS Activity Design Guidance for Integrating a Market Systems Approach in Programming).
13. **Facilitate private sector investment**, access to financial and business development services, and public-private partnerships (See the GFSS Activity Design Technical Guidance for Private Sector Engagement in Programming).
14. **Promote sustainable productivity gains** through research, sustainable intensification, and strengthened public and private extension systems. Optimize animal feeding,[34,35] including support to forage production, use of agri by-products, and developing fattening enterprises (See the GFSS Activity Design Guidance for Increased Sustainable Agricultural Productivity).
15. **Support and develop the capacity of producer, marketing, and processor organizations** to strengthen input and service provision and to facilitate equitable market engagement.[36]
16. **Identify scaling pathways and mechanisms and partnerships from the outset** to ensure long-term impact. Consider how investments are aligned with and support national sector development plans, investments from other donors and multilateral development banks, and the degree to which they can partner with the private sector and market systems more broadly.
17. **Consider undertaking socioeconomic and behavioral analysis** to ensure incentives, motivations, and barriers are understood and embrace a human-centered design approach.
18. **Support and strengthen data- and knowledge-generation systems** and the production of evidence, including through systematic evaluation to ensure resources are allocated effectively and impactfully.

Crosscutting Themes and Livestock-Specific Programming Challenges

For all livestock production systems, the following crosscutting themes should be considered:

- **Gender equality, women's empowerment, and inclusive development approaches, including engagement with pastoral and other Indigenous groups:** Women often have distinct and specific roles in the care and feeding of different livestock species and in processing and marketing ASF. Ownership and control of livestock assets, products, and processes need to be assessed and can strengthen women's status within the household and community, plus influence household consumption of ASF. Strengthen the design and management of programs that affect Indigenous Peoples, consulting with them throughout the design and implementation process.
- **Youth and employment:** Livestock production and downstream agri-food system value addition, plus interconnected off-farm services, feed, and crop markets have the potential to create substantial employment. Consider barriers to youth engagement, especially young women and girls, and assess the role of skills and business development training, access to small and medium enterprise (SME) financing, and other support for household-level SMEs.
- **Natural resource and other forms of conflict:** Use conflict assessment tools, identify drivers and livestock dynamics within different types of conflict, effectively manage natural resource-based trade offs, consider conflict mitigation interventions, and embed Do No Harm and conflict-sensitive approaches into designs.
- **Governance and capacity-strengthening of institutions:** Strengthen natural resource, land tenure, and value chain governance and livestock research systems. Weak producer groups and advisory and animal health services limit trade and use of new technologies and practices. Ensure that local stakeholders are empowered and have the capacity to drive change.
- **Policy environment:** Designs should align with national and regional policy frameworks and support policy frameworks that promote pro-poor, sustainable livestock development.

Critical Challenges to Consider within Designs

The following potential negative externalities and approaches must be considered in designs:

Adapt to climate change and promote low-emission livestock systems: Understand how livestock systems are impacted by and have a direct effect on climate change.[37,38] Adopt climate-smart and low-emission approaches.[39,40,41,42,43] Lower GHG emission intensity through improved productivity, reduce disease losses, and improve feeds and feeding practices and good management of manure and other animal wastes, including biogas, where appropriate.[44,45] Understand the land use changes related to livestock investments and measure environmental footprints and wider measures to safeguard sustainability.[46]

Climate variability and drought: Increased climatic variability, flooding, rising temperatures and drought impact drinking water availability as well as grazing and animal feed production. Consider supporting early warning[47] and long-range weather forecasting systems,[48] as well as risk management measures (including insurance, disaster risk finance, and integration with social safety nets) and adaptation measures (including improved genetics and livestock and landscape management). Consider using drought cycle management approaches,[49] commercial destocking,[50] integration of pastoral and other livestock production and market systems (stratifying production), as well as the use of Livestock Emergency Guidelines and Standards (LEGS),[51] and contingency plans to prepare for and action emergency responses, when necessary.

Foodborne disease risks:[52,53] Risks include microbial infection and contamination of ASF, mycotoxin presence, and development of antimicrobial resistance. Adopt risk-based analysis, identify pathways to progressive formalization of markets, and engage key stakeholders when designing solutions.

One Health approach:[54] Recognize and incorporate the interdependence and interactions between the environment, animals, and humans to achieve resilient, sustainable outcomes across complex systems.

Zoonoses and emerging disease, particularly of novel human pathogens: Adopt risk-based analysis, forecasting frameworks and contingency planning to anticipate risks of zoonotic livestock diseases and their potential amplification or spill-over to people and put risk-based mitigation measures in place.[55] For example, addressing wildlife market system trade, reducing environmental exposure to animal fecal materials[56] through proper animal manure management[57,58] and integrated water, sanitation, and hygiene (WASH) interventions and managing risks resulting from land-use, production system and consumption pattern changes.

Sustainable land and water use management: Ensure good natural resource management via optimal use of soil, land, vegetation, water,[59] and other natural resources, and include effective land tenure, landscape-level land use planning, and watershed and rangeland management approaches (see GFSS Design guidance documents; Natural Resource Management and Improved Water Resources Management for Agricultural Systems). Monitor environmental (and socio-economic) impacts, utilizing multi-domain frameworks (e.g. Dairy Sustainability Framework).

Additional Resources and Tools

- USAID. 2021. *Gender Good Practices in Livestock Programming*. USAID.
- Swiss Agency for Development and Cooperation (SDC). 2015. *The Operational Guide for the Making Markets Work for the Poor (M4P) Approach*. SDC.
- Module: Food and Agriculture Organization of the United Nations (FAO) Climate-Smart Agriculture Sourcebook: Climate-Smart Livestock Production.
- FAO. 2020. *Livestock Sector Investment and Policy Toolkit (LSIPT): Making Responsible Decisions*. FAO.
- Feed the Future. 2020. *The Enabling Environment for Animal Source Food Market System Success: Assessing Factors that Support Competitive, Inclusive, Resilient, Nutrition-Sensitive Systems*. USAID.
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For further assistance related to these Activity Design Guidance documents, please contact ftfguidance@usaid.gov.