Climate change adaptation in livestock systems

Photo: ILRI/Riccardo Gangale

Policy and decision support for increased investment in livestock adaptation strategies that contribute to productivity, nutrition, resilience and mitigation

ILRI's objectives

ILRI will support the development of climate-resilient livestock systems across its target regions[1] by supporting decision makers with new evidence, tools and technical knowledge to drive increased investment in livestock adaptation strategies that contribute to food security, resilience and mitigation. Outcomes include:

1. New scientific knowledge on the projected impacts of climate change on livestock systems used by policymakers, donors, NGO's and research institutions in their planning processes.

2. Evidence, tools and technical support available to and used by decision makers to target, prioritize and implement high potential livestock adaptation strategies across a wide range of production systems and future climate scenarios, while accounting for impacts on marginalized groups such as women and youth.

3. Tools and technical support available to and utilized by national governments to monitor the impacts of livestock adaptation strategies over time, including changes in adaptive capacity of livestock keepers and environmental impacts, and to successfully report against their Intended Nationally Determined Commitments (INDCs) under the Paris Agreement.

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1 East, West and Southern Africa and South and Southeast Asia

Situation analysis

Policymakers, donors, NGOs and research institutions need to know what the good-bet climate change adaptation strategies are for livestock systems in different contexts. Sixty-one countries, over half of which are in sub-Saharan Africa, prioritize livestock adaptation in their INDCs under the Paris Agreement (Richards et al. 2015). However, they don't have the technical knowledge or guidance to prioritize different options and make strong business cases when applying for climate finance. Decision makers need support to target and prioritize research and development activities for different livestock production systems tailored to desired outcomes such as technical performance; cost-benefits for different groups of livestock keepers and policymakers; and contributions to productivity, nutrition, resilience and mitigation (Palazzo et al. 2017; Zougmoré et al. 2018).

New scientific knowledge on how climate change will impact livestock systems is urgently needed to inform investment planning. Climate change impacts on livestock systems might be seriously underestimated, with most research attention focused on impacts in cropping systems (Thornton et al. 2015; Porter et al. 2014). Livestock systems are vulnerable to climate variability and increased frequency of extreme climatic events. The number of extreme climate-related disasters has doubled since the 1990's (FAO 2018). Droughts cause 86% of all damage and losses in livestock

systems and can be extremely expensive. The 2008–09 drought in Kenya caused USD9 billion in damages and loss to the livestock subsector (FAO 2015). Moreover, climate extremes, warming and anticipated changes in rainfall regimes could increase environmental losses of nutrients and emissions of greenhouse gases (GHGs) in some situations. New analyses can generate actionable information on the impacts of climate change, including variability and extreme events, on livestock systems. Key gaps include quantity and quality of feeds and forages, shifts in pests and disease pressure, environmental footprint, risks in livestock-derived food supply chains (e.g. cold chain effects) and adaptation potential in livestock systems under projected novel climates (Thornton et al. 2015; Thornton et al. 2014).

Linking livestock adaptation strategies with their current and projected impacts will enable better decision making. Scanty information is available on the impacts of livestock adaptation strategies, including innovations by livestock keepers, and the lack of comparable indicators across studies makes available data less useful for policymakers (Escharcha et al. 2018; Crane et al. 2017). Livestock keepers have adaptive and innovative capacities for dealing with climate change and can be key drivers in determining the right adaptation strategies for their production systems whether they are in the rangelands or mixed crop-livestock systems (Crane et al. 2011). As crop yields decline under climate change, the role of livestock might increase in mixed crop-livestock systems and livestock keepers can capitalize on new opportunities. Assessing impacts of adaptation strategies is complex, with suitability and outcomes varying depending on the objectives of policymakers, livestock keepers and other stakeholders, agro-ecological zone, species and breeds of animals reared, market opportunities, infrastructure, institutional environments and cultural preferences. Proposed adaptation strategies often focus on intensification or transformation of production systems; but these changes bear trade-off risks, such as the potential for increased environmental impacts and negative outcomes for some livestock keepers (e.g. gender, ethnicity, age and wealth)—factors critically important for policymakers and development actors (Salmon et al. 2018).

Policy makers need tools and guidance to implement monitoring and evaluation (M&E) for livestock adaptation and measuring, reporting and verification (MRV) for mitigation. Currently, there are no systems in place to monitor and evaluate the impacts of livestock adaptation strategies over time. Yet, there is a need for a robust and valid instrument and appropriate small sets of metrics for national tracking of adaptation targets to fulfill reporting requirements under the Paris Agreement, to act as a warning system and to test adaptation strategies (Crane et al. 2017). In addition, countries need support to implement reliable environmental monitoring for the MRV's, starting with a baseline that determines the current environmental footprint of livestock systems to measure against as climate change and adaptation occur (Lopez-Ballesteros et al. 2018).

ILRI's solutions

Solution 1: Generate a better understanding of climate change impacts on livestock systems.

Apply new ex-ante multi-scale, model-based analyses to analyze and quantify key questions:

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1. What are the hotspots of climate change vulnerability in livestock systems? Specifically, in which production systems and geographies does research need to address dietary diversity for improved nutritional outcomes under different climate change scenarios?

2. How will increasing climate variability and frequency of extreme events impact livestock and livestock systems? How will smallholder livestock production systems evolve under these changes?

3. What will the economic impacts of climate change be at multiple scales from macro to household level? What will the outcomes be at the household level, in value chains (productivity, pre- and post-production losses, commodity prices, market supply of meat and milk, imports/exports), at the national, regional and global scales?

4. How will climate change impact critical components of livestock production including feed and forage yield and nutritional quality and animal disease burden? What are the costs associated with these impacts?

Solution 2: Develop tools and conduct analyses to construct a toolbox of good-bet adaptation practices, technologies and policies that are robust across different scales and climate futures.

1. Create an inventory of current and potential livestock adaptation strategies.

2. Implement a multi-stakeholder process to develop a robust set of livestock adaptation indicators.

3. Develop prioritization frameworks for multiple scales—global, regional, country, community and household—that allow decision makers to identify good-bet adaptation strategies in different livestock systems.

4. Analyze potential impacts of different adaptation strategies and incorporate into prioritization frameworks.

   - Conduct cost-benefit analyses on adaptation strategies to identify robust "no regrets" options with projected positive net benefits across a wide range of uncertain future climate scenarios.

- Develop methodologies and conduct tradeoff analyses between social, economic, political and biophysical outcomes.
- Extract evidence of the impact of different adaptation strategies from past and current research and development interventions targeting climate change adaptation in livestock systems through a meta-analysis.
- Generate evidence of the environmental footprint of adapted livestock systems.
- Generate evidence on how variables such as gender, ethnicity, age and wealth status affect the impacts of different adaptation strategies.
- Identify where the costs of adaptation in existing livestock systems are too high and develop recommendations for supporting alternative livelihoods.

5. Develop guidelines for on-farm testing and evaluation of climate change adaptation strategies for livestock.

6. Collect evidence on how livestock keepers are already adapting and develop methodologies for engaging with livestock keepers to strengthen ongoing adaptation dynamics.

7. Test and scale up promising adaptation strategies.

Solution 3: Develop methodologies and tools for long-term adaptation monitoring, including environmental impact.

1. Generate baseline for environmental impact of current livestock production systems with a specific focus on climate (GHG emissions, air quality), water (water quality and quantity) and soil health (C/N stocks, erosion, desertification).

2. Provide tools and guidance to policymakers to implement their MRVs.

3. Develop adaptation tracking methods, instruments and operational protocols tailored to each livestock production system for long-term monitoring and evaluation of development interventions.

4. Work with partners to develop a monitoring network of key livestock systems that tracks management, productivity, environmental loss pathways of nutrients and GHGs and natural resources (climate, soil and water resources).

Solution 4: Build the capacity of policy makers.

1. Engage stakeholders around participatory scenario processes that utilize projections of climate change impacts on livestock systems and the adaptation decision framework to drive towards longer-term targeting, prioritization and investment planning for adaptation in livestock systems.

2. Provide tools and technical support to countries to prioritize livestock adaptation strategies in their INDCs and to implement long-term environmental and adaptation monitoring for reporting.

Roll out ready tool: Livestock master plans

ILRI will engage in participatory processes with policymakers in low-income countries to incorporate adaptation actions for livestock systems in their 5-year livestock master plans (LMPs) and a consideration of climate risks in their 15-year Livestock Sector Analyses.

Since 2015, ILRI has been working with countries across the globe to develop LMPs that set future priorities and investment strategies for livestock research and development activities, while at the same time building the capacity of governments to carry out data-driven, fact-based analytics and planning. Despite its high contribution to agriculture GDP, the livestock sector has suffered from being low priority for many countries. LMPs are a step towards reversing this trend—the Ethiopia LMP launched in 2015 targets poverty reduction for 2.36 million livestock-keeping households, has stimulated more than USD250 million in private investment into the sector, and is being implemented through a USD170 million project of the Ethiopian government and the World Bank.

Building on this success, ILRI is working with the French Agricultural Research Centre for International Development (CIRAD) and Food and Agriculture Organization of the United Nations (FAO) to include measures of adaptive capacity and environmental services and their potential trade-offs with livelihood and productivity outcomes in the LMP model. Through future LMP processes, ILRI will build the capacity of countries to understand how climate change might affect their livestock systems and leverage data and information to assess the trade-offs between investment options. This will support countries in selecting and implementing technically sound adaptation and mitigation INDCs that allow them to optimize for their own goals.

ILRI's impact and capacity

Interdisciplinary, scientific expertise and world class modeling and experimentation capacity to provide scientific leadership for designing and implementing livestock adaptation strategies in ILRI's target regions.

Strong country-level partnerships that open the door for policy-level engagement. Key examples include recent stakeholder engagement actions built around participatoryscenario processes and new training materials for personnel in government ministries involved in implementing INDC commitments under the Paris Agreement[2].

Large capacity for cutting edge research on environmental footprints of livestock systems and testing adaptation interventions in the field through ILRI's Mazingira Centre[3].

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2 https://ccafs.cgiar.org/blog/connecting-dots-implementing-nationally-determined-contributions-agriculture; https://ccafs.cgiar.org/scaling-out-scenario-guided-policy-and-investment-planning#.XBdLMWgzY2w
3 https://mazingira.ilri.org/publications/

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