



FEED THE FUTURE INNOVATION LAB FOR LIVESTOCK SYSTEMS

Future Livestock Systems: Scenario-guided policy review workshop

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By the Management Entity at the University of Florida



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RESEARCH PROGRAM ON
Climate Change,
Agriculture and
Food Security



ILRI
INTERNATIONAL
LIVESTOCK RESEARCH
INSTITUTE



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Acknowledgement

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Sustainably intensifying smallholder livestock systems to improve human nutrition, health, and incomes.

Disclaimer

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Acronyms

ABE	Agricultural and Biological Engineering
ASF	Animal-source food
CCAFS	Climate Change, Agriculture and Food Security
CGIAR	Consultative Group on International Agricultural Research
EDRI	Ethiopian Development Research Institute
EIAR	Ethiopian Institute of Agriculture Research
FAO	Food and Agriculture Organization of the United Nations
GoE	Government of Ethiopia
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IDA	Interdisciplinary Analysts
IFPRI	International Food Policy Research Institute
IITA	International Institute for Tropical Agriculture
ILRI	International Livestock Research Institute
LMP	Livestock Management Plan
LSIL	Livestock Systems Innovation Lab
MoAL	Ministry of Agriculture and Livestock – Government of Ethiopia
NGO	Non-governmental organization
UF	University of Florida
UNEP	United Nations Environment Programme

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1. Introduction

The U.S. Agency for International Development (USAID) awarded the University of Florida (UF) Institute of Food and Agricultural Sciences (IFAS) funds to establish the Feed the Future Innovation Lab for Livestock Systems. This five-year initiative (October 2015 to September 2020) supports USAID's agricultural research and capacity building work under Feed the Future, the U.S. Government's global hunger and food security initiative. The International Livestock Research Institute (ILRI) is the UF/IFAS partner in implementation of the Livestock Systems Innovation Lab (LSIL). The six target countries for this project are: Burkina Faso and Niger in West Africa; Ethiopia and Rwanda in East Africa; and Nepal and Cambodia in Asia.

The LSIL aims to improve the nutrition, health and incomes of the poor by sustainably increasing livestock productivity and marketing, and consumption of animal-source foods (ASF). This aim will be achieved by introducing new location-appropriate technologies, by improving management practices, skills, knowledge, capacity and access to and quality of inputs across livestock value chains, and by supporting the development of a policy environment that fosters sustainable intensification and increased profitability of smallholder livestock systems.

Scenario Process

Scenarios can be used in an intensely participatory process used for future envisioning, policy development and planning. Successful scenario analysis efforts have addressed agricultural, climate change and development policy formulation processes with many governments. Success stories are Cambodia, Honduras, Bangladesh, Colombia, Uganda, Tanzania and Ghana (Climate Change, Agriculture and Food Security-CCAFS, 2015, 2016, 2018). While the original development and use of scenarios stem from military and private sector planning efforts, scenario planning processes are routinely used by large- and small-scale organizations to effectively envision different plausible futures, thereby addressing future uncertainty, and allowing the planning of better-informed potential responses. Scenarios are “what if” stories about the future, told in words, numbers (models), images and other means. Rather than attempting to forecast a single future in the face of broad future uncertainty, scenarios represent multiple plausible directions that future drivers of change may take.

Scenarios can be used to develop policies, plans and investments as well as test their feasibility against a range of plausible future contexts. Each scenario offers different future challenges and opportunities. Therefore, for each scenario, planners can ask the question: *How well will our plan work under the specific conditions of this scenario? What needs to be changed?* When recommendations for improvement from a range of different scenarios are integrated, the plan has a better chance of being effective in the face of an uncertain future – for instance, by having strategies that are expected to work under all scenarios, or by including a range of different options that can be used depending on the specific scenario. Scenarios can also be used before a plan exists, by starting with the challenges and opportunities that different scenarios offer, coming up with ways to approach those issues, and then combining them in a new, robust, plan. *Rather than providing a single “most likely” forecast, multiple scenarios explore multiple concrete, plausible futures and what these would mean for food security, environments and livelihoods. This way, the set of scenarios engages with broad future uncertainty for the testing of policies, investments and research innovations.*

The recent CCAFS and the LSIL scenarios process focuses on contextual drivers of change for agriculture and food security – climate change and socio-economic changes (e.g. in markets, governance, broad economic developments, infrastructure).

Regional Scenarios for East Africa

Within the CCAFS program, multi-stakeholder regional scenarios have been developed for the East African region and 5 other global regions in order:

1. to explore key regional socio-economic and uncertainties for food security, environments and livelihoods under climate change through integrated qualitative-quantitative scenarios describing futures up to 2050;
2. to use these scenarios with regional, global and local actors for strategic planning and research to explore the feasibility of strategies, technologies and policies toward improved food security, environments and livelihoods under different socio-economic and governance conditions.

Within the CCAFS program, combined regional socio-economic/climate scenarios have been developed with a wide range of stakeholders in East and West Africa, as well as South Asia, Southeast Asia and Latin America. For East Africa, a set of qualitative scenarios up to 2050 was developed in close collaboration with regional stakeholders. Subsequently, these scenarios have been quantified using two agricultural economic models: GLOBIOM, developed by IIASA, and IMPACT, developed by IFPRI. The CCAFS scenarios project focuses strongly on the use of scenarios for decision making to achieve better policies and investments. In East Africa, government policies and action plans have been tested and developed to be feasible in the face of the challenges posed by the combined socio-economic and climate scenarios. Subsequently, maps on land use, ecosystem services and biodiversity have been developed in collaboration with UNEP WCMC. These maps were used by regional decision-makers to start to review and propose improvements to strategies.

Two drivers were considered highly relevant for future food security, environments and livelihoods in Eastern Africa, but with high levels of uncertainty attached to them:

- *Regional integration:* Will the countries of Eastern Africa integrate politically and economically, or will a fragmented status quo be maintained?
- *Mode of governance:* Will governance – the rules, regulations, institutions and processes affecting the behavior of individuals and groups – be characterized by a reactive or proactive stance of governments, the private sector and civil society?

These two “uncertain” drivers were used to structure four scenarios. An artistic impression of these scenarios by Mauvine Were is displayed in Figure 1. These regional scenarios were used as a basis for the development of national scenarios for Ethiopia in the following section.

2. Purpose of the training course

The objectives of the Scenarios meeting were the following:

- Review CCAFS East African regional scenarios and recent IMPACT macro-model projections
- Downscale the regional scenarios into Ethiopia-focused future scenarios
- Explore how Ethiopia’s Livestock Master Plan will function within these future scenarios
- Identify the different challenges and opportunities that may arise in each future scenario
- Review policy elements in the Livestock Master Plan to increase resiliency to adverse events and to promote emerging opportunities

3. Methodology

In July 2018, LSIL organized a 1.5-day workshop to generate Ethiopia-focused scenarios from the CCAFS regional scenarios (Vervoort et al., 2014). The workshop agenda is included in Appendix 1. There were 20 participants in total (13 male and 7 female) from different institutions such as: ILRI, CCAFS, Ministry of Agriculture and Livestock and FAO.

After reviewing the regional scenarios, working groups were formed, each focusing on one of the four East Africa scenarios listed in Figure 1. Each group reviewed the description of the scenario and listed individual thoughts as to what the scenario means for Ethiopia, and for the scope of the LMP, up to 2040-50. Broader, contextual developments were considered, including:

- Political and institutional developments
- Socio-economic and demographic developments
- Culture, norms and values
- Technological developments, science
- Natural resources, ecological developments

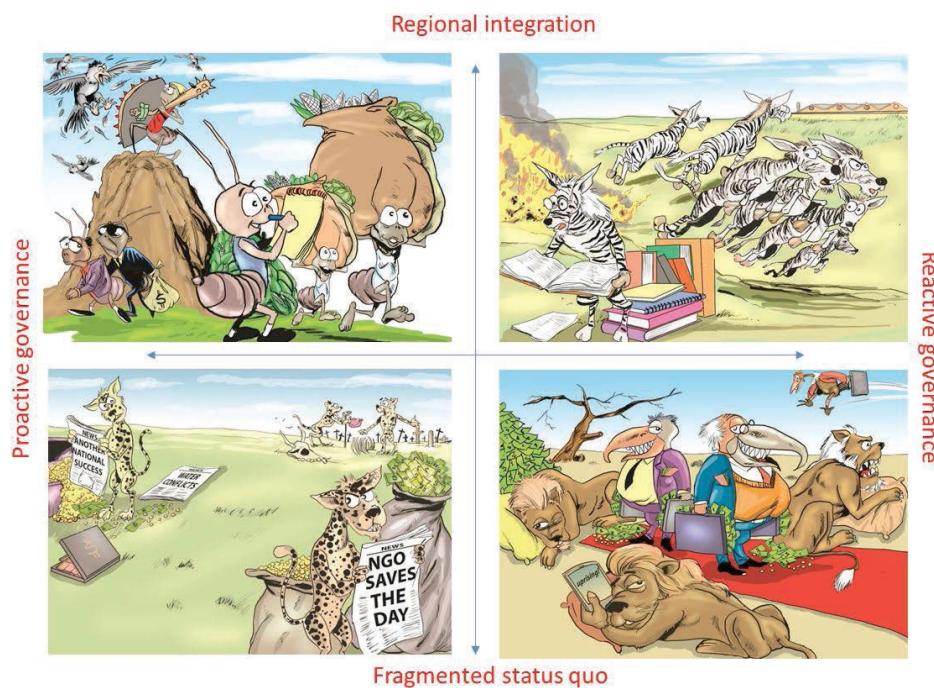


Figure 1. Graphics by artist Mauvine Were showing four regional East Africa Scenarios (Vervoort, 2014).

After the individual reflections, the group shared thoughts and clustered similar ideas to start to build a coherent world for the scenario in Ethiopia. Having established the 2040/50 picture for the scenarios, the participants consider what the scenarios might mean in the shorter term – up to 2030. Subsequently, more details concerning the livestock sector were added to the scenarios including the primary question: *What will*

the future of the livestock sector look like within the context of this scenario? While participants shared their insights on the livestock sector in general, more specific elements also included the following production areas:

- Dairy cattle
- Red meat-milk and cattle feedlot systems
- Poultry
- Livestock feed and health
- Animal genetics

4. Results

The four scenarios discussed in this section tailored the regional drivers and issues into a more Ethiopia-focused context. An important caveat to these national-level scenarios is that no one scenario predicts what exactly what future events are going to occur. It is important to note that these national-level scenarios do not represent actual predictions of what events are going to occur. When looking at complex socio-economic and political drivers and their interaction with biophysical drivers, it is impossible to predict the exact form of how future conditions will develop over the coming decades. Thus, all four scenarios have plausible elements and policy makers should resist the temptation to choose their one preferred scenario and disregard the others. Additionally, all scenarios should be considered and possibly integrated into future policy plans and alternatives so that more resilient options are generated. Often one policy measure may successfully mitigate potential problems in several future scenarios.

Given that the two Scenario Analysis Groups were relatively small (6-8 members), it was decided to highlight two scenarios per group. As a result of time (1.5 days) and group-sizes, not all scenario elements have equal level of details. Each scenario is presented with a summary of the regional scenarios first with more Ethiopia-focused elements following. After the regional and national summaries, specific societal elements are outlined. Lastly, potential implications for the LMP are reviewed under each Scenario's assumptions.

Regional integration

Proactive governance



Reactive governance



Fragmented status quo

Industrious Ants – Scenario Overview

East Africa Regional Perspective: This scenario is characterized by the slow but strong economic and political development of East Africa and proactive government actions to improve regional food security. However, there are costly battles with corruption and security is fragile as the region must deal with new international tensions resulting from its assertion in the global political and economic arena. The region's focus away from export-only commercial crops causes some challenges to compete on the global market – and the region's dedication on regional self-reliance proves to be challenging when a great drought hits in the early 2020s – though by that time many state and non-state support structures are in place to help mitigate the worst impacts. Governments and non-state actors struggle to mitigate the environmental impacts of growing food and energy production

Ethiopia Perspective: Ethiopia and Kenya have continued to grow in trade and mutual support as their economies complement each other's deficiencies. While growth in urban areas has led the way, rural development and employment has also increased. Adverse issues such as climate change do raise challenges sporadically, but these impacts are limited to smaller regions and are not long-lotringer.

Political and institutional developments: The regional integration and proactive governance has allowed the following elements: (1) Good inter-ministerial cooperation, (2) Reconciliation between CGRE and other policies, (3) Active positive, economic ties between Ethiopia and Kenya as well as rest of East African community. There is a good degree of policy dialogue between stakeholders along with a strong relationship

with Eritrea leading to greater port access. While there is increased competition for land and water resources in the highlands, these issues do not dominate national issues. Overall, the investment environment is positive and provides useful growth opportunities.

Socio-economic and demographic developments: This scenario sees more equitable development between rural and urban areas along with better market infrastructures as well as physical infrastructure. Addis Ababa growth is strong with other robust locations emerging as well. In terms of culture, norms, and values, immigration flows increase from less-rich neighboring countries to capitalize on economic opportunities leading to some localized stressors. Nutritional practices of ASF increase during fasting periods. Lifestyle diseases such as obesity, heart disease and diabetes are on the increase as diets follow more western preferences.

Technological developments and science: Strong internet connectivity and good information flows drives science and technology developments. Strong university and research development continue and increase regional cooperation. Additionally, increased efficient agricultural practices to address food security.

Natural resources and ecological developments: Environmental issues are given higher focus especially regarding land conservation. While there is an increase in eco-tourism, climate change is still a challenge in specific regions. Overall, there is mostly efficient utilization of natural resources.

Implications for the Livestock Master Plan

The following elements are needed (or assumed to have occurred over time) within this scenario. (1) Increased access to livestock insurance for cattle and small ruminants allows more balanced development. (2) Increased irrigation from small dams leads to higher crop/forage/feed production possibly leading to increased water quality problems in rivers. (3) Increased access to credit for smallholders allows access to markets. (4) All informal trade decreases as a result of improved trade regulations. (5) Increased value chain development for by-products such as leather goods.

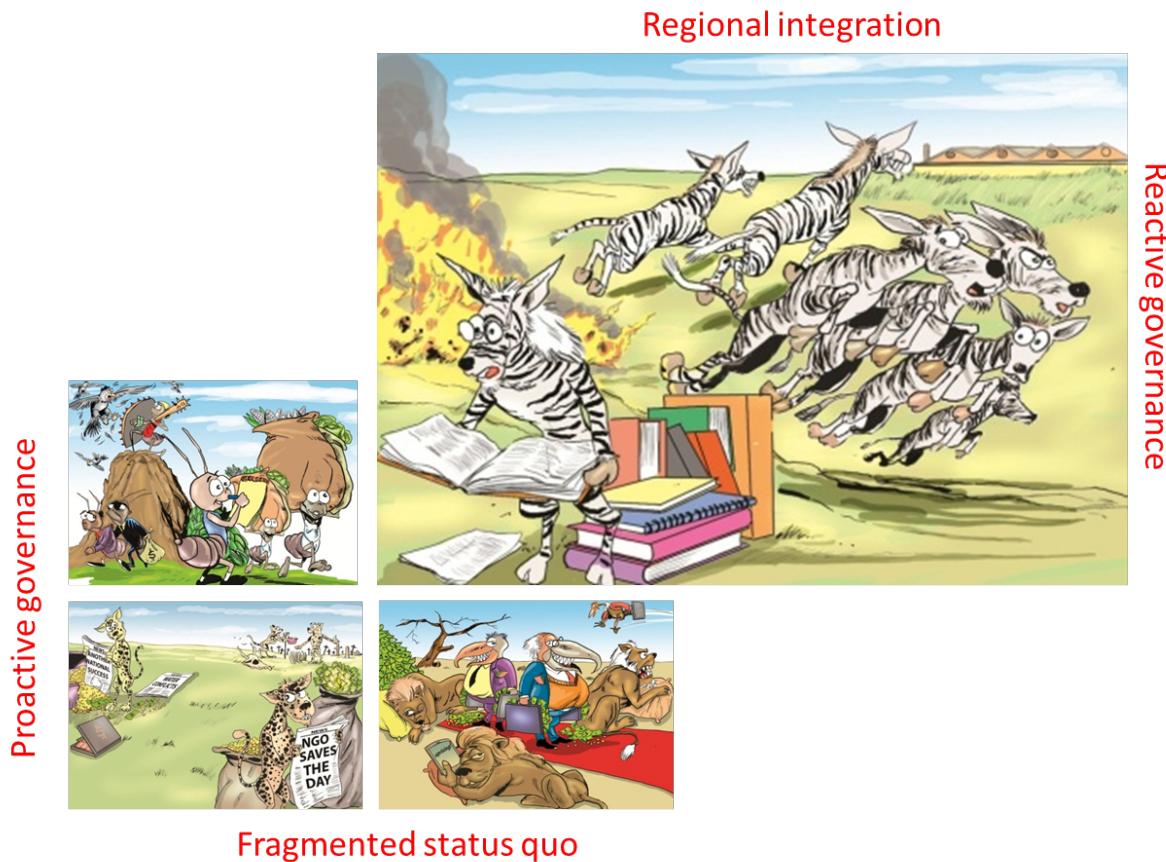
Cow dairy development Roadmap: Increased milk consumption and milk/dairy exports.

Red meat-milk and cattle feedlot systems development Roadmap: (1) Increased feedlot and cattle production leads to increased domestic consumption of red meat. (2) Increased certification for meat quality. (3) Greater private investment in feedlots and abattoirs. (4) Better trade for export, reduced trade barriers, and increased incentives for formalized trade.

Poultry development roadmap: (1) Increased consumption of poultry. (2) Increased Improved Family Poultry (IFP) production and commercial production. (3) Increased capacity building with IFP. (4) Promotion of cooperatives with IFP

Take home messages

1. Slow but steady growth towards LMP targets, but potentially lagging indicators until 2035-2040.
2. Benefits from other regional countries.
3. Producers may source some of their livestock feed components from other countries instead of growing them internally. There may be good opportunities for supplementation of feeds.
4. Encourage food/feed linkages for maize to mix maize into feeds.
5. Lift import tariffs on feed-related items.
6. Explore opportunities to import LS products from neighboring countries. Kenya and Uganda may be in better position to export dairy products to Ethiopia.



Herd of Zebra – Scenario Overview

East Africa Regional Perspective: In this scenario, governments and the private sector push strongly for regional development, but mainly through industry, services, tourism and export agriculture, with limited action on food security, environments and livelihoods. East African economies boom, but the region suffers the consequences of its vulnerability to global market forces and unsustainable environmental exploitation. Only when food insecurity becomes extreme, following rocketing food prices during the great drought of the mid 2020s, is action taken to improve the management of water resources and invest in climate-smart food production for regional consumption.

Ethiopia Perspective: Ethiopia realizes strong industry-led economic growth along with increased foreign direct investment (FDI). These drivers create a higher demand for goods and services that larger producers can tap into with limited access by smaller producers. Increasing inequity leads to increased urbanization, plus out-migration to other large, East African cities. The unequal growth creates negative environmental effects and natural resource competition/tension is initially high, but governments address these reactively to provide stability when needed.

Political and institutional developments: Most national-scale actors move in reaction to both external (global trade, climate) and internal (political stability, economic inequality, socio-cultural) events. Thus, longer-term planning does not have much traction in formulating policies and plans. While regional trade flourishes, there are challenges in providing opportunities for both urban and rural regions, thus cities tend to grow and realize increasing influence.

Socio-economic and demographic developments: While the national economy shows boom cycle gains, especially in larger urban areas, issues such as food security, environment, livelihoods do not follow the upward trend in many regions. There is significant vulnerability to global markets and environmental change with concomitant challenges in water, biodiversity loss, intensification of agriculture along with increased pollutants. While more integrated regional agreements allow an increase in flows of people, civil society and educational opportunities, populations remain separated by class, culture, language and religious differences. Additionally, prices remain high with high levels of socio-cultural dissatisfaction.

Implications for the Livestock Master Plan: The following elements are needed (or assumed to have occurred over time) within this scenario.

Cow dairy development Roadmap: (1) Current production targets prove too ambitious, increasing dairy product demand will necessitate imports past what is accounted for by initial levels in the LMP. (2) Commercial sector investment will be largely to the detriment of rural smallholders. (3) In a regionalized system, more steps will be necessary to ensure competitiveness of Ethiopian dairy.

Red meat, milk and cattle feedlot systems development Roadmap: (1) A major constraint is livestock numbers and suitable land, with limited government-focused assistance, more large-scale growth may be seen in the other two value chains. (2) Not much investment from government and limited private sector investment in pastoral production. As such the pastoral system will diminish and the feedlot sector will grow to meet demand from the region. (3) Higher domestic prices for red meat.

Poultry development roadmap: (1) Smallholder market-oriented (informal) production would increase with lack of government regulation. (2) Increased demand and with more commercial production of eggs and meat. (3) Imports of meat will also increase with local demand and increased local incomes. (4) With limited government resources, poultry may serve as best use. (5) Vertical integration of commercialized systems proves massive advantage over smallholders to their detriment, driving inequality. (6) Consider additional government support for smallholders, particularly genetics, health and feed.

Take-home points

1. To meet LMP targets, large-scale private investment will be needed.
2. Potential dangers include: leaving smallholders behind, food security, environmental issues such as water scarcity.
3. Success will require coordination at the national government scale to facilitate a competitive Ethiopian agriculture sector through strategic use of tariffs, taxes, etc.

Proactive governance

Regional integration



Fragmented status quo

Lone Leopards – Scenario Overview

East Africa Regional Perspective: In this scenario, regional integration exists only on paper by 2030. In reality, government, non-government institutions and individuals are busy securing their own interests. In terms of food security, environments and livelihoods, the region initially seems to be heading for catastrophe in the 2020s. However, after some years, national and international as well as government and non-government partnerships become more active and, unburdened by strict regional regulations and supported by international relations, are able to achieve some good successes by the later 2020s/early 2030s. Unfortunately, because of the lack of coordination, this is a hit-and-miss affair, with some key issues ignored while on others there are overlapping or competing initiatives. The inability of governments to overcome regional disputes and work with one another becomes untenable when a severe drought hits in 2025. This pushes civil society, bolstered by international support, into a demand for radical change in governance. In many cases, the resulting change is long lasting and for the better.

Ethiopia Perspective: With proactive national governance within a more fragmented region, Kenya and Ethiopia appear to be the primary regional powers in East Africa. Barriers to trade are ever present as well as barriers to joint activities with smaller, regional governments and economies. Both wins and losses occur regularly in this fragmented scenario which has similarities to the current Ethiopian situation. Proactive government policies in developing Chinese investment helps to fulfill agriculture investments and overall national targets, but these investments may not be so beneficial for lower-income populations. There is a significant difference between development/advancement in the highlands and lowlands, leading to a greater chance of social volatility scenarios.

Political and institutional developments: While there is progress in some sectors, government policies and actions tend to work from the urban and peri urban areas outwards to the rural highlands and low lands.

Some proactive government programs would create cooperatives in areas that have some success. Strong NGOs would be a different factor in making resilient market networks, but only in certain areas.

Government is already quite strong but may not be able to service all areas in need. NGOs have an agenda that is not always aligned with the government agenda. This misalignment may cause challenges in coordinating implementing actions. NGO involvement may increase in rural areas and could be more coordinated by the national and regional governments.

Socio-economic and demographic developments: Environmental issues are less problematic because the proactive, national government moves quickly to remediate issues before they become crises, but border effects continue because of the lack of strong international agreements. Competition between food and feed crops as well as divisions over water/land resources will pose an issue in this world where regional coordination is lacking. Foreign investment/private sector development may move to regions providing the most lucrative incentives. Although different government programs may create tradeoffs with each other, many believe that not enough is being done on environmental issues to be truly sustainable.

Implications for the Livestock Master Plan: The following elements are needed (or assumed to have occurred over time) within this scenario. Because the government is not coordinating efforts, the private sector is taking a larger role due to market forces and demand. These efforts are mostly focused on profits and where money can be made in areas such as intensive poultry production with local, enterprise-level focus in some places while other producers are ignored. Therefore, larger-scale investments such as animal-health services are not addressed.

The live animal trade remains with little value addition occurring. Attempts to monitor animal disease dynamics are not very effective, especially regarding One Health, and lack of regional coordination will be detrimental along with a significant lack of effective control of animal diseases.

Private sector entities are much more concerned about animal health issues while in public sector reporting is patchy and slow. Given market pressures and export issues, the private sector has a direct interest in being very proactive about animal health issues under their direct control. The diffuse rural environment of livestock held by smallholder populations is more problematic for the government as informal cross-border trade continues under the free grazing system.

Cow dairy development Roadmap: (1) Dairy consumption grows in urban areas, driving growth. (2) Greater investment by foreign companies that are organized and effective, but not necessarily on the government's terms. Overall, they do have the tacit blessing of the government. (3) There is potential for exports in the dairy sector. (4) Dairy is dependent on animal genetics and health, if in this proactive scenario the government decides to invest in dairy services then it could improve. (5) Dairy development would be focused in the highland areas. (6) Most dairy development may be very urban-oriented to be near demand centers. (7) Government would be willing to provide extension services in key areas (AI genetics, health, and feed). The issue is that developing high quality genetics requires a huge investment. Milk-market standards are in process of being developed. Once implemented they may pose issues to smaller, informal producers. (8) Construction of collection points and cooling facilities.

Red meat-milk and cattle feedlot systems development Roadmap: (1) Cattle feedlot systems become more prevalent. (2) Government currently recognizes need for feed production; this proactive scenario means the government could allocate land and resources for feed production. (3) Promotion of intensive forage production leads to land disputes. (4) Cut & Carry promotion would come at a detriment to the environment. (5) Imported feeds are too expensive to import feed then export meat at a competitive price, thus the expansion of stock-feeding/feedlots. (6) Use of soil and water conservation to rehabilitate lands for feed is

possible. Ethiopia has unique feed resources that other East African countries do not have. (7) Promotion of production of indigenous oilseed cake. (8) Small ruminant exports to Middle East increase.

Poultry development roadmap: (1) Expansion of private investments toward high poultry production, with collaboration of the government for local consumption and export. (2) Government promotion of cooperatives with NGO involvement in contract farming. (3) A current challenge exists for realizing this future scenario, there are not many examples of successful poultry cooperatives. These would need to be prioritized. (4) Real market risk can occur in poultry production with disease spread. (5) Fairly strong internal and export markets may exist in this scenario. (6) Continued production of local breeds, while improved genetics grow in number.

Livestock Feed and Health: (1) Intensive feed production in highlands with use of stover as feed. (2) Proactive government involvement in market organization. (3) Appropriate delivery of health services for livestock. (4) Private sector- dairy and poultry with public government/NGO- pastoralist and red meat. (5) In many cases, private sector vet models may not work well in a pastoral setting but may work better in an intensive dairy setting. (6) How much will private sector participate in livestock feed and health? Feedlots and intensive plots will sort themselves out as incentives already exists to do so.

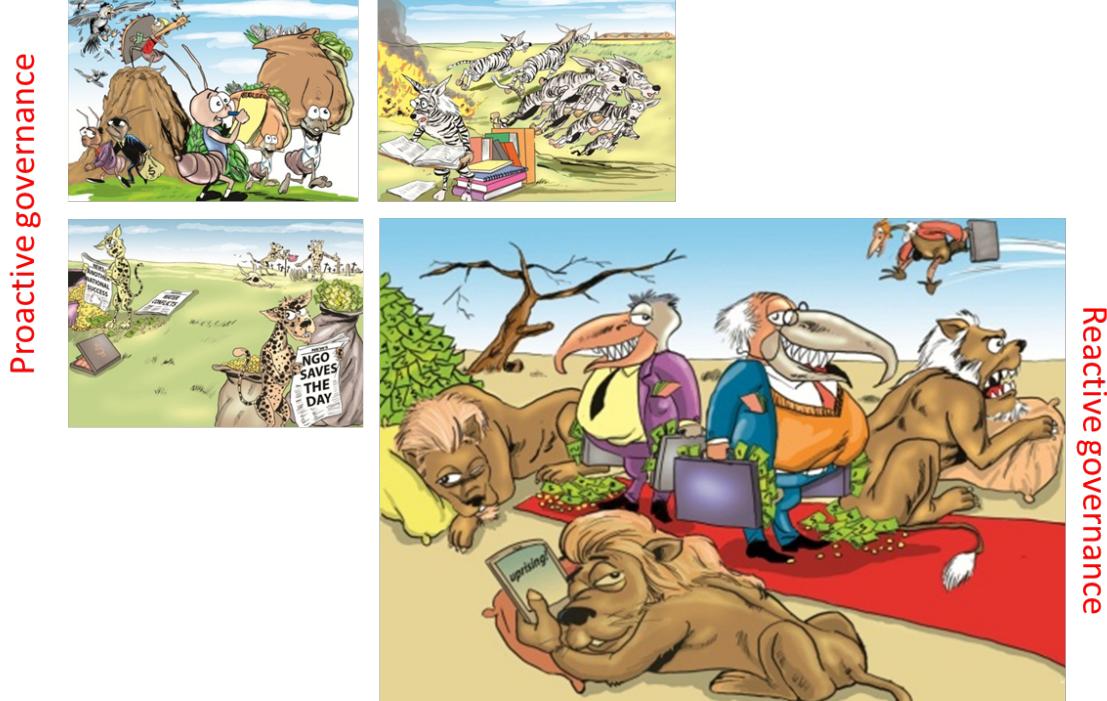
Animal Genetics: (1) Dairy is a sector where genetics can be improved well, presumably. So theoretically, as investment continues, then dairy genetics will improve as well. (2) Continued investment in improved dairies. (3) Missed opportunities for coordinating dairy and poultry development with Kenya and other regional countries. (4) Better coordination between research centers and extension system actors would be beneficial.

Take-home points

Within this world, LMP targets are difficult to achieve or not met at all. Domestic red meat production and consumption continues but remains challenging due to priority on meat exports by governmental policies and the need for constant production to meet export demands. Addis demand and forage production in higher rainfall areas are critical. There remains a high risk of uneven development (strong in cities, weaker in rural areas).

Emphasis on poultry development/demand to be prioritized within the LMP. Additionally, there is a critical need for feed production for dairies from highland feed sources and government-supported forage programs. Continued support for Climate Resilient Green Economy (CRGE) and Climate Smart Agriculture (CSA) to maintain prominence or commitment may diminish under future production pressures. Increased alignment of federal plans/objectives and regional plans/objectives and resource allocations. Strong government presence and NGO presence aids in this process.

Regional integration



Fragmented status quo

Sleeping Lions – Scenario Overview

East Africa Regional Perspective: This scenario is all about wasted potential and win-lose games. Governments in 2030 act only in response to serious situations and in ways to further their own self-interests, thereby allowing foreign interests free rein in the region. Their actions – or lack of them – have devastating consequences for East Africans' food security, livelihoods and environments. Conflicts, protests and uprisings are common, but each time reform is promised, it fails to materialize. The lack of coordinated effort on climate change and its impacts means that a severe drought occurring in 2025–2027 results in widespread hunger and many deaths among the region's poor and vulnerable. It is only the adaptive capacity and resilience of communities, born out of decades of enforced self-reliance based on informal economies, collaboration and knowledge sharing that mitigates the worst effects of this disaster. The first signs of better governance emerge only in the late 2020s, but the region's population still faces a very uncertain future.

Ethiopia Perspective: Political institutions capture resources without redistribution, causing NGOs to try to pick up the slack in delivering required services. Limited infrastructure/institutional growth driven by self-interested private sector creates some opportunity, but large amounts of the population are unable to capitalize on economic growth. Food imports are necessary to feed massively increasing urban population. Local innovation is necessitated by a lack of resources leading to some small amount of progress. Global trade is variable with product dumping from international companies providing some access to new technologies. Increased land degradation with serious water/resource conflicts results in resource-limited regions. Expansion of informal markets increases without any regulation or input from governmental sectors.

Political and institutional developments: Foreign investment tends to be mostly extractive with few local benefits. Increased individualization of land with increased degradation due to short-term, decision-making in crop choice. Significant and prolonged resource conflicts over water and land resources.

Socio-economic and demographic developments: High population growth with the largest increase in urban populations. Younger rural populations move to urban fringe age with agriculture left to an aging, decreasing farming sector. Technological progress continues mostly in communications with some localized innovations. Local economic development is occurring with stronger growth in the informal sector. At the national scale, the Ethiopian economy has challenges with product dumping from larger economies that stifle larger-scale product developments from within.

Implications for the Livestock Master Plan: The following elements are needed (or assumed to have occurred over time) within this scenario.

Cow dairy development roadmap: (1) Some foreign direct investment (FDI) with large-scale dairies near the urban fringes of Addis Ababa. (2) Not much change with smallholder dairy sector. (3) Difficult to achieve both foreign and domestic investment in the dairy sector. (4) Required LMP increases in dairy sector will occur more slowly by 2040 than in the 2020s with production increasing mainly from herd size increases. This inefficiency will cause more conflicts with greenhouse gas (GHG) and environmental issues. Increasing gap between demand and supply.

Red meat-milk and cattle feedlot systems development roadmap: (1) Increasing gap between demand and supply, especially in urban areas. (2) Exports to the Middle East expand. (3) Domestic supply from lowlands into feedlot enterprises increases due to increased demand and prices. (4) Medium sized smallholders and feedlots increase market-oriented production. (5) Informal trade increases strongly with little or no regulation causing tensions between domestic and export supplies.

Poultry development roadmap: Private sector expands but feed is imported, domestic production has some increases as well. Smallholder sector production shows no increases but remains steady. LMP targets are unlikely to be met through either foreign or domestic production/investment. Increased segmentation between commercial and smallholder production. Medium smallholder production will increase but the sector will not be well regulated with potential OneHealth issues of outbreaks. Any expansion of smallholder production occurs from NGO-supported investments. Some substitution of chicken for beef but no environmental gains in terms of GHG occur as large-scaler production is primarily for export.

Take-home points

Within this world LMP targets are difficult to achieve or not met at all due to the limited resources allocated to either direct support or incentives for FDI. Government entities may need to pay increased attention to incompatible tensions between export and domestic consumption. Additionally, a significant rise of the informal livestock sector would create potential challenges to moves to formalize trade to regulate for zoonoses. Smallholder market-oriented (informal) production would increase with lack of government regulation and with limited government resources; poultry may serve as best use of limited resources.

7. Recommendations

While most of the scenario-focused recommendations have been mentioned within the Take-home points sections, there was significant interest in further exploring and refining elements of the LMP with respect to projections of livestock population growth and potential changes in internal- and export-focused ASF demands. There were multiple questions concerning how scenario results could be incorporated into

upcoming policy planning efforts to allow for greater flexibility in setting potential policy targets under future uncertainty. Additionally, there were questions about how these results could be presented to other Ministry officials and modified to address cross-ministry issues and concerns.

8. Next steps

The LSIL scenario workshop group was encouraged to conduct a follow-up meeting in Ethiopia with additional ministry officials attending to allow systematic review and expansion of scenario elements. ILRI/CCAFS representatives (Dr. Dawit Solomon) was very helpful in suggesting potential follow-up efforts to build a longer-term plan for collaboration and support plan among GoE and related institutions. In the time since the workshop, ILRI has initiated a new project: the Program for Climate-Smart Livestock systems (PCSL), with support from the German Corporation for International Cooperation GmbH (GIZ). The program is being implemented in three countries, one of which is Ethiopia. PCSL aims to support governments, the private sector, and local stakeholders in realizing their development objectives while also fulfilling their commitments to achieve climate change adaptation and mitigation goals. The project takes the stakeholder engagement platform being developed and provides good opportunities in the future for synergistic follow-ups to build on the scenario-led policy testing work undertaken here. Economic modeling tools and data being developed by the foresight team within ILRI's Policies, Institutions and Livelihoods program (various projects) could be adapted to support the policy processes. In particular, there is scope to expand the incorporation of scenario approaches into the LMPs that ILRI's foresight analyses already support.

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10. Appendices

Scenario-guided review of the Ethiopia Livestock Master Plan

18-19 July 2018, ILRI Campus, Addis Ababa, Ethiopia

Agenda

DAY 1	
Time	Activity
08:30-09:00	Registration
09:00-10:30	<p>Workshop opening Facilitator: Dr Dawit Solomon, Regional Program Leader, CCAFS & ILRI</p> <p>Opening and welcomes</p> <ul style="list-style-type: none">• Dr Steve Staal, Program Leader, Policies, Institutions and Livelihoods, ILRI• Prof Greg Kiker, University of Florida and Livestock Systems Innovations Lab• H.E. Dr Gebregziabher Gebreyohannes, Livestock Health and Feed Regulatory Sector State Minister of The Ministry of Agriculture and Livestock Resources (MoALR) <p>Introduction to workshop objectives and agenda (15 minutes)</p> <ul style="list-style-type: none">• Prof Greg Kiker <p>Introduction of the Ethiopia's Livestock Master Plan (30 minutes)</p> <ul style="list-style-type: none">• H.E. Dr Gebregziabher
10:30-11:00	<i>Coffee break</i>
11:00-12:00	<p>Introduction: scenarios, and scenarios for East Africa</p> <ul style="list-style-type: none">• Lucas Rutting, Utrecht University• Dr Dolapo Enahoro, ILRI
12:00-13:00	<i>Lunch</i>
13:00-14:45	Session 1: Scenario breakout groups work on downscaling the East Africa scenarios for Ethiopia
14:45-15:15	<i>Coffee break</i>
15:15-16:00	Session 1 (continued)
16:00-17:00	Session 2: Scenario-guided policy review Reviewing the LMP through each scenario (one per breakout group)

17:00-17:15	Wrap-up of the day
DAY 2	
9:00-10:30	Continue Session 2
10:30-11:00	<i>Coffee break</i>
11:00-12:00	Continue Session 2
12:00-13:00	<i>Lunch</i>
12:30-13:30	Finish session 2 & prepare presentations
13:30-15:00	Groups present the results from the scenario-guided review
15:00-15:30	<i>Coffee break</i>
15:30-16:30	Plenary session: - Discussion of workshop results - Next steps
16:30-17:00	Wrap-up of the workshop



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