



FEED THE FUTURE INNOVATION LAB FOR LIVESTOCK SYSTEMS: AN UPDATE ON ACTIVITIES IN RWANDA – NOVEMBER 2016

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).



*Innovation Platform participants.
Photo credit: M. Eilittä/LSIL*

Background

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.

Our Management Entity at UF/IFAS supports and integrates efforts across the target countries, crystallizing and sharing knowledge generated across four Areas of Inquiry (AOIs) and three Cross-cutting Themes (CCTs). The LSIL draws on the expertise of target country, U.S. and foreign universities, institutes and organizations through competitively-funded long-term, multi-disciplinary, integrated applied research and capacity-building projects. Additional non-competitive research efforts complement the competitively-funded projects. Technologies, practices, and policies are analyzed in the context of future impacts and drivers.

Our grant portfolio

We fund the following types of grants:

- **Reach grants:** Competitive, larger grants of up to \$ 1,000,000, for projects lasting for up to four years. These involve multiple partners engaging in research and capacity building and employing an integrated multidisciplinary approach. One Reach grant has been awarded for a research for development project in Rwanda.
- **Focus grants:** Competitive, smaller grants of up to \$150,000, for projects lasting up to one year. These are for proof of concept or research for development bridging studies. Two Focus grants have been awarded for research for development projects in Rwanda.
- **Catalyst grants:** Unsolicited, short-term grants for UF faculty to initiate and implement initiatives that lead to larger projects. Currently, three Catalyst grants have been selected for Rwanda.
- **Strategic partnership grants:** Unsolicited, collaborative efforts with leading research or development institutions that complement the competitive research agenda. No strategic partnership grant has been selected for Rwanda yet.

Priorities for Rwanda

To identify the priorities in Rwanda, the LSIL representatives engaged more than forty individual stakeholders during a scoping visit to learn about their perceptions of the priority constraints to ASF production and consumption. This was followed by a multi-stakeholder Innovation Platform meeting that fostered more in-depth discussions, consensus building and joint, participatory identification of the most important priorities. The Innovation Platform meeting was held on February 18-19, 2016 in Kigali and it was attended by 46 individuals representing the Government of Rwanda (GoR), non-governmental organizations, private organizations, universities, and research institutes. Of the 39 organizations that participated, 13 represented the GoR and three represented the private sector. The priorities for Rwanda are presented in Appendix 1.

Overview of ongoing and funded efforts

Non-competitive Catalyst projects:

The LSIL plans to initiate efforts on the following Catalyst projects, developed based on the priorities identified during the Innovation Platform meeting. A complete description is available in Appendix 2. Additional Catalyst projects will be identified and developed in the future.

- **Determining how to increase the health and nutritional outcomes of the GoR’s “One Cow per Poor Family” program.** The study includes a systematic review of peer-reviewed literature and gray literature on experiences with this significant government program as well as findings of USAID-funded projects with significant efforts in nutrition and behavior change. To understand factors limiting the efficacy of the health and nutritional impacts of the GoR’s Girinka program and to recommend strategies to increase its effectiveness from a gender perspective. *Expected completion date:* December 2016.
- **Workshop on livestock epidemiology, data analysis, and health policy.** The purpose of the project was to enhance the epidemiology capacity for delivery of more efficacious and efficient government animal health services in Rwanda. The workshop created opportunities for young scientists and health professionals to gain new knowledge and skills in disease surveillance, epidemiologic studies, and animal health research. *Completion date:* October 2016.
- **Dairy feeding and management practices for increased milk quantity and quality in Rwanda.** The aim of this project is to obtain a clear understanding of the gaps in feeding and management of cows and milk that constrain milk quality and quantity and to train trainers that will correct these problems. This will lead to improved milk production, quality and safety, and less milk rejection at collection centers. *Expected completion date:* March 2016.



Milk processor.
Photo credit: J. Hernandez/UF-IFAS

Competitive Reach grants:

Following a competitive process with 10 applications for Rwanda that were reviewed by the LSIL Technical Evaluation Panel, a four-year Reach grant project was selected for funding by the LSIL External Advisory Board and approved by USAID and the Ministry of Agricultural and Animal Resources (MINAGRI). See Appendix 3 for a more detailed project description, including information on the Rwandan and international collaborators.

- **Enhancing production, quality and consumption of milk for income and improved nutrition in Rwanda.** This project will be implemented by the International Livestock Research Institute (ILRI). It aims to examine the effects of combining strategic nutrition messaging with the GoR’s Girinka program on consumption of high quality milk and that of improving the capacity of cooperatives to improve milk marketing. Working in two to four districts, the project will: (1) Evaluate the impact of a nutrition education intervention on ASF consumption and nutrition outcomes among children 6-23 months of age

and pregnant and lactating women; (2) Assess and enhance performance and capacity of dairy cooperatives to improve market access for smallholder milk producers; and (3) Evaluate the costs and benefits to value chain agents of supplying milk that meets the Seal of Quality (SOQ) standards

Competitive Focus grants:

The LISL received 12 applications for Focus grants for Rwanda which were reviewed and selected in a similar process to the Reach grant applications. The following projects were selected for funding. See Appendix 4 for more detailed project descriptions, including information on the Rwandan and international collaborators.

- Assessment and Mitigation of Aflatoxin and Fumonisin Contamination in Animal Feeds in Rwanda.** The project is implemented by Iowa State University in collaboration with the University of Rwanda. The main objective is to assess and mitigate the prevalence of aflatoxins and fumonisins in animal feeds in Rwanda and to raise awareness among professionals and policy makers in order to better protect consumer health and increase export opportunities. The project will (1) Quantify aflatoxin and fumonisin levels in animal feeds in five different agro-ecological zones (AEZs) of Rwanda; (2) Establish a surveillance and early detection system for aflatoxin and fumonisin presence and mitigation in animal feeds; (3) Raise awareness of aflatoxin and fumonisin contamination and prevention among stakeholders involved in the animal feed value chain; and (4) Provide input to the regulatory framework regarding policies for the mitigation of aflatoxin and fumonisin contamination in animal feeds.
- Milk production practices, udder health and the impact on milk quality, safety and processability in Rwanda.** This project is led by the University of Rwanda in collaboration with the Swedish University of Agricultural Sciences (SLU) and the National Veterinary Institute (of Sweden). The overall objective of the project is to develop best practices that enhance the health of dairy cows and milk quality.



*Dairy cow in Rwanda.
Photo credit: ILRI*

Next steps

- Reach and Focus grant project start dates: November-December, 2016.
- Innovation Platform meeting: January 2017. The purpose is to ensure that all relevant stakeholders are aware of the funded projects and can provide advice to the project team and support implementation of the projects.

Contact us:

Feed the Future Innovation Lab for Livestock Systems, University of Florida

P.O. Box 110910 | Gainesville, FL, 32611-0910

Email: livestock-lab@ufl.edu | Phone: (352) 294-1064 | Website: <http://livestocklab.ifas.ufl.edu/>

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Appendices:

Appendix I. Priorities developed for Rwanda

ASF Production and Marketing

- Support the establishment of a feed industry, which includes conventional and non-conventional feed, is environmentally friendly, and provides affordable feed
- Enhance use of agro-industrial by-products and food waste
- Feed analysis and diet formulation
- Increasing ASF consumption in priority target groups?
- Increasing the quality, quantity, sales and safety of milk
- Creating a public-private partnership to provide extension services for smallholder male and female farmers
- Improving management practices to increase the quantity and quality of small livestock (poultry, pigs, rabbits) production?

Livestock Disease Management and Food Safety

- Transboundary diseases
- Brucellosis and Tuberculosis
- Certification of milk and milk products (subclinical mastitis)
- One-health Platforms
- Private veterinary services in partnership with government

Enabling Policies and Future Systems

- Capacity building: extension services focused on feed production and animal nutrition
- Facilitate establishment of policy advisory committees consisting of farmers, market actors, policy analysts, regulators and NGOs
- Facilitating competitive markets for ASF (market information, certifications, food safety policies)
- Rules, regulations and incentives for animal health
- Rules, regulations and incentives for ASF
- Support development of a Livestock Master Plan for a comprehensive livestock policy

Appendix 2. Ongoing Catalyst projects

Catalyst grants

1. Determining how to increase the health and nutritional outcomes of the Government of Rwanda's "One Cow per Poor Family" program"

Principal Investigator and lead institution: Dr. Kathleen Earl Colverson, University of Florida

Summary: The dairy value chain was selected as one of the focal value chains for the Feed the Future Initiative in Rwanda because of the potential competitiveness of Rwanda's dairy industry, the increase in the number of dairy cows thanks to the GoR's "One Cow Per Poor Family" program, the positive nutritional and food security benefits from the consumption of milk, and the linkages of dairy production with crops that are important Feed the Future focal value chains due to their use as feeds. Although the Ejo Heza (Brighter Future) project has had a strong behavior change and communication component, its impact on household health and nutrition seems to have been limited because poor families that received cows from the GoR program generally preferred increasing their purchasing power through selling milk and dairy products rather than consuming more animal-source foods (ASF) at the household level. Some research on these types of programs has been conducted (e.g., Pimkina et al., 2013; Argent et al., 2014) but no Rwanda-focused systematic review has been done to examine why milk and related ASF consumption did not increase, and how to effectively increase milk and ASF consumption in Rwanda. A clear understanding of what is needed to change the status quo will require a thorough review of peer-reviewed literature and gray literature MINAGRI, Ministry of Health, NGOs, etc., as well as surveys and discussions with stakeholders and program participants. The focus will be on identifying sociocultural norms, behaviors, myths, and other factors that reduce or prevent ASF consumption, specifically from a gender perspective. This project will compile this information and document past successful or unsuccessful interventions implemented in other locations to address these obstacles. The data will subsequently be examined to identify best-bet methods to overcome the influence of the factors that limit ASF consumption (particularly gender) and thereby contribute to developing effective social behavior change communication (SBCC) approaches. The study will include a systematic review of peer-reviewed literature and gray literature identified through meetings with in-country partners about past and existing reports, and findings associated with the Ejo Heza project. In addition, key individuals at partner organizations and households who participated in the project will be interviewed to complement the literature review findings.

Activities conducted to date: An extensive literature review was followed by field work in October 2016. Interviews with stakeholders from various organizations including the following were conducted: MINAGRI, RAB, various NGO's and UN organizations as well as research organizations. The report will be finalized by November 30 2016.

2. Workshop on livestock epidemiology, data analysis, and health policy

Principal investigator and lead institution: Dr. Jorge Hernandez, University of Florida

Co-PI and Collaborator institutions: MINAGRI, Rwanda Agriculture Board

Summary: Animal disease surveillance systems are a key component for early detection and management of livestock diseases of economic and public health importance (eg, foot and mouth disease (FMD), tuberculosis, brucellosis, mastitis, avian influenza, etc.). Epidemiologic methods and techniques are used for formulation, implementation, and evaluation of national animal disease surveillance systems.

Animal health policymakers require timely data and information for selection of risk management options that are feasible and acceptable for disease control and prevention. The purpose of this project was to enhance the epidemiology capacity for delivery of more efficacious and efficient government animal health services in Rwanda. The project objectives were to: (1) To review surveillance systems of selected animal diseases of economic and public health importance and provide feedback (recommendations); (2) Review current district abattoir capacity and investment plans and provide feedback (recommendations); (3) To create opportunities for young scientists and health professionals to gain new knowledge and skills in disease surveillance, epidemiologic studies, and animal health research (e.g. University of Rwanda, MINAGRI, Rwanda Agriculture Board) that can impact health policy. Program activities included a five-day workshop that targeted four key issues: (1) evaluation and application of official diagnostic tests used in national government veterinary services, (2) design and analysis of epidemiologic studies to measure disease burden and to identify risk factors associated with farms affected with selected diseases (e.g., foot and mouth disease, other diseases) in animal populations, (3) methods and concepts used in animal disease surveillance programs that take into consideration efficacy and system costs (efficiency); and (4) sharing of data or project progress related to animal disease surveillance programs in Rwanda by participants followed by a session of questions and answers.

Activities conducted to date: The workshop took place from October 17 to 21, 2016. A total of 12 animal health professionals from MINAGRI, RAB and the University of Rwanda participated and were exchanged information on the burden of livestock diseases and surveillance systems for early detection and risk management of diseases of economic and public health importance in Rwanda. The event was well received and participants have already been thinking of ideas for ways to continue exchanging information and enhancing the epidemiology capacity in Rwanda in the near future.

3. Dairy feeding and management practices for increased milk quantity and quality in Rwanda

Principal Investigator and lead institution: Dr. Geoff Dahl and Dr. Arie Havelaar, University of Florida

Co-PI and Collaborator institutions: Dr. Robert Roberts, Penn State University

Summary: Improved competitiveness of the Rwandan dairy sector will greatly depend on the productivity of its dairy cows, and the quality of the milk produced, aggregated and marketed from those cows. The project aims to identify and upscale improved animal feeding and management practices of dairy smallholders, milk collection center staff and milk processors through training of trainers to improve milk yield and quality. The Rwanda Dairy Competitiveness Program II has supported efforts on animal services and trained leaders and other farmers in improved management. The project proposes to complement such training through Training of Trainers, including dairy co-op personnel at milk collection centers, extension agents, milk processors and community animal health workers. Most of these groups have access to the farmers but are not necessarily aware of the role that feeding and management play in animal performance and production of a healthy dairy product, nor do they have the curriculum to train farmers. Some also have responsibilities and access upstream to influence milk handling at cooling centers and processing for retail distribution, but may not have complete understanding of the influence of farm level management on milk quality at the consumer level.

Activities plan: This activity will start in December 2016.

Appendix 3. Funded Reach grant project

I. Enhancing production, quality and consumption of milk for income and improved nutrition in Rwanda

Principal Investigator (PI) and lead institution: Dr. Emily Ouma, International Livestock Research Institute (ILRI)

Co-PI and Collaborator institutions: RTI International, University of Rwanda, TechnoServe.

Summary: Increasing the quality, marketing, and consumption of ASF, including milk, is an important research for development priority for Rwanda. Rwanda's dairy industry is recognized by the GoR as a strategic sector that can improve incomes and nutrition of poor households. The aim of the project is to contribute to efforts aimed at enhancing the quality and consumption of milk for improved income and nutrition in Rwanda. The proposed project draws upon the work and lessons of a previous GoR program, the One Cow per Poor Family (Girinka) program, and an ongoing USAID Feed the Future funded program - Rwanda Dairy Competitiveness Program (RDCP II).

Specific research objectives include the following:

- (1) Evaluate the impact of a nutrition education intervention on ASF consumption and nutrition outcomes among children 6-23 months of age and pregnant and lactating women: The overall purpose is to determine whether participation in the Girinka program alone or Girinka participation plus targeted nutrition education is more effective at improving maternal and child ASF consumption and nutrition outcomes. The intervention will educate project participants on the importance of nutrition, including through behavior change messaging on ASF, especially milk. This intervention will be evaluated using a cluster-randomized design.
- (2) Assess and enhance the performance and capacity of dairy cooperatives to improve market access for smallholder milk producers: Various challenges affect function of the cooperatives, including poor management, lack of training, lack of refrigeration, and pest control. This project will assess performance gaps of the cooperatives in aspects of governance, gender, leadership, and business management. Based on the results, a gender-sensitive capacity development response plan will be drawn, implemented, and its impacts evaluated.
- (3) Evaluate the costs and benefits to value chain agents of supplying milk that meets the Seal of Quality (SOQ) standards: The RDCP II evaluation notes that although the SOQ initiative is believed to have had positive impact, the impact has not been properly quantified and the analysis done so far has yielded mixed results. Therefore, an analysis of its costs and benefits, including cost drivers and sensitivity of the benefits to changes, and their distribution at the different nodes of the value chain will be undertaken. Recommendations from the evaluation will be communicated to milk producers and processors during efforts described under (2).
- (4) Assess consumer demand for milk quality and safety attributes: The potential to sustain supply of quality milk depends, in part, on consumers' willingness to pay a price premium for quality attributes. The project will assess consumers' preference for specific milk quality attributes and willingness to pay for milk that meets SOQ standards. Information generated will be integrated in efforts described in the other objectives, above.

The project will be implemented in 2 to 4 districts, covering 1 to 2 milk sheds. Knowledge gained during the study will be disseminated using a variety of strategies, including stakeholder meetings, dairy cooperative meetings, and through publications and international conferences.

Appendix 4. Funded Focus projects

I. Assessment and Mitigation of Aflatoxin and Fumonisin Contamination in Animal Feeds in Rwanda

Principal investigator and lead institution: Dr. Dirk E. Maier, Iowa State University
Co-PI and Collaborator institutions: University of Rwanda

Summary: Aflatoxins and fumonisins are fungal metabolites that contaminate crops and animal feeds under favorable growth conditions. They are of importance to public and animal health as they are associated with or are causative agents of certain cancers in humans. They have a variety of negative impacts on animal health and productivity. They are also considered an economic barrier because contamination levels of aflatoxins and fumonisins in food and feedstuffs can lead to rejection of these products in international markets. The risk for aflatoxin and fumonisin contamination of crops and animal feeds has not been well established in Rwanda. However, it has significant implications for animal health and productivity, human health (as a result of direct exposure and exposure via animal source foods), and identifying and implementing mitigation and management strategies and effective regulations. The overall hypothesis of this project is that more comprehensive and current data on the incidence and severity of mycotoxin (particularly aflatoxins and fumonisins) contamination in durable crops, animal feeds, and ASF will raise awareness among stakeholders, and will inform mycotoxin mitigation and control decisions to improve food/feed safety and productivity of the Rwandan agricultural sector. As an additional benefit, Rwanda's participation in international commodity and foodstuffs trade would increase.

The main objective of this study is to assess and mitigate the prevalence of aflatoxins and fumonisins in animal feeds in Rwanda and to raise awareness among professionals and policy makers in order to better protect consumer health and increase export opportunities. Specifically the study will: (1) Quantify aflatoxin and fumonisin levels in animal feeds in five different agro-ecological zones (AEZs) of Rwanda at different points in the animal feeds value chain; (2) Establish a surveillance and early detection system for aflatoxin and fumonisin presence and mitigation in animal feeds; (3) Raise awareness of aflatoxin and fumonisin contamination and prevention among stakeholders involved in the animal feed value chain; and (4) Provide input to the regulatory framework in regards to policies for the mitigation of aflatoxin and fumonisin contamination in animal feeds.

2. Milk production practices, udder health and the impact on milk quality, safety and processability in Rwanda

Principal Investigator and lead institution: Jean Baptiste Ndahetuye, University of Rwanda
Co-PI and Collaborator institutions: Swedish University of Agricultural Sciences (SLU), National Veterinary Institute (of Sweden)

Summary: GoR initiatives such as Girinkahave increased milk production from 185,000 tons in 2007 to 445,000 tons in 2013 and the annual milk production is projected to reach 650,000 tons by 2017. However, there are limitations in achieving the vision of high quality milk production. These include the lack of service providers and lack of research at different levels of the milk chain. Lack of research on dairy animal health and milk pre-and post-harvest best practices lead to significant qualitative and quantitative losses of milk. Lack of good quality milk hampers the efforts to fight malnutrition and can occasionally lead to public health hazards.

The overall objective of the current project is to develop best practices that enhance dairy cow's health and milk quality in the Rwandan dairy chain. Specific objectives include the following: (1) Evaluate udder health, risk factors and impact of subclinical mastitis on dairy productivity in Rwanda; (2) Evaluate microbiological and chemical quality of raw milk in Rwanda by evaluation of the prevalence of zoonotic bacteria, their antimicrobial resistance and the antimicrobial residues in milk at different sites of the milk chain in Rwanda; and (3) Train dairy farmers, MCCs managers/technicians, IAKIB's extension officer /veterinarians, district's veterinarians and students in best practices for good udder health and best milk production practices. The site of research will be the Gicumbi District in Northern Rwanda, an area where previous research has indicated high somatic cell counts, suggesting possible high prevalence of subclinical mastitis in dairy cows, as well as high coliforms and total count.