



Animal health research can inform how smallholder farmers and governments tackle animal diseases for greater livelihood outcomes

Photo ILRI/Sunny Sudami

KEY MESSAGES

- Development work can be supported by epidemiological models that predict disease outbreaks and evaluate the effects of interventions because these models provide evidence-based advice on prevention and control of livestock diseases.
- Utilizing national surveillance data to develop risk maps and simulation models has contributed to improved disease control in countries where it has been applied.
- A gendered perspective on the impact and control of livestock diseases is necessary for the successful management of livestock disorders in smallholder settings.
- No animal disease occurs in isolation but in combination with other infectious agents and during particular management conditions which necessitates an integrated herd health approach.
- Application of epidemiological and socio-economic tools strengthens the ongoing global eradication program on Peste des petits ruminants (PPR-GEP) led by the UN Food and Agriculture Organization (FAO) and OIE (World Organization for Animal Health).
- Promotion of a One Health approach supports awareness and insights on the need for hygiene measures in regard to diseases that are transmissible from animals to humans and leads to a safer livestock production.

INTRODUCTION

Livestock productivity in developing countries is often limited by a number of factors, such as diseases, shortage of adequate feed and a lack of locally adapted breeding strategies. Many livestock producers, especially smallholders, do not have access to professional animal health guidance and care, and these limitations can result in their inability to create and maintain conditions that would contribute to more profitable, responsible and sustainable animal husbandry.

Under the CGIAR Research Program on Livestock (Livestock CRP) 2017 - 2021, researchers focused on exploring different solutions and approaches that could provide the greatest impact to improve livestock productivity and, in turn, improve the livelihoods of resource-poor farmers, most of them women.

The activities consisted of finding ways to evaluate animal health constraints and threats by developing and deploying methods and tools for use in low-income countries to help identify key disease problems and understand their impact on animal productivity and farmer livelihoods.

*Pig vaccination
in Uganda.*

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APPROACHES AND RESULTS

The ultimate aim of the research has been to inform the development of livestock interventions. Focus of much of the work has been on endemic, emerging and re-emerging diseases in pigs, small ruminants and cattle; assessments of gendered disease impacts; and, risk modelling and mapping of such diseases, primarily in four priority countries – Ethiopia, Tanzania, Uganda and Vietnam.

Some of the key approaches and results were:

- **Development of research capacity and long-term epidemiology expertise** in the countries where we worked. CGIAR researchers worked closely with doctoral and master's students from national universities, who were involved in much of the field and lab work. Arising from these efforts were **sixty peer reviewed papers**, including relevant review articles, which were published in international and regional journals.
- We developed a greater understanding of **women's crucial role in the management and care** of livestock, which has become a vital element of the program. It is essential to involve women in the planning of measures to prevent and control animal diseases and to listen to and take advantage of their experiences.
- A significant part of the work has been to **provide and utilize assessment tools to study animal health constraints and control options**. Predictive or simulation models were adopted, as were models that show which control methods to prioritize, including vaccination and farm biosecurity measures. This work has proved useful for predicting outbreaks of livestock diseases such as foot-and-mouth disease and African swine fever and for suggesting preventive measures, for example with the porcine reproductive and respiratory syndrome. This kind of information has been embraced by national authorities and has also been published in governmental websites.
- Activities conducted enabled the **mapping of diseases that previously had not been surveyed**, yet which have considerable impact on smallholder farmers. Results from

the mapping exercises showed that infections do not occur in isolation but rather in combination with other agents and under particular management conditions. This data has contributed to other global initiatives and programs assessing livestock diseases such as the Global Burden of Animal Disease (GBAD).

- An **interdisciplinary field manual and a toolbox** was developed that provides epidemiological and socio-economic research and data collection support and evidence to the ongoing control efforts to control and understand the spread of *peste des petits ruminants* (PPR) in sheep and goats. The disease is of great global concern, especially in Africa and Asia. The tools developed are available in English, French and Swahili, along with with instruction lectures and training videos made available online to allow a blended learning approach that can adhere to COVID restrictions for field travel. The aim of these efforts is to develop more accurate diagnostic tools and provide better epidemiological and socio-economic data of PPR in affected areas. This aligns and support the World Organisation for Animal Health (OIE) and the Food and Agriculture Organization's (FAO) goal of eradicating PPR by 2030.
- **Zoonotic agents**, i.e. pathogens that are transmissible between animals and humans, were investigated. For these diseases, awareness and information on hygiene measures are crucial in order to make livestock production safer. This is particularly important for women who are most at risk due to their close involvement with their animals, including cooking and handling milk and raw meat.
- The work included **economic and socio-economic considerations of animal health** and applied a **One Health** approach in a broader sense than commonly used, where human health is not only potentially affected by zoonotic pathogens, but also where the health and wellbeing of people is influenced by management factors and impact of livestock diseases.



An animal health worker extracts blood samples from goats to identify the prevalence of livestock diseases. Photo ILRI/Geoffrey Njenga



Manure management is a biosecurity measure that can help mitigate the spread of diseases. Photo K. Dhanji/ILRI



Cattle at ILRI's research station, Kapiti, in Kenya. Some of ILRI's vaccine testing and other animal health related research is being conducted here. Photo ILRI/Jake Meyers

COLLABORATION AND PARTNERSHIP FOR IMPACT

Significant efforts were made to not only engage with farmers and their communities, but to partner with regional and national research and development agents and governments to ensure longer term implementation of the findings.

In one example, national research partners and veterinary services from six countries in East and West Africa benefited from work on PPR to inform strategic vaccination. Training in disease modelling, geographic information system mapping (GIS) and basic epidemiology was organized for animal health professionals.

In another example, our modelling and risk map papers were posted through the Ministry of Agriculture and Rural development in Vietnam, which is an effective means of positioning and delivering our scientific findings to influence policy makers and end-users.

IMPLICATIONS

- The inclusion of **economic and socio-economic considerations** on the animal health issues being studied has helped generate tangible evidence for decisions makers to prioritize investment in animal health especially in countries where resources are limited.
- The **establishment of modelling tools** to predict disease outbreaks and evaluate the effects of intervention measures is example of modern and practically oriented epidemiology research and development needed for planning disease control interventions.

- The **partnership** between CGIAR researchers, national and international universities, the National Agricultural Research System (NARS) and development organizations has helped develop relevant research questions that meet the demand of beneficiaries, and it has ensured that these issues were addressed adequately.

RECOMMENDATIONS

We recommend the continuation of the work to strengthen and build upon the efforts and activities that were initiated under the CRP Livestock program and to look at ways in which the approach and lessons learned can be expanded to other countries. This applies in particular to the work on **risk analysis, modelling of disease epidemiology and control**, the **gender effects**, and the **delivery of animal health services**. There is also an opportunity to build a more pronounced **One Health agenda** that will consider environmental aspects of animal health to meet the growing global interest and needs in this field.



Mass vaccination of cattle by private vets. Photo ILRI/Michel Dione

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Featured publications

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A vet vaccinating sheep in central Mali. Photo ILRI/Michel Dione