FEED THE FUTURE
The U.S. Government's Global Hunger & Food Security Initiative

Feed the Future Innovation Lab for Livestock Systems

Technology Package for Prevention & Control of Mastitis in Dairy Animals

Research Team & Methods


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Research Location: Mid-western region of Nepal
- Surkhet, Bardia, Banke, and Dang districts

Research Methods:
- Control and intervention groups
- Participating community organizations: 4 women's dairy cooperatives and 8 self-help groups
- More than 300 participating dairy farmer cooperative members
- 15 animal health workers and technicians in charge of field monitoring and milk sample collection
- Microbiology analysis and capacity building at the Surkhet Regional Veterinary Laboratory

Innovation Description

Innovation Name: Technology Package for Prevention & Control of Mastitis in Dairy Animals
Innovation Description: The innovation is a package of technologies and practices to prevent and control mastitis, a potentially fatal disease severely reducing livestock milk production, reducing incomes of smallholder farmers and food safety.
Technology Package Components:
- Identifying knowledge gaps
- Developing good husbandry practices (GHP), including mastitis detection [California Mastitis Test (CMT); milk conductivity test] and mastitis control [post milking teat dipping (PMTD); dry cow therapy (DCT)] technologies
- Training livestock technicians and dairy farmers

Intended End Users: Primary − household member in charge of farm management | Secondary − second household member | Tertiary − producer cooperatives | Quaternary − technicians
Summary of Benefits:

Short-term	Long-term
• Increased knowledge of sub-clinical mastitis • Farmers acquire mastitis technologies • Increased producer knowledge of good husbandry practices (washing, cleaning stall, sun drying, making cows stand, etc.) as a means to increase production	• Sustainable farmer's feedback mechanism established • Improved human health through discarding milk infected with mastitis • Improved milk safety for consumption • Increased production and farmer income • Sub-clinical mastitis prevention

Problem Addressed


Milking in Nepal (credit: DeVries/UF)

Globally, increases in milk demand are projected for Africa (17%) and Asia (32%) by 2030 relative to those in 2000. In Nepal, dairy is the most important livestock subsector, contributing almost two-thirds to the livestock share of the Gross Domestic Product (GDP). Nevertheless, dairy animal productivity is markedly low. Nepali governmental policy documents, and multi-stakeholder meetings in Africa and Asia of livestock industry representatives from the government, private, development, and academic sectors, identified improving milk yield, quality, and safety as top livestock priorities.

Mastitis in one of the most significant and prevalent diseases of dairy animals. Studies show that the prevalence rate of sub-clinical mastitis in Africa and Asia exceeds 50% of cases, threatening farmers, dairy processors, and consumers. In Nepal, mastitis can be nine times higher on farms and 104 times higher in manufacturing plants than international standards, necessitating an urgent need to solve the problem.

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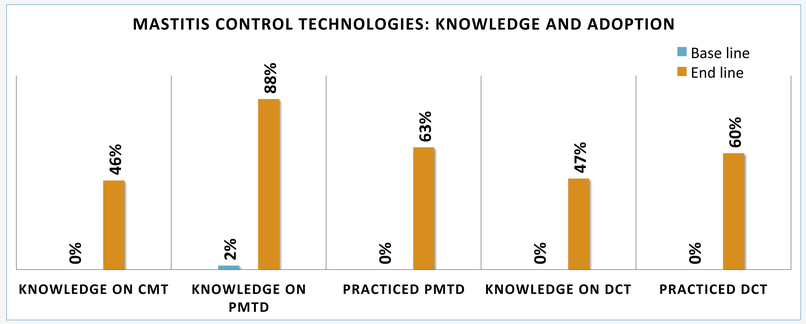
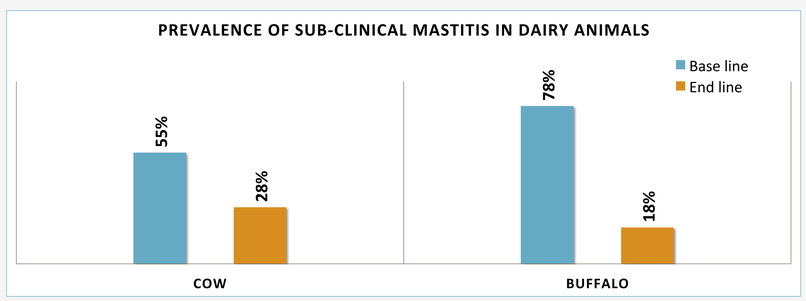
Credibility of the Innovation

Qualitative and quantitative data obtained by comparing baseline (n=654) and end line (n=403) farmer surveys showed that smallholder farmers who were unaware of mastitis detection techniques were also unaware of PMTD and DCT techniques. Participating farmers acquired knowledge (86% increase of PMTD; 47% of DCT). This led to behavior change with more than 50% practicing the control strategies in just six months and 74% adoption six months after the training. The package reduced sub-clinical mastitis prevalence (from 55% at baseline to 28% at end line in dairy cows [n=432]; from 78% to 18% in buffaloes [n=216]), six months after implementation.





Drivers & Enabling Conditions

Key Drivers for Scaling	Enabling Condition for Scaling Success
• Growing market demand for quality milk • Enabling policy environment for increasing milk production and quality • Availability and affordability of the technologies in the mastitis control package	• Buy-in of dairy cooperatives and regional/national governments • Ample evidence base of the positive effects of the mastitis control package • Capacity building to disseminate knowledge • Accessibility and availability of mastitis testing resources

Experimental designs will be carried out at each dairy cooperative to show the economic benefits of controlling mastitis through decreasing mastitis prevalence and increasing milk production as a result of adoption of GHP and mastitis control technologies. The mastitis control package will be scaled up to the other remaining dairy farmers of the cooperatives. Monthly self-help group meetings will be organized to share outcomes to motivate dairy farmers to adopt the mastitis control package.

The GHP manual and mastitis control extension materials (posters, radio jingles, video, etc.) will be instrumental in supporting the wider scalability of mastitis control and prevention technologies and practices. Local agro-vets/cooperatives can supply farmers with these materials. Farmers' feedback mechanisms established at each cooperative on the basis of conductivity readings will encourage dairy farmers to improve overall GHP, utilize mastitis control technologies, and produce quality milk safe for human consumption. These strategies will create sustainable mechanisms for mastitis diagnosis and control.

Partnerships

Scaling the mastitis control package will target women at established diary cooperatives. Other scaling partners will include the livestock divisions of governments, local bodies/municipalities, development organizations, private actors/milk collection centers, and processors who will incentivize farmers to supply higher quality milk.

Changes Needed for Adoption

Mastitis prevention and control involves adoption of GHP, such as clean and ventilated animal sheds, hygiene practices, complete removal of milk in udders, and use of early detection (e.g., CMT) and control (e.g., PMTD) techniques. The mastitis control package can be tailored to different production settings and geographies, and the prevention and control measures are simple, easily adoptable, and economically rewarding for dairy farmers and cooperatives. Consequently, high adoption rates are anticipated - as neighboring farmers and cooperatives see the benefits, they will in turn adopt the technologies. Some support by livestock technicians, for example to provide GHP training, and involvement of dairy cooperatives will be needed to enhance adoption and scaling of the technology package. The package will first be scaled in Nepal before expanding its reach to other countries.

Women are significant actors in livestock systems, particularly in the dairy sector. Targeting women to implement and adopt the mastitis control package empowers them by increasing their knowledge and skills related to mastitis control and prevention, animal and cooperative management, and, ultimately, income. The mastitis control package can be widely scaled through integration and adoption by female and/or male farmers, depending on gender roles and the distribution of livestock management in the scaling regions.

The mastitis control and prevention project conducted exposure visits to dairy cooperatives in Nepal.

Financial Sustainability

Scaling up the package would require about US $15 per dairy animal to adopt mastitis control practices when targeting 10,000 dairy animals. This covers costs of technicians and/or model farmers and supplies milk testing technologies (CMT kit; milk checker). Costs for cooperatives are around $2,000, mainly to establish testing and information feedback systems. Apart from these inputs, time will be required for the technicians/model farmers to teach dairy cooperative members. Farmers will also need to purchase some items themselves (povidone iodine; antibiotics). These inputs will ideally be purchased collectively through dairy cooperatives at a lower cost and subtracted from the monthly payment to the farmers. After these initial inputs, the project will be financially self-sustainable as no further subsidies will be required. The benefits will far outweigh the costs in economic (increased income from milk sales) and nutrition (consumption of safe milk free of mastitis) terms.

The Technology Package for Prevention and Control of Mastitis in Dairy Animals, after sharing extension packages to around 10,000 dairy animals, anticipates an additional 1 million liters of milk into the regional and national milk grid by the end of year three. Thus, 10,000 smallholder dairy farmers (averaging 1 dairy animal per household in rural Nepal) will be in position to receive additional US $500,000 income, annually.

References

•Heifer International Nepal. 2017. Improving Dairy Animal Productivity and Income of Dairy Farmers through Control of Mastitis Disease. Final sub award report
•FAO. 2011. Mapping supply and demand for animal-source foods to 2030, by T.P. Robinson & F. Pozzi. Animal Production and Health Working Paper. No. 2. Rome.
•Livestock System Innovation Lab. 2016-2017. Stakeholder Consultation and Priority Setting Meetings: Burkina Faso, Niger, Nepal, Ethiopia, Rwanda.
•Dahal L.R., D. B. Nepali, and R. Shah. 2010. "Total Bacterial Counts of Raw Milk in Eastern Terai of Nepal." Journal of Agriculture and Environment 11: 46–50.
•Manfre C, Rubin D, Allen A, Summerfield G, Colverson K, Akeredolu M. 2013. 'Reducing the gender gap in agricultural advisory and extension services: How to Find the Best Fit for Men and Women Farmers', MEAS Discussion Brief #2. Urbana: Modernizing Extension and Advisory Services.

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