

Photo: H. De Groote/CIMMYT

Transforming Crop Residues into High-Quality Feed

A DUAL APPROACH TO INCREASE LIVESTOCK PRODUCTIVITY AND REDUCE EMISSIONS IN ETHIOPIA AND NEPAL

The Challenge:

In Sub-Saharan Africa and South Asia, livestock systems heavily rely on low-quality cereal crop residues such as rice and wheat straws, which limits productivity and drives high methane emissions. Using higher-quality forage crops as feed is often impractical due to land constraints. Improving crop residue digestibility can boost animal performance, reduce land use, and cut emissions. Yet, poor logistics and high cost of collection means much of the residue is burned, wasting resources and polluting the air. Repurposing crop residues into high-quality ruminant feed offers a scalable and sustainable solution for achieving productivity and climate goals.

Project Overview:

Though effective biochemical treatments for improving crop residues exist, they remain underused on farms due to socioeconomic and logistical barriers. This project promotes scalable business models where enterprises collect and treat residues off-farm, then sell the improved feed to farmers—aligning more closely with farmer preferences and capacities. Through field trials and systems analysis, the project will quantify these benefits to support climate goals and strengthen farming systems in Ethiopia and Nepal.

Key Messages:

- Improving livestock productivity improves farmer livelihoods—better feed leads to healthier animals, higher milk and meat yields, and more stable incomes for smallholder farmers.
- Cereal crop residues are already a vital feed source, but their digestibility and nutritional value are limited. Enhancing their digestibility and nutritional quality through biochemical treatment or genetic approaches can lead to significant productivity gains for milk and meat.
- Interventions must focus on building self-sustaining, locally driven business models that make improved feed solutions accessible and scalable.
- Better feed means a better future by producing more food on the same land and reducing methane emissions per unit of output, improved feed systems support both climate action and food security

Project Activities

- Engage local stakeholders in Ethiopia and Nepal by involving government agencies, researchers, cooperatives, and private sector actors through workshops and training during project planning and implementation.
- Pilot innovative feed technologies in collaboration with local feed manufacturers, and raise awareness among existing and potential entrepreneurs by providing training on crop residue-based feed production. Develop credible scenarios for local businesses to produce crop residue-based feed.

- Develop self-sustaining business models by integrating real-time project data, desk research, collaboration with local partners, and insights from other aligned initiatives
- Advocate for the integration of feed quality traits into crop breeding programs by collaborating with breeding institutions to promote dual-purpose crops that support both food and livestock feed needs.
- Quantify the environmental and economic benefits of improved crop residue use through emissions modeling, productivity assessments, and cost-benefit analyses to inform national climate strategies.
- Develop and disseminate project findings as actionable recommendations to inform policy and investment decisions, enabling the scaling and replication of efficient crop residue-based feed interventions across the regions.

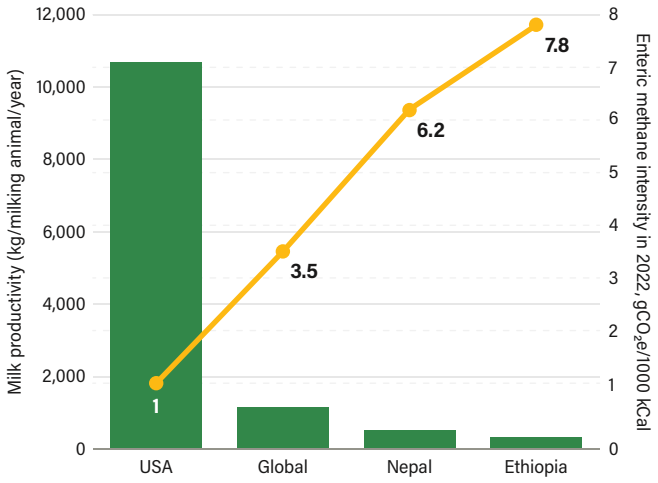
Expected Outcomes

By the end of the project, smallholder and commercial farmers will realize the benefits from increased productivity and income, and new business opportunities will emerge around residue treatment. Policymakers will have access to robust evidence supporting the integration of feed quality into agricultural and climate strategies.

Timeline

June 2025-May 2027

Figure | **Dairy productivity in Ethiopia and Nepal, 2022**



Note: While dairy productivity is rising, a major gap in milk yields persists between developed and developing countries which drives higher enteric methane emission intensity. This inefficiency points to both challenges and opportunities for improving feed systems. Notably, the figure reflects enteric methane per unit of feed calories only, excluding emissions from feed production and transport, which are typically higher in industrialized systems.

Source: Systems Change Lab.

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About ILRI

ILRI is an international organization working to improve food security and reduce poverty through research for better and more sustainable use of livestock.

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