



Research and development impact targets:

- Improved forage options for smallholders
- Increased availability of high-yielding, high quality forages
- Improved ecosystem services in integrated crop-livestock systems
- More efficient forage based livestock production systems
- Cross-cutting themes: eco-efficiency, climate change, policy, gender, decision support, market analysis

Enhancing forage integration and access for smallholder livestock production

Making the most of livestock assets: improved options

In the upland areas of Southeast Asia, most smallholder farmers keep animals. Buffalo provide a traditional source of draught power for land preparation or transport, and animal manure is often used to fertilize crops. But most importantly for upland smallholder farmers, livestock such as cattle, buffalo, pigs, goats and poultry represent a savings account. When the household needs money to pay

for a wedding; medical bills or school fees, for example, a few animals can be sold for immediate cash.

Planting highly productive, nutritious forages on small areas of the farm can allow farmers to increase livestock productivity without relying on increasingly scarce natural resources. If forages are planted close to the homestead and animals kept close-by, labor required to collect feed or herd animals can be reduced. But because the productivity of these animals is typically low, cattle, buffalo,

pigs and goats are customarily not kept for the purpose of maximum income generation and are left to feed on crop residues and graze native vegetation pasture: often of relatively poor nutritional quality.

Animals barely maintain or even lose weight during the dry season, while only very slowly gaining weight when more feed is available during the rains. Additionally, burgeoning human and animal populations are putting pressure on native grazing areas and traditional feed sources, forcing farmers



to find feed for their animals far from the homestead. By consequence, smallholders often find themselves caught in a labor-productivity trap: more labor is needed to improve production, but low animal productivity does not justify the time investment to find feed of sufficient quantity and quality.

As a CIAT Asia priority theme, **Enhancing forage integration and access for smallholder livestock production** addresses the opportunities and challenges for smallholder farmers. While smallholders could benefit from increased market demand for livestock products, they also face feed shortages as plots become smaller. CIAT's research aims to support farmers by making available forage options that meet quantity and quality requirements for profitable animal raising, while improving productivity through gains in overall efficiency and access to livelihood-enhancing ecosystem services.

Regional trends and opportunity

Rapid increases in meat consumption in Asia is driving regional demand for livestock products. As improved infrastructure opens market opportunities in previously remote upland

areas, smallholder farmers capable of commercializing their livestock production have an unprecedented opportunity to improve and diversify their livelihoods.

Yet too often, they lack the necessary information, capacity and resources to take advantage of lucrative market prospects. Over the past two decades, CIAT's research, in collaboration with national partners, has focused on boosting livestock productivity through participatory development of improved forage systems and forage germplasm. Bringing farmers together with other livestock value chain actors, so that each better understands the concerns and demands of the other, has been a central part of this research and development process.

Working together with regional partners, CIAT Asia's researchers are defining new research areas to build on past experiences and respond to local demand. Regional priorities for immediate action include continued variety improvement through breeding and selection, improved forage seed production and distribution systems, and scaling up diverse, eco-efficient forage-based agricultural systems.

Building on two decades of research achievements in Asia

To support the shift from livestock keeping to more intensive production, regional and international collaboration has already enabled researchers to whittle down locally suitable forage species. Initially screening over 6,400 forage accessions from CIAT's headquarters in Colombia, a process of participatory evaluation with farmers ensured economic developed widely-adopted improved forage species.

While continuing to identify requirements for germplasm development, new research focuses on linking farmers to livestock markets - in particular, commercializing production and distribution systems, to position forages within whole farm and landscape systems. This newer, broader research and development scope is expected to stimulate local livestock systems and implies new partnership with research institutes, development NGOs and more direct engagement with private-sector firms and support services providers.



Decreasing costs and increasing productivity

Animal feed makes up a major part of the overall cost of smallholder livestock production. When associated labor costs and resource trade-offs for feed crop production are considered, raising livestock becomes a less attractive livelihood option for the poor.

Improved fodder varieties are today found in livestock troughs across the region - such as the protein-rich legume *Stylosanthes guianensis* or high biomass-yielding Mulato II grass. These improved forage varieties can deliver double or even triple weight gain in animals, especially when combined with better animal-keeping practices. Given that, throughout Southeast Asia, forage feed is a costly import, making these varieties, adapted over decades to local conditions by CIAT researchers and local partners, represent a great financial opportunity for farmers and regional economies.

Combined with other best practices, such as penning animals and ensuring well-stocked troughs – with adequate water and mineral licks throughout the day – these varieties can offer a stepping stone out of poverty. Yet much remains to be done in ensuring

improved seeds reach remote farmers. Identifying and improving local distribution systems for improved seed is among CIAT Asia's priorities.

Looking at the bigger picture: improved ecosystems

Learning from past research interventions to bolster resilient, climate-smart and sustainable livestock systems, CIAT's cross-country learning and collaborative research model ensures a stronger foundation for sustainable livestock systems.

In future, a deeper understanding of integrated crop, livestock and tree systems could generate income from other ecosystems services and reduce the water and carbon footprint per farm. Our research team is actively investigating ways for integrated crop livestock- tree systems, to become more resilient, productive and eco-friendly. This includes building capacity and understanding of these systems among farmers and extension partners; investment and policy decision makers.

Markets and maximizing investments

Improvements to forage and livestock management boost livestock productivity and improve cattle, buffalo, chicken, and pig husbandry. In remote areas of northern Lao PDR for example, fast-growing, high quality, largely disease and pest-resistant forages ensure that steers can double in value from around US\$200 to more than \$400 over just 120 days.

With forages grown near the house, time spent gathering feed is cut from several hours to just 20 minutes per day. Examples from central and eastern Cambodia show that, because children usually collect animal feeds, time saved in collecting such feed directly results in more children getting to school on time, with teachers reporting better progress in school.

Enterprising farmers have embraced new opportunities by selling forages, resulting in extra income of up to \$300 a year. There is more to do: awareness of the premium market potential of a regular supply of healthy animals will go a long way to help farmers maximize their livelihood investment. One way



to do this is to raise awareness among smallholders about the market opportunities available, linking collectors, traders, middle men, retailers, sellers and consumers.

Healthier animals, healthier people – and profits

Improved animal husbandry has knock-on impacts. For example, pigs are the immediate host of the tapeworm *Taenia solium*, which can cause cysticercosis in humans - cysts in muscles and the brain which can lead to seizures or even death. The tapeworm can be spread by eating undercooked pork, and by roaming animals, which close the cycle of infection by consuming infected human and animal faeces.

Together with institutional service providers for specific animal health support such as a new vaccine, CIAT and national partners have joined forces to improve animal health, management and feeding, consequently producing healthier livestock products. Through capacity building activities, farmers understand the tapeworm cycle and health risks related to poor pig management practices, as well as the potential for boosting profits by producing healthier animals in more hygienic conditions.

Photos:

Georgina Smith / CIAT

Our team

From its core expertise in forages research, the CIAT Asia team now involves cross-thematic and interdisciplinary linkages with specialists in integrated farming systems and agricultural landscapes, in market access and impact assessment, and also in complementary feed crops such as cassava. CIAT Asia works hand in hand with the Center's forages cassava team and draws expertise support from global CGIAR research programs. Our lead researchers for forages and livestock include:

- **Adrian Bolliger:** Specialist in livestock & smallholder systems
- **Tassilo Tiemann:** Specialist in forages & livestock



The International Center for Tropical Agriculture (CIAT)

a member of the CGIAR Consortium – develops technologies, innovative methods, and new knowledge to better enable farmers, especially smallholders, to enhance eco-efficiency in agriculture. We aim to make agricultural production more competitive and profitable, as well as sustainable and resilient, through economically and ecologically sound use of natural resources and purchased inputs. Headquartered near Cali, Colombia, CIAT conducts research for development in tropical regions of Latin America and the Caribbean, Africa, and Asia.

www.ciat.cgiar.org

Contacts

Dindo Campilan: Director for Asia: d.campilan@cgiar.org

Georgina Smith: Communications specialist g.smith@cgiar.org