



## Research Brief

# CROP-LIVESTOCK INTEGRATION, INTENSIFICATION AND SPECIALIZATION: WHAT TRAJECTORIES IN NORTHWEST VIETNAM?

## KEY TAKEAWAYS

Vietnam's Highlands are at a turning point in their agricultural transformation. Crop-Livestock Integration (CLI), a central pivot of its low-input family farms, is subject to farm specialization and evolving CLI practices. CLI can persist or even expand, particularly when supported by adequate resources, institutional arrangements, and local knowledge.

However, its long-term sustainability depends on:

1. addressing land and labor constraints;
2. adapting policy incentives to recognize the multifunctionality of mixed systems; and
3. strengthening inter-farm cooperation and biomass flows at larger scales.

Policy interventions also need to move beyond binary models (i.e., extensifs vs. specialized) and actively pursue creative arrangements that lay between both extremes. Participatory scenario planning helps envision and co-design future pathways for CLI that align with socio-economic needs and environmental constraints.

The forward-looking approach proposed by this research is essential to preserving farm diversity and maintaining ecological resilience under the fast-evolving nature of Vietnam's agricultural modernization.

This research brief outlines drivers, constraints and opportunities for **Crop-Livestock Integration (CLI)** in the highlands of Northwest Vietnam. CLI offers a critical lever to promote nutrient cycling, improve climate resilience and exploit system-level synergies, yet its continued use is challenged by a nation-wide drive for agricultural specialization and intensification. Based upon an in-depth characterization of local farm typologies and transition trajectories, different pathways are identified to reconfigure CLI strategies as to meet changing economic conditions, policy objectives and environmental constraints.

## SETTING THE STAGE

Mixed crop-livestock systems are the world's most widespread agri-food production model, covering about 2.5 billion hectares, and are especially popular in tropical regions. They produce three quarters of the world's milk and half of ruminant meat. In those systems, CLI proves a central means to promote food and livelihood security, resilience, and resource use efficiency. Specifically, CLI enables a two-way exchange of biomass with animals providing traction or manure to reconstitute soil fertility, crops offering family food self-sufficiency and crop residues providing livestock feed or forage. As such, CLI closes nutrient loops, minimizes waste and enhances value, thus supporting sustainability.





Regardless of its notable benefits, a continued adoption of CLI is challenged by an increased drive for agricultural intensification, simplification and specialization – as favored by market forces and public policies. In many parts of Vietnam, this has led to a profound restructuring of farming systems over the past 40 years. Yet, by fostering specialization, public policies risk excluding CLI at the farm level. These trends are further accelerated by increasing national and regional demand for meat.

As a result, mountainous Northwest Vietnam - a region with a historical dominance of mixed crop-livestock family farms - is witnessing a shift toward more specialized and intensified production systems.

This Research Brief seeks to identify and analyze ongoing changes in CLI practices in Vietnam’s Dien Bien Province, understand trajectories of change in the prevailing farming systems, and identify pathways through which this invaluable practice (and mixed family farming overall) can be sustained and smartly integrated in local agri-food systems.

## RESEARCH APPROACH

The study employed a mixed-methods approach, based upon:

- A quantitative farm survey of 100 households across five communes in Dien Bien District (Dien Bien Province, Vietnam);
- Qualitative retrospective interviews with 24 local farmers to characterize past or ongoing farm trajectories;
- Farm trajectory typology construction through expert-based methods and multivariate analysis.

In addition, CLI was analyzed through two complementary lenses: the degree of integration between crops and livestock, and the level of diversification of farm activities.



## CORE FINDINGS

### Farm typology

The analysis identified seven types of farms, grouped into three broad categories:

1. Livestock-specialized farms (A)
2. Mixed crop–livestock farms (B)
3. Crop-specialized farms (C)

The typology revealed how mixed systems still represent a significant proportion of farms (approximately two-thirds), though a shift is underway toward specialized systems. This shift may carry important implications for CLI. Mixed crop-livestock family farms are now following different paths:

- some intensifying by becoming more specialized in livestock or crop production,
- while others by maintaining a certain degree of diversification, with different level crop-livestock integration.

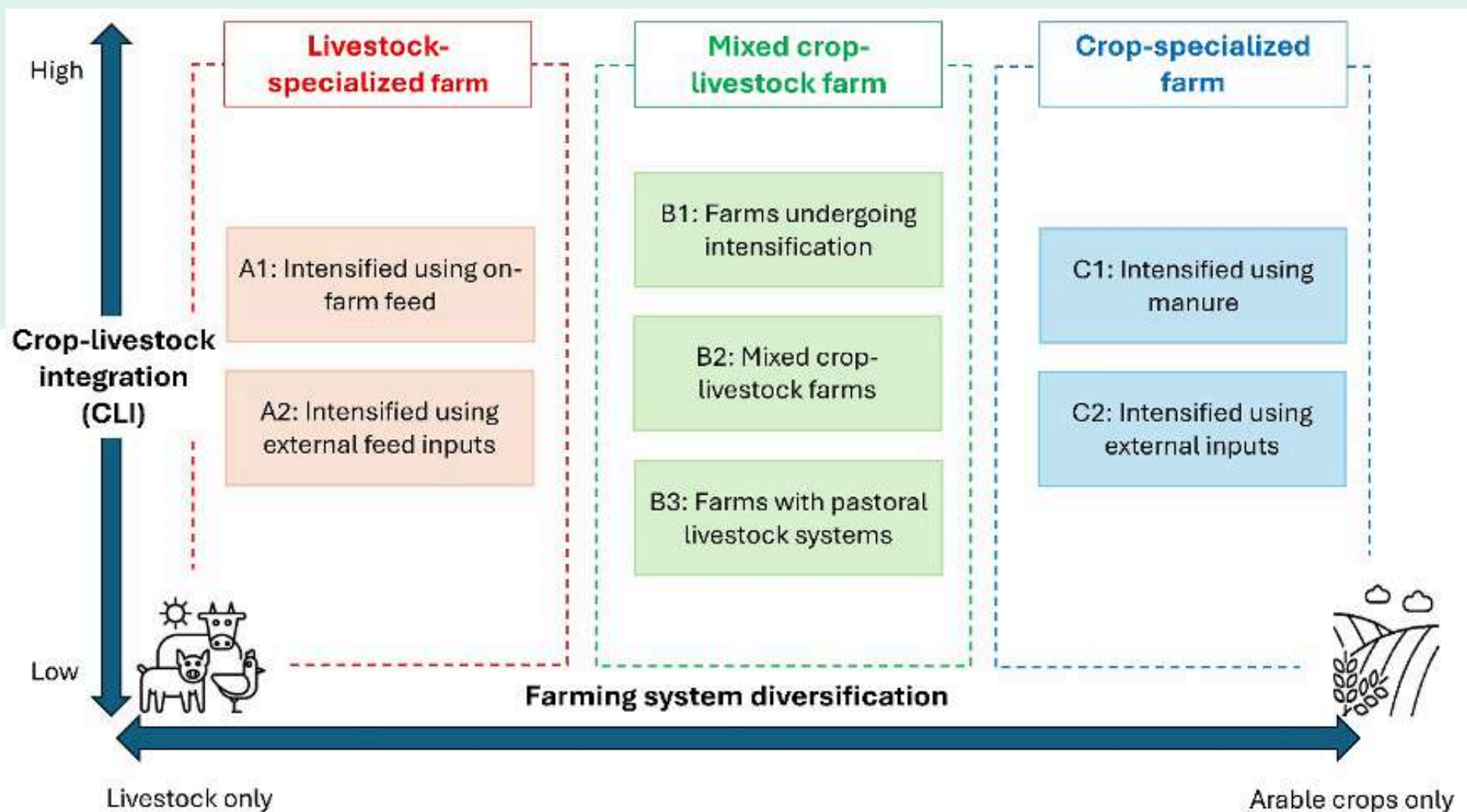


Figure1: Types of farms and their past trajectories (from Le Trouher, 2024)



# TRAJECTORIES OF CHANGE

The study identified three predominant trajectories shaping CLI practices locally:

## 1. SPECIALIZATION IN CROP SYSTEMS

Farms located in lowland and irrigated areas are increasingly shifting from mixed farming into specialized systems such as market gardening and fruit production, driven by:

- Ready availability of land and water resources;
- Proximity to growing urban markets e.g., the nearby city of Dien Bien Phu;
- The rise of intermediaries facilitating crop sales;

In this context, CLI practices and mixed cropping systems overall are diminishing. Some farms maintain a degree of integration by producing animal feed or by using manure as fertilizers, but an increasing share have come to rely upon chemical inputs e.g., due to an absence of a manure market.

While this trajectory may jeopardize long-term soil fertility and deepen external input dependencies, it can also generate opportunities for CLI through a (facilitated) sale, purchase and exchange of manure.



Fruit plot, Dien Bien Province (Hàn Anh Tuấn, 2021)



Cattle fed in the barn (ASSET project 2025)

## 2. SPECIALIZATION IN LIVESTOCK SYSTEMS

In parallel to the above, some farms are shifting towards family-run livestock production, particularly pig, cattle and buffalo fattening. These farms often:

- Transition from mixed models (B1, B2) to livestock-focused models (A1, A2);
- Intensify through more controlled practices e.g., stabling, on-farm forage or silage;
- Face reduced access to grazing area;

As manure becomes amply available in concentrated livestock farms, CLI can be advanced through regional, inter-farm integration. Yet, waste management and biomass exchange are less integrated within farm and may complicate animal waste management.

## 3. TRANSFORMATION OF GRAZING SYSTEMS

The majority of the farms have transitioned from free-grazing systems to forage-based feeding. This has been facilitated through a legal prohibition of cropping on sloping lands, which have reduced grazing areas and the abundance of natural grass, and shifts in labor availability and work organization.

As a result, some pastoral livestock farms (B3) have reduced herd sizes and expanded fodder crop cultivation and crop residue use. This trend illustrates an adaptive CLI strategy under environmental and institutional constraints.



Cattle grazing (ASSET project 2023)



Harvesting natural grasses at the edge of fields for animal feed in Dien Bien (Hàn Anh Tuấn, 2022)



## IMPLICATIONS OF THE FINDINGS

In addition to identifying the main transition pathways, underlying drivers and associated sustainability challenges, the study also pinpointed opportunities for reconfigured CLI in and beyond Vietnam's Dien Bien Province:

- 🌱 Crop-Livestock Integration can continue to exist where farms retain diversified activities and enjoy adequate access to land, labor and other resources. Even specialized farms can continue CLI by using self-produced cattle forage and feed or animal-derived fertilization;
- 🌱 Territorial-scale integration, where specialized crop and livestock farms collaborate e.g., through manure exchange, may compensate for declining farm-level integration;
- 🌱 Furthermore, institutional innovations, such as farmer cooperatives and knowledge-sharing platforms, could support CLI revitalization. These require alignment with policy frameworks and investment in farmer training and capacity building.



Forage plot in Dien Bien (Hàn Anh Tuấn, 2022)



Preparation of silage with forage chopping (Hàn Anh Tuấn, 2024)

The research further uncovered dual trajectories of change which either involve increasing farm specialization or evolving CLI practices. Whereas CLI - as traditionally practiced by family farms - may not be sustained over time, either trajectory can allow for a continued CLI persistence or expansion under particular conditions. In particular, the long-term sustainability of CLI in Northwest Vietnam can be ensured by:

- 🌱 Addressing land and labor constraints. This can involve incentivizing sustainable land management and forage cropping on marginal lands, or by tailored capacity-building and youth engagement programs;
- 🌱 Revisiting policy incentives to recognize the multifunctionality of mixed systems. Amongst others, Vietnam's livestock or reforestation law and agricultural development objectives can be adjusted to support integrated models. Amended policies can promote flexible, place-based interventions that account for local land or labor constraints, ethnic diversity and variable agroecological contexts;
- 🌱 Strengthening inter-farm cooperation and biomass (i.e., manure or crop residue) flows beyond the boundaries of single farms. Regional CLI networks or territorial manure and feed markets can help to close nutrient loops and enhance resource use efficiencies.

## RESOURCE

This research brief is a summary of:

### Trajectories of crop–livestock integration in the context of specialization in Northwest Vietnam

Alice Le Trouher, Charles-Henri Moulin, Le Thi Thanh Huyen and Mélanie Blanchard

**The Journal of Agricultural Science, 2023: 161(4) : 488-501**

**DOI:** <https://doi.org/10.1017/S0021859623000412>



#### Contact:

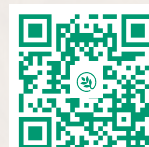
Alice Le Trouher ([alice.letrouher@outlook.fr](mailto:alice.letrouher@outlook.fr))  
Charles-Henri Moulin ([charles-henri.moulin@supagro.fr](mailto:charles-henri.moulin@supagro.fr))  
Le Thi Thanh Huyen ([lehuyen1973@yahoo.com](mailto:lehuyen1973@yahoo.com))  
Mélanie Blanchard ([melanie.blanchard@cirad.fr](mailto:melanie.blanchard@cirad.fr))

**Publication date:** October 2025

Grow Sustainably, Eat Healthy

**ADOPT AGROECOLOGY**

[f](#) [in](#) [X](#) @ASSETProjectSEA



Coordinated by:



Funded by:



The content of this website has been produced with the financial assistance of the Agence Française de Développement (AFD), the European Union (EU) and the French Global Environment Fund (FFEM). The views expressed herein can in no way be taken to reflect the official opinion of the AFD, EU or FFEM.