



*Photo: SNV*

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# **Livestock-Based Livelihoods and Value Chains in the Pu Mat Landscape: Opportunities for Sustainable and Biodiversity-Compatible Development**

*Report by SNV for the Biodiverse Landscape Fund (BLF)*

# Preface



To address the interconnected challenges of rural poverty, biodiversity loss, and climate vulnerability, UKAid is supporting the Biodiverse Landscapes Fund (BLF) in the Lower Mekong. The programme focuses on the Annamite Mountain range, which spans Vietnam, Cambodia, and Laos and features one of the most biologically important and endangered tropical forests in the world.

In Vietnam, the programme focuses on the Pu Mat landscape in western Nghe An province. This area forms the core of the Western Nghe An Biosphere Reserve and shelters rare species like the Saola, large-antlered muntjac and many different primate species.

Ethnic minority communities, primarily the Thai and the marginalised Dan Lai, inhabit the buffer zones of Pu Mat National Park. Traditionally, these families relied on forest resources and subsistence farming. However, population growth and restricted forest access have forced a shift toward participation in the cash economy. Today, livestock, cattle, buffalo, pigs, and poultry serve as their primary source of income and a vital economic safety net.

At the same time, livestock production in this region faces critical challenges. Extensive free-grazing degrades forest edges and increases conflicts between humans and wildlife. Remote geography, poor infrastructure, and frequent disease outbreaks, such as African Swine Fever (ASF), trap households in a cycle of low productivity and high risk. These constraints hinder economic growth and threaten an already fragile ecosystem.

The BLF aims to break the cycle of poverty and biodiversity loss by building resilient, profitable, and nature-positive livelihoods. This assessment provides the evidence needed to connect community well-being and conservation goals. By strengthening livestock production and value chains, while simultaneously revitalising the value of integrated subsistence farming, we foster ecologically responsible growth that protects the forest and ensures local people thrive alongside nature.

# Executive summary

This report analyses livestock production systems in the Con Cuong and Anh Son districts of Nghe An Province, specifically focusing on ethnic minority communities in the Pu Mat National Park buffer zone. In this landscape, livestock serves as a primary engine for food security and household income. However, current traditional and small-scale practices limit productivity and place significant pressure on the surrounding forest ecosystem.

The field-based assessments and analyses have identified the following strategic bottlenecks within the Pu Mat livestock systems:

- **System inefficiencies:** Results indicate that extensive free-grazing of cattle and buffalo leads to slow weight gain, prolonged production cycles, and high disease risks. Households frequently treat cattle and buffaloes as “living savings” rather than commercial assets, leaving producers dependent on local traders.
- **High vulnerability:** Pig and poultry farming provide consistent cash flow but remain vulnerable due to poor biosecurity and low vaccination rates. Women, who manage the majority of poultry production, face additional challenges from climate variability and limited technical support.
- **Environmental risks:** Inadequate waste management and forest-edge grazing threaten water quality and increase the risk of disease transmission between livestock and wildlife.





Photo: SNV

The assessment concludes that strengthening production foundations must take priority over immediate market expansion. A stable technical foundation is a prerequisite for sustainable scaling. The proposed strategy focuses on four integrated interventions:

- **Enhancing on-farm practices:** Improving animal nutrition, housing infrastructure, and integrated waste management (including both solid waste and wastewater treatment systems).
- **Upgrading veterinary services:** Establishing community-based animal health systems to stabilise supply and reduce mortality.
- **Facilitating peer learning:** Selecting demonstration households to showcase improved models and drive community adoption.
- **Aligning with conservation:** Ensuring all livestock production models support forest protection and biodiversity goals.

This report outlines a strategic framework for transitioning livestock-based livelihoods in the Pu Mat landscape from traditional “living savings” to sustainable, market-oriented value chains.

The proposed interventions aim to catalyse economic growth for marginalised communities (Thai and Dan Lai) by addressing systemic barriers such as inadequate veterinary services and sub-optimal breed quality. Simultaneously, these actions will significantly reduce anthropogenic pressure on the Pu Mat National Park’s core biodiversity zones.



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# Abbreviations

ASF	African Swine Fever
BLF	Biodiverse Landscapes Fund
DARD	Department of Agriculture and Rural Development
F&F	Fauna & Flora
FGD	Focus Group Discussion
GESI	Gender Equality and Social Inclusion
KII	Key Informant Interview
LVC	Livestock Value Chain
NGO	Non-Governmental Organisation
SNV	Netherlands Development Organisation
VCA	Value Chain Analysis
VND	Vietnam Dong
VET	Veterinary / Veterinary Services

# 1. INTRODUCTION

The Biodiverse Landscapes Fund (BLF) is a programme of the UKAid, funded by the Department for Environment, Food and Rural Affairs (DEFRA) and implemented by a consortium led by Fauna & Flora (F&F), the International Union for Conservation of Nature (IUCN) and Netherlands Development Organisation (SNV).

The programme operates across three transboundary forest landscapes in the Lower Mekong region, spanning Cambodia, Vietnam, and Laos. Its core objective is to strengthen biodiversity conservation while supporting inclusive, nature-positive livelihood opportunities for communities living in and around protected forests. Within the consortium, SNV leads work on sustainable value chains, with a focus on improving rural livelihoods while reducing pressure on natural ecosystems.

In Vietnam, the programme centres on the Pu Mat Landscape in western Nghe An, a core area of the Western Nghe An Biosphere Reserve. This landscape is of global conservation importance, comprising a 94,816 hectares core zone and an 86,000-hectare buffer zone. It provides a critical sanctuary for endangered species like the Saola and Large-antlered muntjac. (Image 1)

The buffer zone is home to ethnic minority communities, primarily the Thai and the highly vulnerable Dan Lai. These communities reside in remote villages, including Ban Bung and Co Phat, located inside the core zone. With limited infrastructure and market access, these households rely heavily on traditional agriculture and livestock for food security and income.

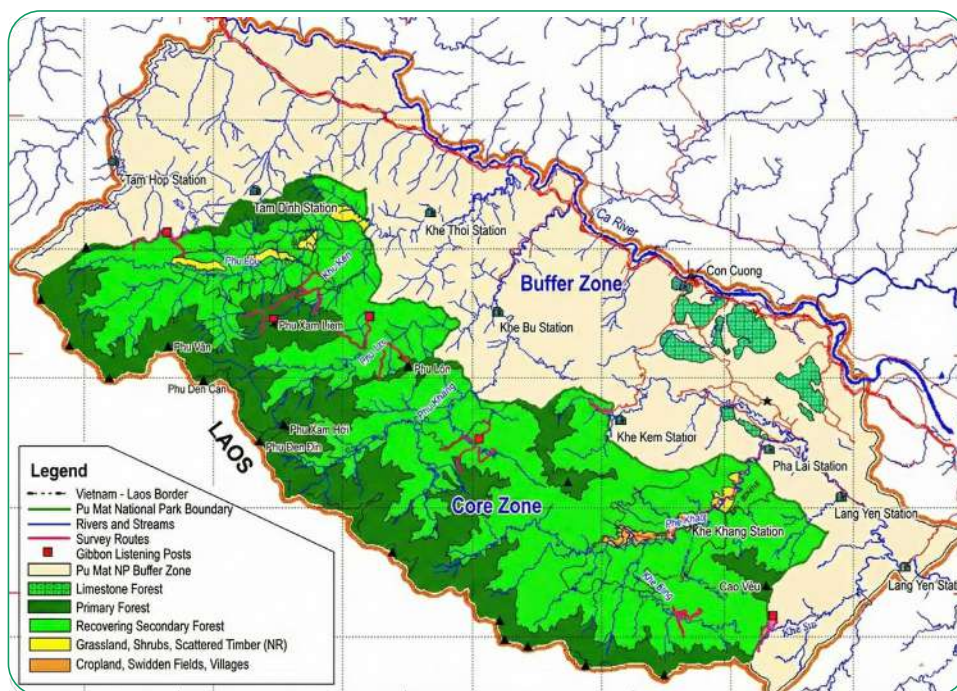


Image 1: Map of Pu Mat National Park – Nghe An<sup>1</sup>

Livestock production - cattle, buffalo, pigs, and poultry - is the primary livelihood engine for these communities. However, current practices create a critical challenge for conservation. Extensive free-grazing practices in the forest-edge and buffer zones remain common, particularly among ethnic groups. Free-grazing leads to forest degradation and increases the risk of disease transmission between livestock and wildlife. Furthermore, low productivity, weak market integration, and climate shocks leave these households economically fragile.

This study focuses on three priority communes facing high natural resource pressure: Chau Khe, Mon Son (Con Cuong District), and Phuc Son (Anh Son District). While socioeconomic conditions vary with Phuc Son being more commercial and Chau Khe facing the highest poverty, all three share a deep interaction with the forest ecosystem. (Image 2)



*Image 2: Map of survey area  
(A: Chau Khe; B: Mon Son, and C: Phuc Son)*

Building on recent the recent BLF assessments, this study identifies strategic bottlenecks and priority interventions. The goal is to develop resilient, equitable, and nature-positive livestock systems that enhance household incomes while safeguarding the ecological integrity of the Pu Mat landscape.

## 2. METHODOLOGY

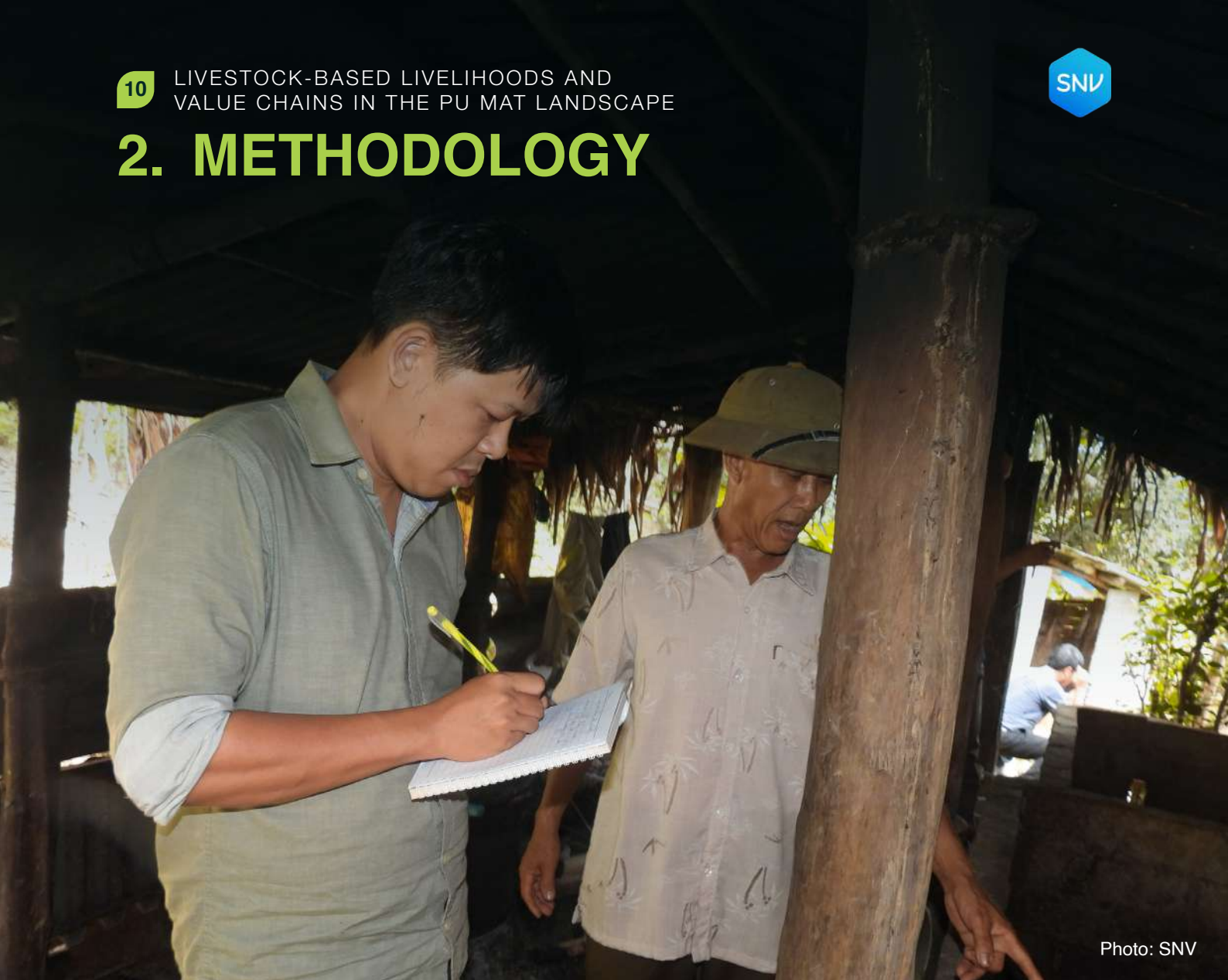


Photo: SNV

This assessment applied a Value Chain Approach (VCA) to evaluate cattle, buffalo, pig, and poultry systems in the Anh Son and Con Cuong districts. The study analysed every stage of the chain, encompassing input suppliers, farmers, processors, and retailers, while also accounting for end-consumer preferences and market demand.

The team followed a rigorous four-step process: desk review, tool design, field surveys, and data synthesis. To ensure high reliability, the study triangulated secondary institutional data with primary field evidence, including:

- 17 key informant interviews (KIIs) with district officials, veterinary staff, and commune leaders.
- Two focus group discussions (FGDs) per commune with 5–6 key livestock farmers to assess local livestock production systems and value chains.
- Structured interviews with 80 farmers, 4 collectors, and 2 abattoirs.

Village walks and household observations further validated on-farm management practices and their direct interaction with the surrounding forest ecosystems.

# 3. LIVESTOCK PRODUCTION SUPPORT SYSTEMS

## The livestock sector: Provincial trends and local realities

Livestock remains a cornerstone of Nghe An's rural economy. By 2023, the province managed a massive inventory: around 800,000 cattle and buffalo, nearly 1 million pigs, and over 32 million poultry. Annual output now exceeds 150,000 tonnes of pork, 72,000 tonnes of poultry meat and 700,000 eggs. Notably, beef production continues to rise as farmers pivot from traditional buffalo to higher-yield cattle breeds.

Despite significant regional volumes, production remains highly fragmented, with 90% of households rearing fewer than ten animals. This limited scale restricts market access and prevents processors from achieving consistent quality. Consequently, it weakens farmers' bargaining power during price negotiations. Furthermore, several critical constraints hinder growth. Feed costs remain prohibitively high as 70% of ingredients are imported, while remote areas suffer from poor access to improved breeds and inconsistent veterinary services.

In the mountainous Pu Mat landscape, livestock represents one of the few stable income sources for rural households, although production scales vary significantly between Con Cuong and Anh Son districts.

- **Con Cuong District:** Department of Agriculture and Rural Development data indicates an inventory of 31,658 cattle and buffalo, 36,220 pigs, and 381,742 poultry. Despite the prevalence of small-scale farming, the district hosts one specialised farm managing 56 Belgian Blue Beef (BBB) cattle.
- **Anh Son District:** This district maintains a substantially larger sector, reporting nearly double the pig and poultry populations of Con Cuong. In 2021, Anh Son recorded 51,800 pigs and 1.4 million poultry, compared to Con Cuong's 29,860 and 0.6 million, respectively

While there are differences in pig and poultry volumes, cattle and buffalo populations remain comparable across both areas.



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Despite disparities in volume, both districts followed a nearly identical market trajectory between 2015 and 2021. Both regions suffered significant downturns due to the 2018 Foot and Mouth Disease (FMD) outbreaks, followed by a dramatic contraction in pig populations during the 2019 African Swine Fever (ASF) crisis. While the sector has seen a modest recovery since 2019, buffalo numbers continue to decline as farmers favour more efficient cattle and poultry systems (Figures 1 & 2).

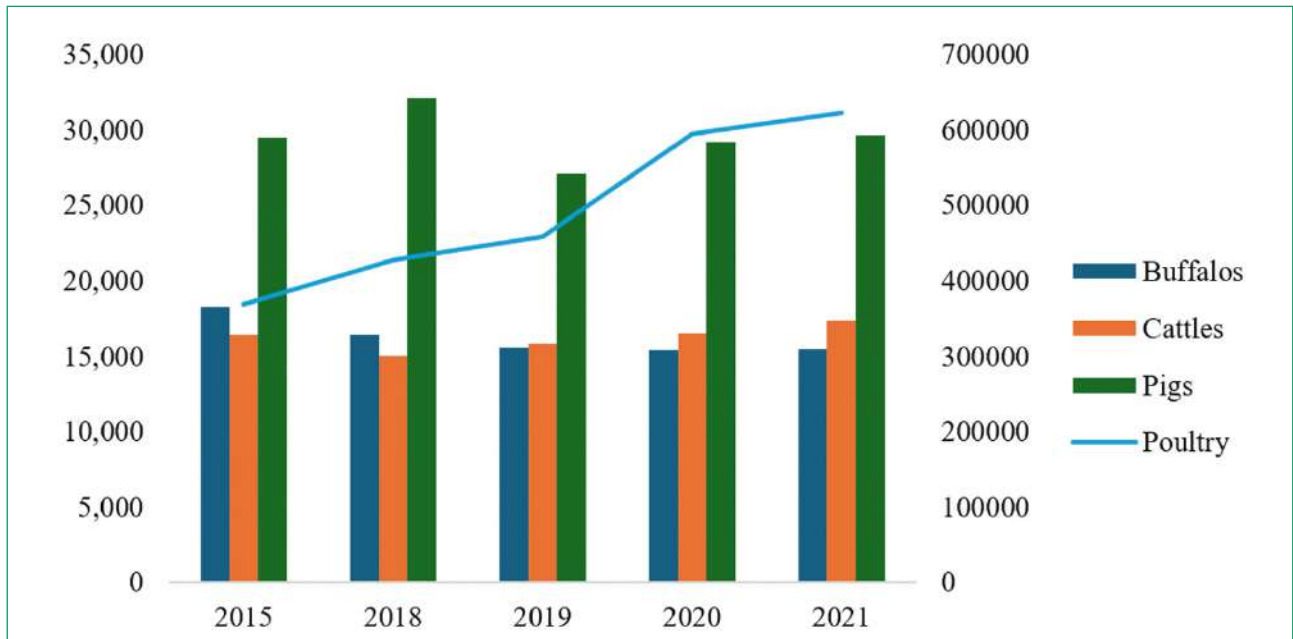


Figure 1: The number of the main livestock in Con Cuong district from 2015 to 2021

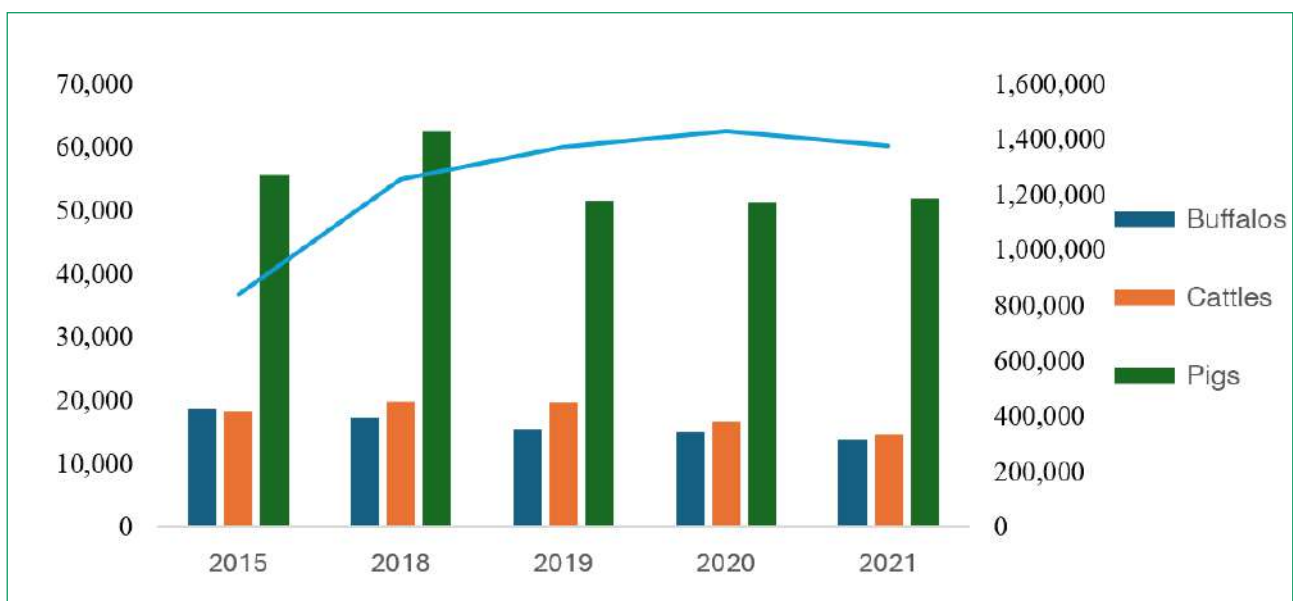


Figure 2: The number of the main livestock in Anh Son district from 2015 to 2021



### Socioeconomic Drivers and ethnic marginalisation

Economic conditions vary sharply across the landscape. Phuc Son commune demonstrates a strong commercial orientation with no “poor” households in the survey sample. In contrast, Chau Khe remains highly vulnerable, recording a 75% poverty rate.

Demographics also reveal an ethnic divide. Thai households generally possess higher education levels and larger landholdings. Conversely, the Dan Lai community remains the most marginalised; despite dedicating more labour to livestock, 70% of Dan Lai households live in poverty. In Mon Son, a clear disparity exists between households in the commune centre and those residing deep within the National Park, where isolation limits economic opportunity (Table 1).

**Table 1: Socio-economic characteristics of local communities**  
(Data represents averages unless otherwise stated)

Indicator	Average	Ethnic group		Communes			
		Thai	Dan Lai	Phuc Son	Mon Son	Chau Khe	
Age (years)	45.6	48.3	39.7	51.6	43.3	45.6	
Education (Grade)	4.3	4.6	3.5	3.71	4.3	4.1	
Household size (persons)	4.8	4.96	4.48	4.9	4.76	4.89	
Labour force (persons)	2.37	2.42	2.26	2.3	2.35	2.67	
Raising labourers (persons)	1.53	1.42	1.73	1.55	1.36	2.6	
Economic (%)	Better-off	14	18	5	6	21	0
	Moderate	44	52	25	94	27	25
	Poor	42	30	70	0	52	75

### Land tenure: Fragmented holdings and feed bottlenecks

Land scarcity creates a primary bottleneck for development. While 81% of households own rice land, holdings are small and fragmented, averaging just 1,465 m<sup>2</sup> per household and dropping to a mere 600 m<sup>2</sup> in Chau Khe. This limited acreage prevents farmers from cultivating fodder crops like maize or cassava, forcing a costly reliance on external feed.

Ownership of “Forest land” (land designated for timber and agroforestry) is equally low, averaging 32% across the landscape. A significant imbalance in land distribution further complicates the issue: Mon Son households manage an average of 13.7 ha of forest land, while Phuc Son households hold only 2.3 ha. Lacking legal access to sufficient grazing land, many households view free-grazing in the core zone of Pu Mat National Park as their only survival strategy, despite the risk of legal prosecution and fines (Table 2).

**Table 2: The land resources available of interviewed households**

Indicator	Average	Ethnic group		Communes		
		Thai	Dan Lai	Phuc Son	Mon Son	Chau Khe
Rice land %	81	82	78	89	83	56
	(sao <sup>1</sup> )	2.93	2.65	3.59	2.8	3.22
Cassava land %	16	22	4	0	26	0
	(sao)	4.7	4.2	10	0	4.7
Maize land %	58	66	43	61	67	0
	(sao)	1.8	1.9	1.4	2.9	1.4
Forest land %	32	36	22	61	24	11
	(ha)	7.85	2.7	2.6	2.3	13.7

### Institutional support: The extension and veterinary gap

While government agencies and unions support livestock development, service coverage remains inequitable. Extension activities often focus on accessible lowland areas, leaving remote ethnic villages with limited technical support.

Underdeveloped veterinary services further hinder the sector. Most communes employ only one officer, leading to delayed disease detection. In remote areas, response times of two to three days often allow outbreaks to spread uncontrollably. Furthermore, previous efforts to distribute improved breeds often failed; 70–80% of project-supported animals died or were sold prematurely because farmers lacked the cash flow to buy feed or the skills to manage non-native breeds.

1 Sao: land unit 500 m<sup>2</sup>

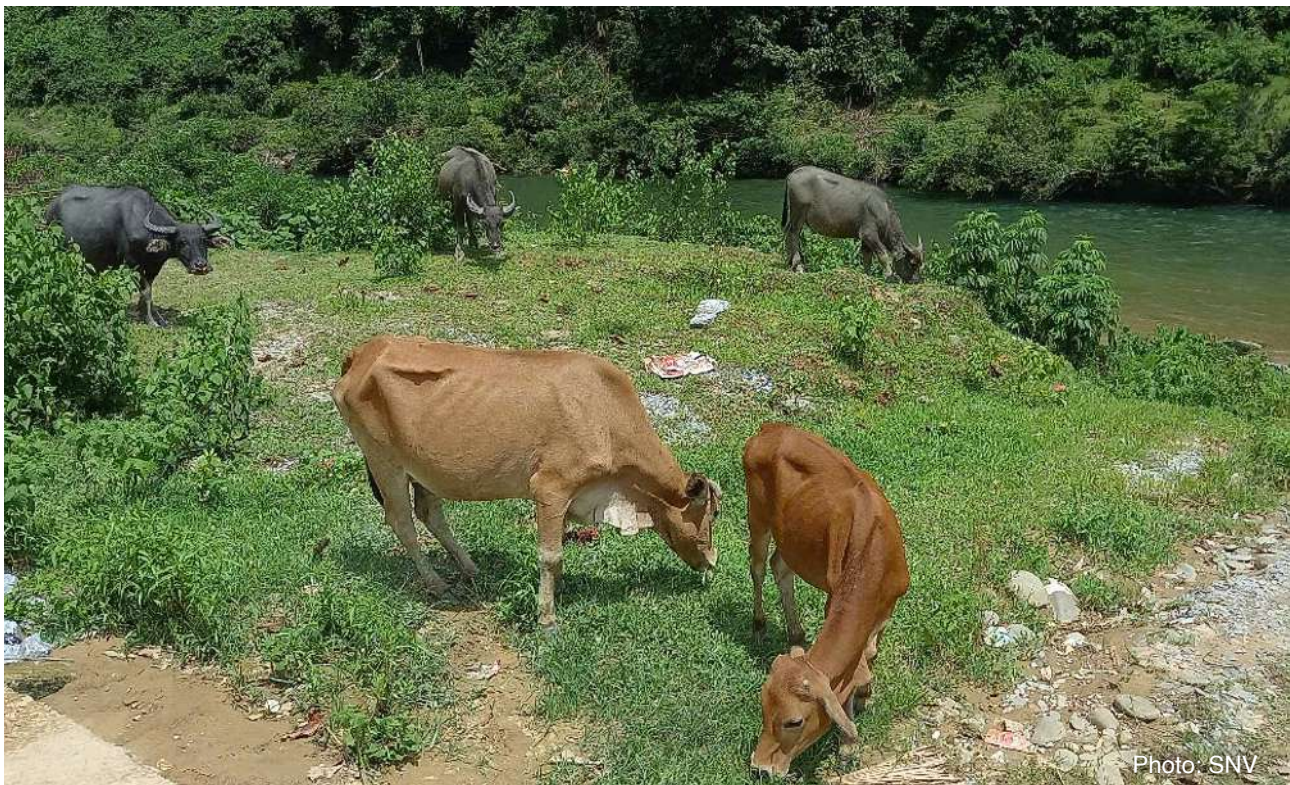
Conversely, a recent participatory model by Fauna & Flora (F&F) achieved significant success by empowering farmers to select breeds suited to their specific needs. This approach enhanced animal welfare and drastically reduced mortality, proving that sustainable development requires more than material inputs. Success instead demands hands-on training and service models tailored to the local context, including specific forest ecosystems and climatic patterns.

### **Conservation nexus: Forest impacts and wildlife conflict**

The reliance on forest-edge resources creates a direct conflict with biodiversity goals. Free-grazing degrades understory vegetation, compacts soil, and prevents natural forest regeneration. Beyond environmental damage, this proximity fuels wildlife conflicts, such as crop raids by wild elephants and boars. Furthermore, poor waste management at the forest edge facilitates disease transmission between domestic pigs and wild suid populations, threatening rare endemic species.

### **Climate vulnerability and resilience**

Erratic weather, including floods, droughts, heat waves, and prolonged cold or wet spells, severely undermines livestock productivity and weakens animal health. These climatic stresses reduce feed availability, compromise shelter conditions, and increase physiological stress in animals, thereby lowering disease resistance. Field observations in villages such as Co Phat (Image 3) illustrate how extreme weather events trigger acute feed shortages and livestock losses, while also creating favourable conditions for disease transmission. As a result, disease outbreaks were reported by an estimated 38–50% of households in the past year. Building climate resilience, therefore, requires a strategic shift: reducing reliance on forest grazing, upgrading livestock housing, developing resilient feed systems, and strengthening farmer knowledge to protect livelihoods while conserving forest ecosystems.



*Image 3: Skinny cattle due to lack of feed in Co Phat village*

# 4. LIVESTOCK VALUE CHAINS AND MARKET SYSTEMS

This section analyses the value chains for cattle, buffalo, pigs, and poultry, highlighting production systems, key actors, market channels, and core constraints.

## 4.1 Cattle and buffalo production systems

### Current production

Cattle and buffalo serve as vital “living assets” for households in Con Cuong and Anh Son. However, production remains largely traditional, low-input, and subsistence-oriented. Farmers invest minimally in feed, housing, and veterinary services, resulting in low productivity and high operational risks. Adoption of improved practices remains strikingly low (Figure 3).

Breeding relies entirely on natural mating (100%), with no use of artificial insemination. Only 45% of households use manure pits, and regular vaccination is applied by just 24% of households, increasing exposure to disease risks. Feed systems depend mainly on natural forage (45%) and household-planted grasses (55%), while supplementary feed is used by only 27% of households. Most farmers source breeding stock from other households (61%), with no structured breeding programmes in place.

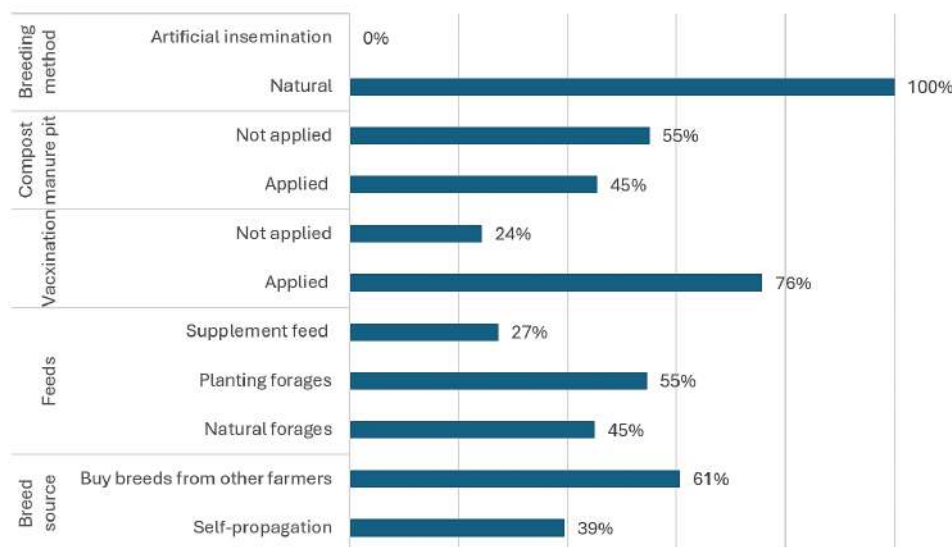


Figure 3: The innovation applies to cattle householders in the surveyed area

### Production management

Grazing practices vary by location, directly impacting both herd growth and biodiversity conservation. While Phuc Son and Chau Khe maintain more controlled grazing, households in Mon Son often allow animals to graze unsupervised within the buffer zone of Pu Mat National Park. This lack of oversight poses significant risks to forest ecosystems and animal health, as free-roaming herds are more susceptible to parasites and diseases from wild populations.

Furthermore, 97% of households rely on local breeds and natural mating; this practice leads to chronic inbreeding, which ultimately results in smaller animal sizes and stagnant herd growth (averaging only 3.1–3.5 animals per household).

### Market dynamics and value chains

The value chain is informal and highly fragmented, consisting of two primary channels (Figure 4):

- Channel 1 (82% of sales): Farmers sell to local collectors. This route dominates remote areas but yields low farm-gate prices due to high transport costs.
- Channel 2 (18% of sales): Direct sales to abattoirs and local consumers, limited mostly to households near district centres.

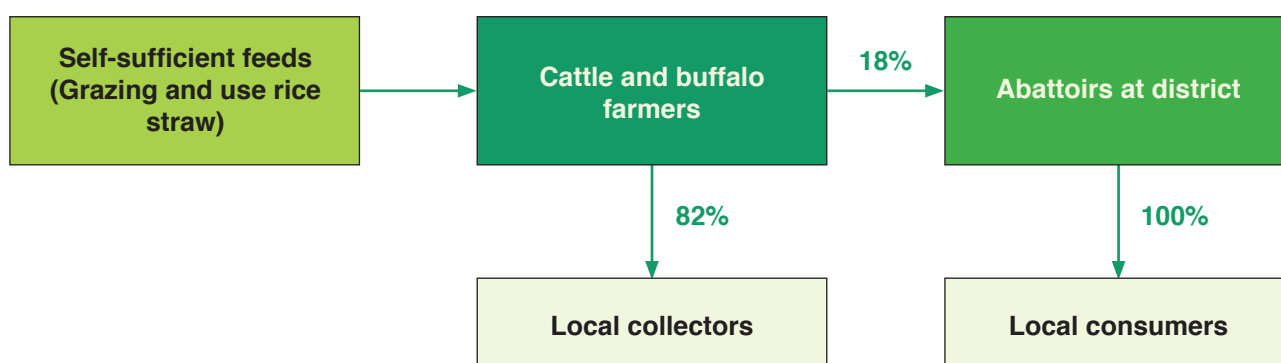


Figure 4: The mapping of the market channel of cattle and buffalo in the project areas

Extreme market isolation severely weakens farmers’ bargaining power. Most households lack access to basic cattle market information, including knowledge of buyers (85%), buyer requirements (91%), and prevailing prices (67%) (Figure 5). In remote villages such as Co Phat and Ban Bung, transport costs range from VND 300,000 to 500,000 per animal, substantially reducing net returns against sale prices of VND 8–10 million per head.

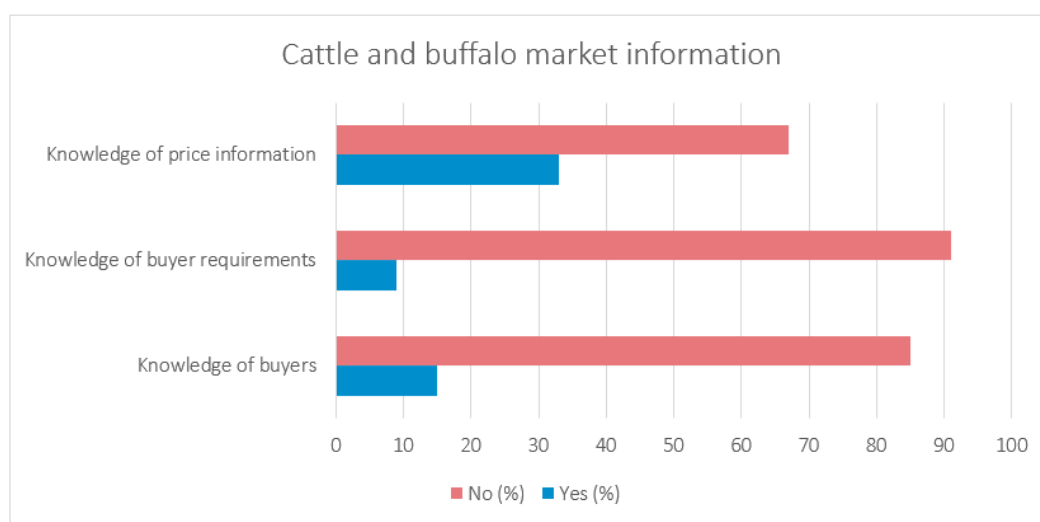


Figure 5: Household access to cattle market information (% of surveyed households) (Source: target household survey)

### Opportunities for market formalisation

Several emerging drivers provide a strategic window to modernise the cattle and buffalo sector and transition from subsistence to commercial production:

- **Local feed optimisation:** Cultivating indigenous grass and forage crops on available land offers untapped potential to reduce costs and reliance on forest grazing.
- **Supportive policy framework:** Government-led vocational training and technical schemes provide a favourable environment for modernising husbandry practices.
- **Collective action:** Organising smallholders into cooperatives will achieve economies of scale, improve market access, and accelerate the adoption of best practices.
- **Infrastructure gains:** New road construction in Khe Bung and Co Phat villages (indicated by the yellow line in Image 4) will revolutionise local logistics, facilitating easier market entry and timely veterinary outreach.



*Image 4: Co Phat villages, inside the buffer of Pu Mat national park*

### Strategic outlook and constraints

While the current production system benefits from strong local knowledge and family labour, structural weaknesses often outweigh these advantages. Key challenges include poor sanitation, weak veterinary outreach, and an over-reliance on natural grazing (Image 5). Additionally, disease outbreaks and trader-dominated markets threaten long-term viability. Transitioning toward a sustainable value chain requires coordinated investment in forage production, the formation of producer groups, and improved market transparency to shift livestock from a simple savings asset to a profitable commercial activity.



Photo: SNV

*Image 5: A typical cattle pen in the surveyed area*

## 4.2 Pig production systems



### Current production

Pig production in Con Cuong and Anh Son is primarily a small-scale, household-based activity. Rather than breeding, 70% of households focus on fattening. Most farmers (65%) prefer local breeds for their adaptability to low-input diets, although 35% now rear cross-breeds. Notably, the indigenous “Tra Lan” pig remains the primary breed of choice, as its natural hardiness and superior meat quality provide a distinct competitive advantage for local value chains. While 95% of households stall-feed their pigs, the scale remains modest, averaging only four pigs per cycle. Consequently, pig farming serves as a supplementary livelihood rather than a commercial enterprise.

### Technical and management constraints

Technical adoption remains a significant bottleneck. Most households (85%) utilise temporary, poor-quality housing (Image 6) and source piglets informally from neighbours. Furthermore, feeding practices remain low-input, with 90% of farmers relying on self-produced grains and greens (Image 6, 7).



Image 6: A pig pen in Chau Khe commune



Image 7: A typical diet for pig with taro and rice bran

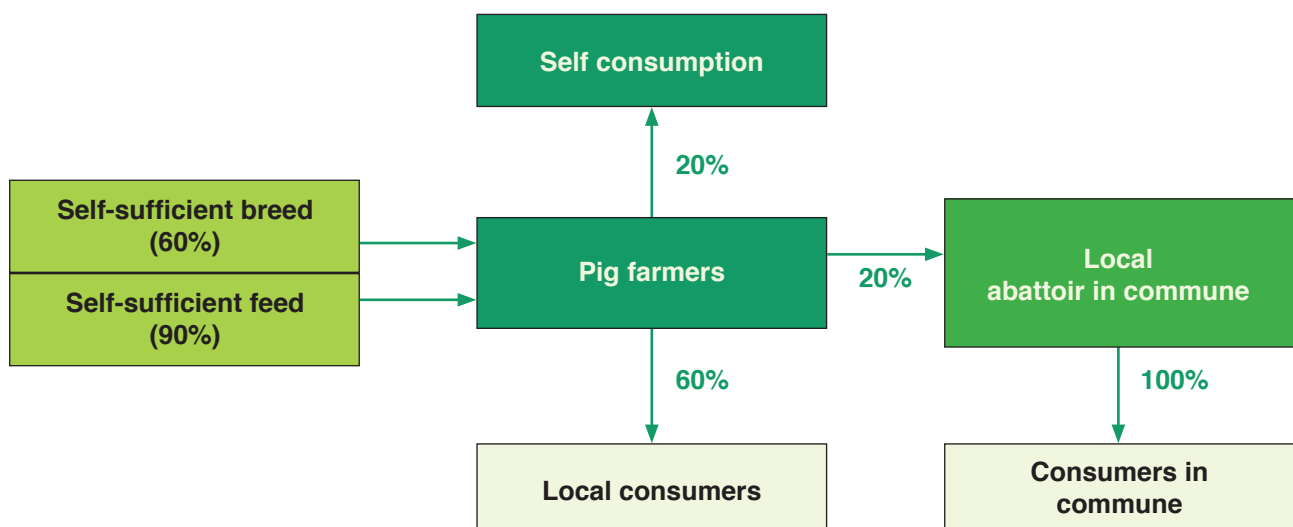
The sector's greatest weakness, however, lies in animal health and environmental management. Only 25% of households vaccinate their herds, and 75% lack manure pits. These shortcomings trigger high disease risks and contaminate the environment near water sources (Image 8). Despite these deficiencies, 76% of farmers express a strong desire to improve their technical skills, offering a clear opportunity for intervention.



*Image 8: Fattening pigs in Khe Bu village, Chau Khe*

The value chain is highly localised and informal (Figure 6). Analysis identifies two main channels:

- **Local/Internal Consumption (80%):** Consists of sales for local ceremonies/festivals (60%) and self-consumption (20%).
- **Commercial Channel (20%):** Sales to collectors or slaughterhouses, concentrated mainly near commune centres.



*Figure 6: The mapping of the market channel of pig products*



*Image 9: Meat quality of the local pig (taken in Con Cuong market)*

Lack of information, the absence of contracts, and producer fragmentation stifle market participation. Most households operate in isolation, missing opportunities for collective bargaining or urban market linkages (Image 9).

### **Opportunities for market formalisation**

Despite current bottlenecks, several strategic drivers provide a strong foundation for professionalising the pig sector:

- **Feed self-sufficiency:** Expanding local feed crop cultivation and the strategic utilisation of agricultural by-products offer clear pathways to reduce production costs.
- Institutional support: National and provincial schemes provide essential technical and financial support through rural vocational training to help farmers modernise their practices.
- **Premium market trends:** Growing consumer preference for “clean” and “native” meat presents a lucrative opportunity. Specifically, the indigenous Trà Lan pig is well-positioned to capture this high-value segment due to its reputation for superior flavour and natural resilience.
- **Inclusive development:** The dominant role of women in pig husbandry facilitates inclusive value chain development. Empowering female producers through targeted support can enhance household resilience and community-wide economic growth.

### Strategic outlook

Pig production represents a “conservation-compatible” livelihood, well-suited to the limited land and capital of buffer-zone households. However, several structural barriers, including weak genetics, poor biosecurity, and inadequate input services (veterinary medicine and breed supply), currently suppress profit margins. Targeted technical and market support can overcome these constraints, unlocking the sector’s high potential for sustainable commercialisation (Image 10).



Photo: SNV

Image 10: A veterinary shop in Chau Khe commune

## 4.3 Poultry production systems

### Current production

Poultry plays an important role in household nutrition and supplementary income across Con Cuong and Anh Son. However, the sector remains largely subsistence-oriented, with 95% of households raising indigenous breeds for meat rather than eggs. While these local genetics are well-adapted to the environment, the production scale remains modest. Flocks average 50 birds per household, with an average sale weight of 1.8 kg. Currently, farmers prioritise immediate food security over market-driven growth.

### Technical and infrastructure constraints

Low technical adoption and weak infrastructure significantly hinder productivity (Figure 7). Only 37% of households utilise permanent shelters, leaving the majority of flocks exposed to predators and climatic stress. Furthermore, 85% of producers rely entirely on self-produced feed. This diet often lacks the essential nutritional balance required for optimal bird growth.

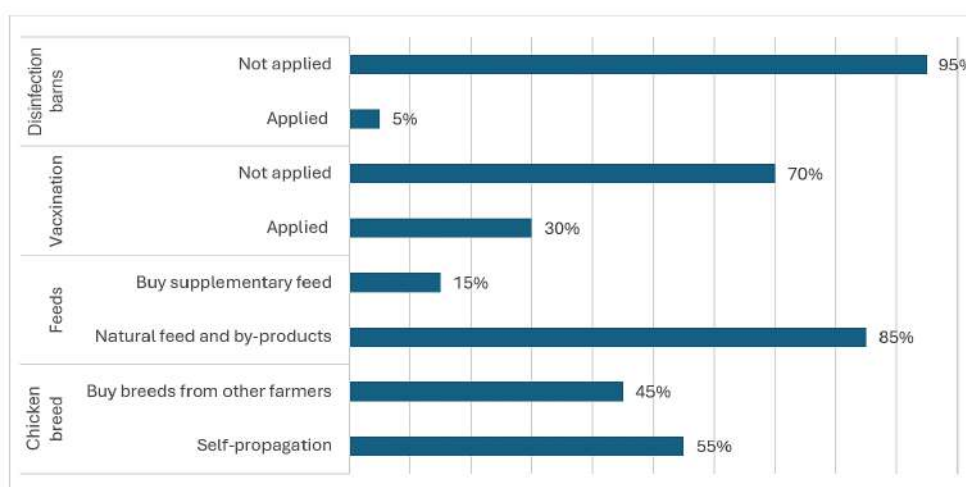


Figure 7: The innovation applies of chicken raising householders in surveyed area

### Animal health and biosecurity

Biosecurity remains a critical vulnerability within the sector. Vaccination rates stand at only 30%, and just 5% of households practise regular disinfection. Combined with limited veterinary access, these deficiencies result in high mortality rates from diseases such as Newcastle and fowl cholera. Farmers identify limited access to quality breeds, disease outbreaks, and a lack of technical knowledge as their primary challenges (Figure 8).

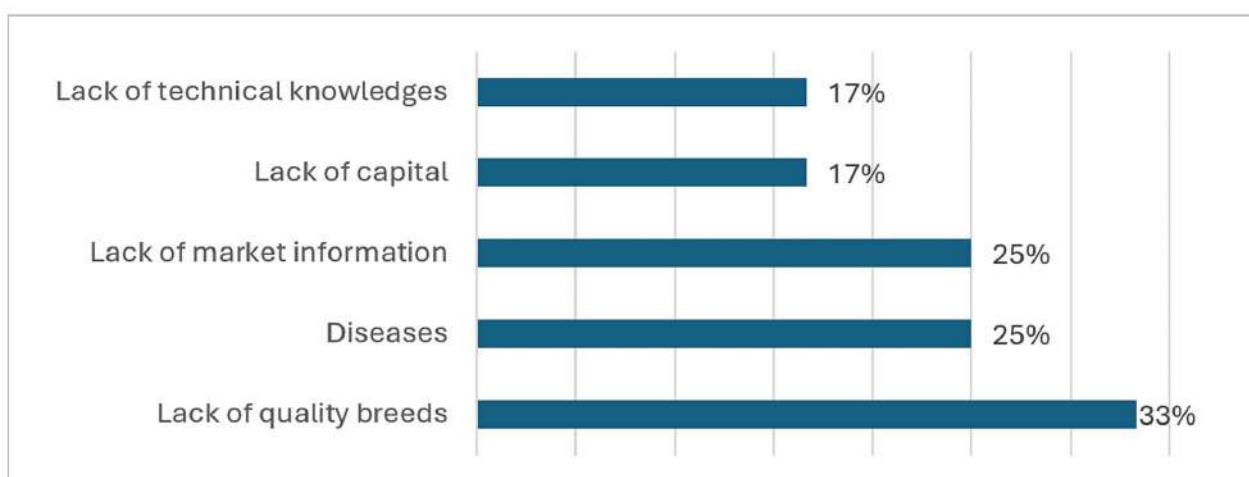


Figure 8: Challenges in chicken farming by small householder

### Market dynamics and value chains

The poultry value chain is simple, informal, and locally confined (Figure 9). Approximately 90% of production is consumed within the household, with only 10 - 15% sold during local festivals or ceremonies. The lack of coordination, market information, and linkages to urban centres traps producers in low-value cycles.

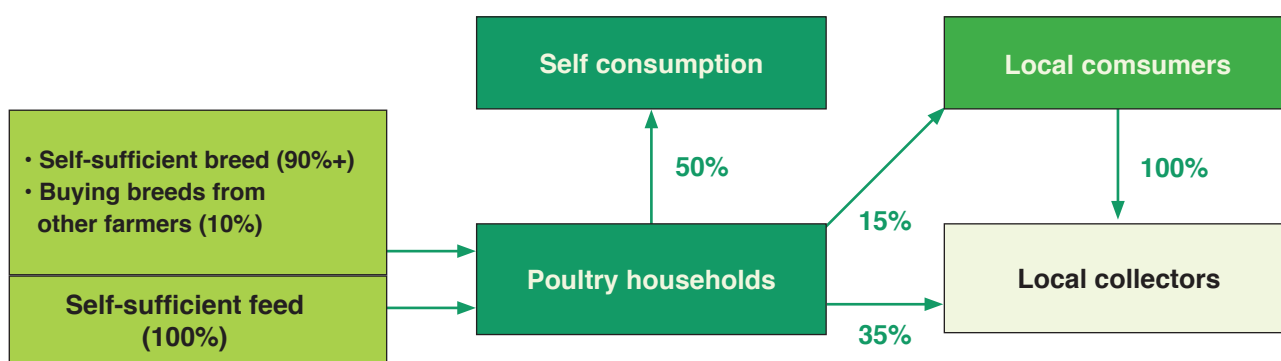


Figure 9: The mapping of the market channel of poultry



Photo: nongnghiepmoitruong.vn

### Scaling indigenous duck models: The Mon Son and Bau Quy

In Mon Son commune, an innovative model for duck egg production demonstrates the power of local adaptation. By keeping ducks in enclosures at night and allowing them to forage freely in rivers during the day, farmers produce high-quality eggs with minimal inputs. This low-input system enjoys strong demand from local consumers.

Similarly, farmers in Anh Son have successfully developed the Bau Quy duck model, a traditional and valuable breed native to Nghe An. Given the ecological similarities across the surveyed areas, replicating this high-profit system is both feasible and strategic. These models provide a proven blueprint for transforming poultry into a “signature local product.”

### Opportunities for market formalisation

While constraints exist, several emerging drivers offer significant potential to modernise the poultry sector:

- **Rising consumer demand:** Market demand for indigenous breeds like Ri and Ri-crossbreds is growing, especially for birds raised under free-range conditions.
- **Institutional support:** Government agricultural extension programmes currently offer improved breeds and technical training, providing a solid foundation for scaling up operations.
- **Collective marketing models:** Transitioning toward producer groups and cooperatives will help smallholders reduce transaction costs, improve market access, and facilitate knowledge exchange.
- **Eco-tourism synergies:** The rise of agro-tourism in the Pu Mat region creates new “farm-to-table” opportunities. Direct sales to tourists can enhance income generation and significantly boost local branding efforts.

### Strategic outlook

Despite these constraints, backyard poultry offers an accessible livelihood that utilises family labour and empowers women. This activity is inherently “conservation-compatible” and aligns with the biodiversity goals of the Pu Mat landscape. While high mortality and informal markets currently limit profits, the sector holds significant potential for sustainable commercialisation through improved veterinary services and producer organisations.

## 4.4 Cross-Cutting constraints across value chains

Regardless of the species - cattle, pigs, or poultry - smallholder and ethnic minority households in the Pu Mat landscape face systemic barriers that stifle productivity and market integration. These challenges are categorised into three core areas:

### Technical and production limitations

Livestock remains a subsistence-oriented “living asset” rather than a commercial venture. Small herd sizes and low-input practices prevent farmers from achieving economies of scale. This is compounded by a heavy reliance on natural grazing and local breeds, which leads to:

- **Genetic degradation:** High inbreeding risks due to informal breed exchange.
- **Nutritional gaps:** Seasonal feed shortages and slow growth rates.
- **Environmental pressure:** Over-dependence on forest-edge resources.

### Fragile health and veterinary systems

Biosecurity remains a critical weak point. Low vaccination rates and poor housing practices leave livestock highly vulnerable to disease outbreaks. At the commune level, veterinary services are often under-resourced, resulting in delayed responses to crises and significant economic losses for the most marginalised families, such as the Dan Lai.

### Market isolation and lack of organisation

The “informality” of the value chain places farmers at a disadvantage. Without farmer groups or cooperatives, producers lack the bargaining power and market information needed to secure fair prices. Key market barriers include:

- **High logistics costs:** Poor road infrastructure in upland areas increases transport fees, often paid directly by the farmer.
- **Information asymmetry:** A lack of connection to processors or urban markets leaves farmers dependent on local collectors.
- **Fragmented action:** The absence of collective marketing limits access to finance, training, and government support.

Addressing these interconnected issues requires a shift from individual, subsistence-based husbandry to organised, market-linked production systems that prioritise animal health and sustainable feed management.

# 5. GENDER ROLES ALONG LIVESTOCK VALUE CHAINS

## Participation of women and men in livestock farming

Livestock production in the project communes involves a range of household-level activities, including daily animal care, feed collection, housing maintenance, grazing, and market engagement. Both women and men participate across these activities, but roles differ by task and location. Because most routine livestock work takes place close to the household, women are more consistently involved in daily husbandry, allowing them to combine livestock care with domestic responsibilities.

As shown in Figure 10, labour roles largely follow traditional patterns. Men tend to perform physically demanding and outward-facing tasks, such as barn construction, grazing in remote areas, and sourcing feed. Women mainly manage daily animal care, barn cleaning, and routine husbandry. This division places women at the centre of day-to-day livestock management and highlights the need for gender-responsive training aligned with specific production roles.

## Decision-making roles

Decision-making in livestock production is often shared between women and men (Figure 10), indicating meaningful female involvement at the household level. However, decision-making authority varies by livestock type. Women play a stronger role in poultry production, which is small-scale and closely linked to household consumption. In contrast, men dominate decisions related to cattle and buffalo, particularly breed selection, sales, and herd expansion. These activities are associated with higher economic value and market interaction. Even where women manage daily livestock activities, men remain influential in strategic decisions. Between 50% and 100% of decisions are made jointly or led by men, reflecting persistent gender norms.

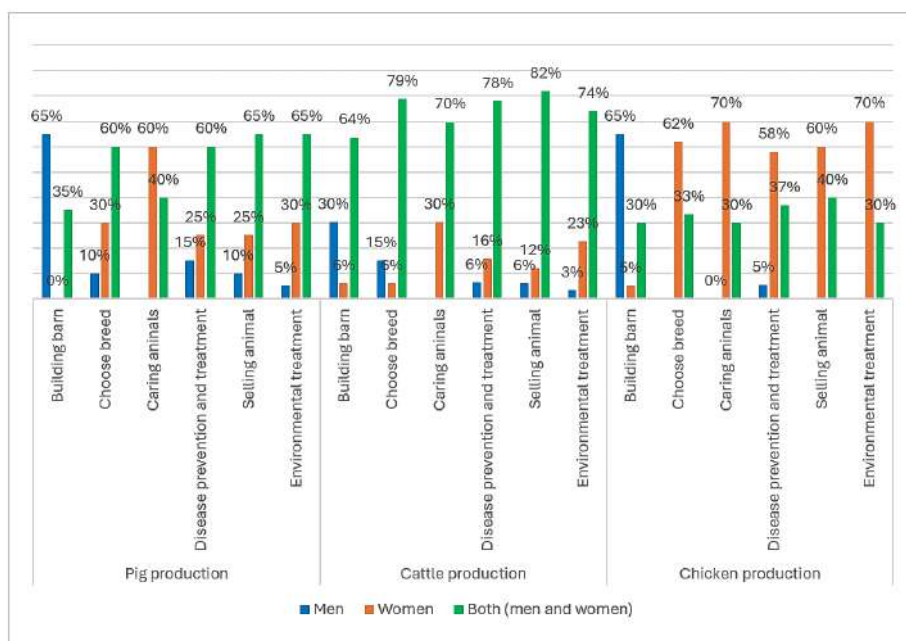


Figure 10: Participation of women and men in selected livestock production and decision-making activities

### Barriers facing women

Despite their central role, ethnic minority women face significant barriers. Most have limited formal education and low access to technical training. Only about 25% of households have received livestock training, with very low female participation. Geographic isolation, poor road access in the core and buffer zones of Pu Mat National Park, and weak access to market and service information further constrain women's engagement.

The lack of farmer groups, cooperatives, or women-focused organisations limits opportunities for learning, collective action, and market participation. Strengthening women's technical skills, market access, and participation in producer groups, while promoting shared decision-making, is essential for inclusive livestock value chain development.



## 6. SOLUTIONS AND RECOMMENDATIONS



### Strengthening community-based veterinary services

The project establishes a community-based animal health system. Local providers deliver rapid and affordable services.

- **Village health workers:** Selected farmers (men and women) receive advanced training in disease prevention. These workers act as first-line animal health providers.
- **Village veterinary medicine cabinets/stores:** Village Animal Health Workers (VAHWs) manage local medicine stocks to ensure remote households have timely access to essential vaccines and treatments, overcoming the challenge of long distances to commune or district centers.
- **Technical linkages:** Professional veterinarians provide continuous guidance via mobile platforms. Periodic field visits ensure quality assurance.

### Strategy for cattle and buffalo production

The strategy promotes a transition from uncontrolled grazing to household-based management. This shift balances livelihood needs with biodiversity protection.

- **Grazing control:** Village regulations define prohibited grazing zones. The project supports households in building hygienic cattle pens.
- **Sustainable feeding:** Farmers cultivate high-yield forage crops like King grass and Mulato II. Demonstration plots showcase hay and silage production techniques.
- **Capacity building:** Field-based training covers nutrition, reproduction, and financial planning. Peer-learning networks facilitate knowledge exchange among farmers.

**Economic impact:** Comparative economic modelling shows that improved cattle fattening increases efficiency rather than total profit. Although profit per cycle changes only marginally (VND 4.0–4.2 million), improved practices shorten the production cycle from 24 to 15 months and increase sale weight from 200 kg to 350 kg (Table 3). Higher feed and veterinary costs offset revenue gains, but labour productivity rises sharply, with daily returns increasing from VND 88,889 to VND 150,000. These gains reduce labour pressure and dependence on forest grazing.

**Table 3: Comparative economics of traditional vs improved cattle fattening**

Item	Current practice	Improved practice	Notes
<b>Breeding</b>	8.000.000	12.000.000	Apply cross-breed
<b>Feed cost</b>	Free grazing	4.500.000	Stall-feeding with forages and extra concentrate (estimated 1kg/head/day)
<b>Medicine and vaccination</b>	Not apply	300.000	Support from local VET
<b>Cycle duration (buy – sales)</b>	24 months	15 months	
<b>Labour required per cycle /</b>	45	28	Estimated farmer spent 0.5h/day for cattle
<b>Sale volume (kg)</b>	200	350	
<b>Revenue</b>	12.000.000	21.000.000	Market price 60.000VND/kg
<b>Profit including labour (VND)</b>	4.000.000	4.200.000	
<b>Return per invested labour day (VND/day)</b>	88.889	150.000	

### Strategy for indigenous pig production

The project focuses on high-value indigenous black pig breeds. This multidimensional strategy improves genetics, nutrition, and market access.

- **Breed improvement:** Farmers form sow-rearing groups to strengthen indigenous genetics. These groups reduce the risks of inbreeding.
- **Biosecurity:** Enhanced housing and health management protect herds from African Swine Fever.
- **Market development:** Cooperatives establish structured slaughtering and processing points. The project promotes local trademarks like “Tra Lan” for premium urban markets.

**Economic impact:** Financial analysis confirms that professionalising the pig sector delivers substantial returns. Table 4 illustrates how enhanced nutrition and health management can shorten fattening cycles from six to four months and elevate labour returns from 202,000 to 333,300 VND per day.

**Table 4: Production costs and returns for pig fattening systems**

Item	Current practice	Improved practice	Notes
<b>Breeding</b>	1.200.000	1.200.000	Price of 10kg piglet
<b>Feed cost (VND)</b>	450.000	1.000.000	Reduce the fattening time by increasing nutrition
<b>Vaccination and Medicine</b>	Not apply	100.000	For the whole period
<b>Cycle duration (buy – sales)</b>	6 months	4 months	Reduce the fattening time by increasing nutrition
<b>Labour required per cycle (day)</b>	11.2	7.5	Estimated for the survey, farmers spend 0.5h/day on pig husbandry activities
<b>Sale volume</b>	56	70	Set the final weight to maximise the profit
<b>Revenue (VND)</b>	3.920.000	4.900.000	70.000 VND/kg
<b>Profit including labour (VND)</b>	2.270.000	2.600.000	
<b>Return per invested labour day (VND/day)</b>	202.000	333.300	

### Strategy for poultry production

Poultry interventions prioritise food security and income for women. These low-cost improvements significantly reduce bird mortality.

- **Semi-confined systems:** Managed scavenging combines with improved housing for better safety.
- **Alternative feed:** Earthworm farming provides a sustainable protein supplement.
- **Producer groups:** Households collaborate for collective input purchasing and branding.

*Economic impact: The economic projections for improved poultry systems are profound. As shown in Table 5, by reducing mortality from 35% to 10%, farmers can more than double their daily returns, making poultry a highly accessible and profitable livelihood.*

**Table 5: Production costs and returns for 50-Chicken rearing cycles**

Item	Current practice	Improved hypothetical practice	Notes
Species	500.000	750.000	The cross-breed is 50% more expensive than local one
Feed cost (VND)	600.000 (4.000 VND/day)	1.350.000 (15.000 VND/day)	Apply concentrate
Vaccination and Medicine	Not apply	300.0000	For the whole period
Cycle duration (birth – sales)	5 months	3 months	Reduce the fattening time by increase nutrition
Labour required per cycle (day)	18.75	11.25	1h per days
Sale volume	32	45	Mortality rate was 35% (current practice) and 10% (improving)
Revenue (VND)	3.840.000	6.480.000	80.000VND/head 1.5 kg/con (Current practice) and 1.8kg/head (improving)
Profit including labour (VND)	2.740.000	4.080.000	
Return per invested labour day (VND/day)	146.133	362.666	

### GESI Integration

Women play a central role in livestock production. The project removes barriers to their participation and leadership.

- **Inclusive training:** Training methods adapt to the schedules and needs of ethnic minority women.
- **Leadership roles:** The project trains women as community veterinarians and group leaders.
- **Labour-saving tech:** New technologies in feed preparation reduce the physical workload for women.

### Enhancing the conservation-livelihood nexus

To ensure that increased livestock productivity translates into reduced forest pressure, the project will implement ‘Conservation Agreements’. In exchange for technical support and market linkages, participating households commit to zero-encroachment in protected zones and the cessation of free-grazing practices that degrade forest understories.



## 7. IMPLEMENTATION APPROACH

The implementation approach focuses on practical, locally led interventions that strengthen livestock production while reducing environmental pressure. It follows a phased pathway from household-level improvements to collective action and market engagement.

### Intervention 1. Community-based veterinary training and support

- Provide basic and advanced training for farmers and community animal health workers.
- Establish village veterinary medicine cabinets/stores with continuous professional support.

### Intervention 2. Farmer training on nutrition and livestock management

- Deliver field-based training on feeding, housing, waste management, and cost-benefit analysis.
- Provide tailored advice through farm visits and identify lead farmers.

### Intervention 3. Demonstration models, exchange visits and peer learning

- Establish demonstration farms for cattle, pigs, and poultry.
- Facilitate exchange visits to promote peer-to-peer learning.
- Empower “champion farmers” to lead local discussions, encouraging neighbours to replicate proven techniques on their own farms.

### Intervention 4. Producer groups and market linkages

- Form species-specific producer groups operating on a “produce together, sell together” basis.
- Support branding, traceability, and collective marketing with Agricultural Service Centres.

In conclusion, these interventions form an integrated pathway that links animal health, farm management, demonstration, and market development. By grounding change in local capacity and evidence-based models, the approach supports sustainable livelihoods while safeguarding the Pu Mat landscape.



