Livestock and People's Live insight on Beef Cattle Value Chain and Commercialization Development Perspective

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Abstract. Lao-native beef cattle predominantly belong to the *Bos indicus* species, and the majority of ruminant production in Laos remains under the control of small-scale or backyard producers employing traditional methods, leading to low productivity. However, substantial quotas for export to the neighbouring nations present an opportunity to enhance the livelihoods of cattle farmers. This study aims to analyse the beef cattle value chain in central part of Laos (Savannakhet province). A value chain approach was taken to understand the broader context and linkages existing in the smallholder beef cattle sector. Multiple qualitative methods were employed to gather information from stakeholders in the cattle value chain. The results show that the cattle value chain in these areas has five main functions implemented by five prominent actors. The results revealed that feed shortage, disease outbreak, lacking of crossbreed cattle adoption, lack of commercial breeders and poor management were the major constraints that farmers faced in production side. For the sustainable development, meet market demand quality and improve commercialization of the chain, this research recommends that the Lao governments should concern and expanding more of cattle production groups, establish national and provincial breeding centres and strengthen agricultural extension networks to train farmers on feed formulation and management. Strengthen the linkage among chain actors and supportive institutions to improve productivity and revenue derived from sub-sector.
Keywords: cattle, cattle farmers. crossbreed, ruminant, and sustainable

1 Introduction

The local news "Vientiane Times" has reported that from 2010 to 2019, the Lao People's Democratic Republic's services sector contributed the most to GDP, accounting for 42% on average, followed by industry (30%) and agriculture (18%). According to the Ministry of Agriculture and Forestry, the value of output in agriculture and forestry increased by 3.4% in 2023, accounting for 21.4% of GDP. Agriculture, including livestock, is the mainstay for

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most of the population and the sector's contribution to GDP in absolute numbers has increased: US$1.61 billion in 2010 to US$2.78 billion in 2019 [1]. Livestock production is critical to farmers' livelihoods throughout the country. Almost 98% of livestock producers in the Lao People's Democratic Republic possess at least one breed of cow, buffalo, pig, or goat. Livestock are domesticated animals that are produced for a variety of functions, including agricultural output, labor, and companionship. These animals are often farmed to produce meat, milk, eggs, wool, leather, and other items. In this research, "livestock" refers especially to cows, pigs, and chickens, which are thought to have the highest retail value. The livestock industry is one of the fastest expanding agricultural subsectors in Laos, with distinctions in cattle, pigs, and poultry.

Rural families prioritize acquiring cattle after land and a harvested crop. Livestock production has become a major engine of the nation's agricultural industry, contributing 18% of the agricultural GDP. Lao meat output increased from 296,086 tons to 387,734 tons between 2010 and 2015[2]. Between 2016 and 2020, the export of live animals increased fivefold, making them a significant commodity. Animal exports made for 21% of all agricultural exports in 2020 alone, with Viet Nam being the main destination and accounting for almost 75% of all animal exports[3]. Despite the opening of the railway from China, the domestic demand for meat has not met anticipated levels, with growth rates falling short of expectations.

Over 90% of all livestock in the country is produced by smallholders, mainly using native breeds of animals[3]. Up to 50% of smallholder households' yearly financial income comes from livestock, which also provides animal protein, manure for fertilizer, and draft power. Larger animals, like cattle, can serve as a significant source of savings for usage in family crises and give many low-income households protection from outside shocks like those brought on by inflation and climate change. More over one-third of the value contributed in the agricultural sector of the Lao PDR comes from cattle. The demand for cattle and animal products, including meat, milk, and eggs, is rapidly increasing both locally and in neighbouring countries, particularly China and Vietnam. The construction of a regional road network throughout the Greater Mekong Subregion and bilateral livestock export agreements between Lao PDR and its neighbours encourage this expansion. The annually value of livestock exports to China alone is about USD 54 million [4].

Smallholders raise more than 90% of the nation's livestock, primarily employing native animal breeds [3]. Up to 50% of smallholder households' yearly financial income comes from small scale livestock rearing [5], which also provides animal protein, manure for fertilizer, and draft power. In addition to providing many low-income households with protection against external shocks like those caused by inflation and climate change, larger animals, such as cattle, are a major source of savings for use in family crises[3]. Laos is undergoing significant changes in its agricultural sector, particularly in cow breeding, mostly as a result of China's increasing need for meat products. Radio Free Asia reported in the framework of the 2017 bilateral trade deal, China's demand for up to 500,000 heads of cattle annually has lately shifted from native cows to crossbred cows. Domestic demand for livestock exceeds supply in the Lao PDR, while growing export demand for live animals and processed meat by neighbouring countries is hindered by underdeveloped livestock production," said ADB Country Director for the Lao PDR Shanny Campbell. The commercial cattle trading market system is inadequate and excludes small-scale rural producers, which represents a significant wasted opportunity for rural families in Savannakhet [3].

Around 80% of farming households keep livestock as their main asset. However, the sector is still underdeveloped, with smallholder farmers holding about 95% of livestock[6]. Transboundary animal diseases, zoonoses, and antimicrobial resistance pose serious threats to livelihoods and food security, hampering productivity and disrupting markets. Livestock

value chains are fragmented and inefficient due to poor infrastructure, weak disease monitoring, and lack of breeding canters, feedlots and certified facilities. Small-herd farmers, especially women, lack access to services and markets. Few studies have looked at actual trade dynamics, actor interactions, and transaction volumes within beef cattle value chains, especially in areas with significant output potential, despite the livestock sector's significance and the large percentage of smallholder farmers engaged. In order to close this gap, this study examines the structure, operations, and flows of the beef cattle trade with the goal of producing data that may guide tactics for boosting market access, improving value chain efficiency, and improving livelihood outcomes for smallholder farmers.

2 Methods

This study employed a combination of desk-based document review and qualitative approaches to examine the beef cattle value chain. Data were collected through multiple qualitative methods, including key informant interviews (KIIs), focus group discussions (FGDs), and field observations. Semi-structured interviews were conducted with key stakeholders at the provincial, district, and village levels across two districts such as atsaphangthong and Outhoumphon district, encompassing four villages in total. These interviews and discussions aimed to map the beef value chain and capture stakeholders' experiences and perspectives. The sample distributed including 30 beef cattle farmers, 4 slaughter house, 4 village level live cattle traders/collector, 4 district level live cattle traders/collectors, 2 local butchers, and 6 restaurant/ 4 meat store at local market.

Further, semi-structured interviews with provincial and district government officers, particularly from the District Agriculture and Forestry Office (DAFO), explored institutional roles, perceptions, and future directions for beef market and agricultural development. In each study village, FGDs involving production groups and households were held to examine cattle production systems, value chain linkages, key challenges, and future plans. Additionally, interviews with cattle traders investigated their business structures, trading operations, and future strategies. Value Chain mapping was analysed using functional analysis. The core processes, actors involved, flow and quantity of product at each node of the value chain were determined. Analytical frameworks were proposed by international organizations of M4P(Market for poor). Data analysis employed descriptive statistics (eg. mean, frequency and percentage).

3 Results and Discussion

3.1 Cattle product and market system

Cattle and buffalo in Savannakhet province are predominantly managed under extensive production systems that align with seasonal patterns and agricultural cycles. During the wet season, when crop cultivation takes place, animals are typically confined near smallholder households in temporary shelters or moved to forested areas to mitigate crop damage. In contrast, during the dry season, livestock are commonly allowed to graze freely on harvested croplands and communal pastures, although feed shortages are frequently encountered. Recent developments in certain regions have introduced the practice of feeding cultivated forages to cattle; however, feed availability remains a significant constraint in many areas. This finding consistent with Olmo et al. [7] who states that smallholder beef cattle production in Laos relies predominantly on extensive and semi-intensive grazing systems utilizing natural pastures and crop residues. The rotational free-grazing system is the most commonly employed practice, whereby farmers rotate their cattle across cultivated forage plots. This

practice is also consistent with the findings of Barvo et al. [8], who reported the prevalence of rotational free-grazing systems in Luang Prabang District. Feed availability fluctuates seasonally, limiting growth rates and reproductive performance during dry periods. Farmers or smallholder producers raising average 5 to 7 native cattle among other livestock such as goats, pig and poultry. Most of beef cattle are raising and kept as a form of saving asset and seem as inherited assets pass down to children, ceremony or important event of family and dowry for marriage. People in these areas lacking of commercial practice of cattle production at household level, despite there are increasing market demand from market. Most of cattle producers sold their cattle in their village by contact their usual traders or village level collector come to the village to buy cattle. They conduct trade or engage in trade negotiations through smartphones or mobile applications by taking photographs or recording videos of the cattle and sending them to prospective buyers. Subsequently, price negotiations are carried out based on mutual agreements or appraisals between the farmers and the buyers or collectors. There are producer group in these areas with average 20 heads of cattle in average, they are also start expanding into crossbreed cattle raising, and planting grass as forage for their cow. Good feeding and fattening practices are paramount for rural producers to obtain better sales prices and increase their integration in the value chain [3]. However, there few household reported that posses fattening practice and knowledges. ILO [3] also added in the crossbred cattle market, these conditions influence farmers' capacity to export under the bilateral agreement with China, which stipulates specific requirements—namely a 45-day fattening period to ensure that cattle attain a minimum weight of approximately 350 kg. Then it is seem impossible for native cattle farmers for met that requirement while their lacking of breeding knowledge and fund.

3.2 Actors in Beef Cattle value chain

1) *Farmers (Producers):* Farmers are the main producers, obtaining cattle through self-breeding (75%) or from other farmers (25%). Calves are valued at USD 35–45.5/head. Farmers sell cattle (190–250 kg) at USD 2.03–2.07/kg to local or district traders. Cattle farmers in the areas have traditional rearing and size of herd average 5 – 7 heads/ herd. 2)*Local Traders:* The majority of producers who supply the local domestic market sell cattle to collectors, who subsequently use slaughterhouses for dealing with butchers and restaurants. Some producers, however, sell these customers directly. They purchase about 65% of cattle from farmers and resell at USD 2.8–3.3/kg (200–250 kg animals) to local butchers or district traders. They act as key intermediaries in collection and short-distance trade.3) *District Traders:* They collect around 80% of cattle from local traders and 20% directly from farmers. Cattle are sold at USD 3.25–3.38/kg to slaughterhouses or USD 3.2–3.32/kg to collectors from other provinces. District traders are critical in aggregating cattle for large-scale buyers and cross-border trade. 4) *Collectors from Other Provinces:* They acquire about 70% of the total cattle traded and channel them to export markets (Vietnam and China), showing their dominant role in regional and international trade. 5) *Processors (Local Butchers and Slaughterhouses):* Local butchers purchase 20% of cattle for local meat supply, selling beef at USD 3.68/kg. Slaughterhouses handle 30% of the cattle, selling processed meat to retailers at USD 3.55/kg. These actors create value addition through meat processing and quality control. 6) *Retailers and Final Consumers:* Retailers and restaurants sell meat to individual consumers at USD 3.88–4.6/kg, representing the highest value point in the chain.

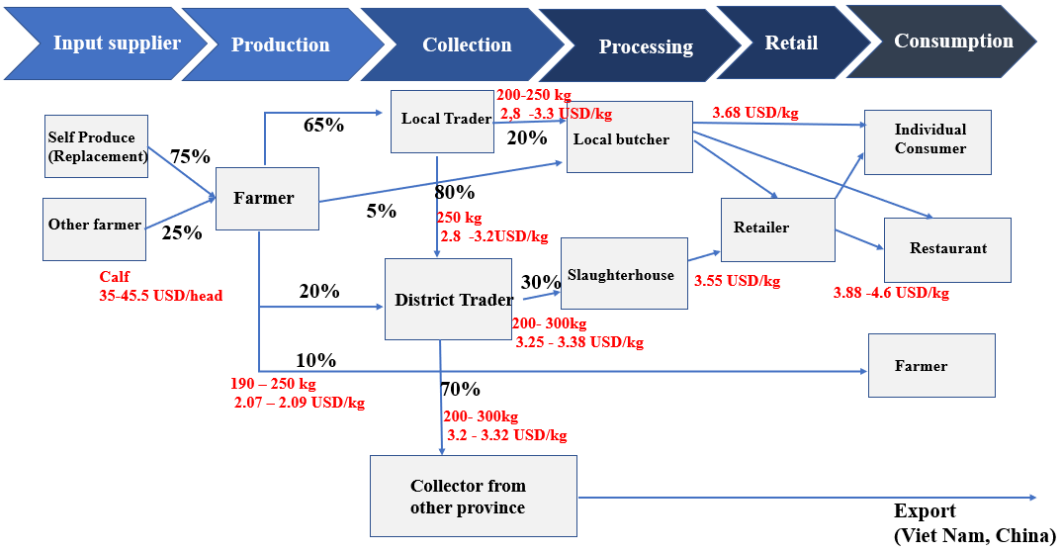

Fig. 1. Beef cattle value chain in Savannakhet province

3.3 Challenge and Future plan for Cattle production development

3.3.1 Input Supply Constraints

The reliance on low-quality local feed and *Bos indicus* genetics represents a fundamental constraint on productive potential. Unlike neighboring countries that have invested in forage improvement programs and systematic breed development, Laos faces a dual challenge: inadequate nutritional inputs limit growth rates and market weights, while fragmented veterinary services expose herds to preventable diseases. Nampanya et al. highlight that these issues are exacerbated by the limited knowledge of smallholder farmers regarding large ruminant health and production practices [9]. Nampanya add The government's ability to provide support, including technical advice on feed and disease management, has been identified as essential for smallholders to enhance their productivity and address food security [10]. The mention of "expanded subsidized AI and crossbreed programs" as an opportunity implicitly acknowledges years of underinvestment in genetic improvement infrastructure. The adoption of modern practices, supported by government interventions and public investment, has shown promise in enhancing cattle production in regions encountering similar constraint[10]. However, without addressing the underlying feed quality issues, improved genetics alone cannot unlock productivity gains—creating a situation where interventions may fail to achieve expected returns.

3.3.2 Production System Inefficiencies

The identification of "traditional grazing" as having "low input use" and "slow maturity rates" highlights a more concerning fact: smallholder farmers are stuck in an equilibrium of low productivity. Wilson reveal that traditional cattle production is primarily based on extensive grazing systems that rely on low-quality forage, contributing to low growth rates and reproductive inefficiencies[11]. Cattle raised in traditional extensive grazing systems take four to five years to achieve market weight, compared to eighteen to twenty-four months in

intensive systems, despite the fact that these systems are culturally rooted and need little capital. Younger generations find cow farming to be economically unappealing due to this prolonged production cycle, which also ties up household resources and lowers income velocity. Anyway, the absence of improved breeds and technologies leads to stagnation in production levels, limiting opportunities for enhancement within the sector[12]. Globally, the inefficiencies of traditional grazing systems are similarly documented. These systems are characterized by minimal input use and an inherent vulnerability to climatic adversities such as droughts, which compound existing nutritional challenges[13]. For the majority of smallholders, who lack the technical expertise, financial resources, and risk tolerance for intense fattening operations, the suggested solution—contract farming models with high-value crossbred finished cattle—represents a significant jump that may not be feasible.

3.3.3 Processing Sector Underdevelopment

Most importantly, the processing industry is still in its early stages. "Licensed small-scale facilities" that only provide "primary cuts" are indicative of the lack of value-addition capabilities found in more advanced livestock industries. The country loses out on job opportunities in meat processing and related industries, farmers receive lower prices for live animals rather than premium prices for processed goods, and Laos is still forced to export low-value commodities rather than finished goods as a result of this restriction. The goal of "modern, medium-to-large-scale processing, moving to processed meat products for export" is confronted with significant obstacles, such as capital needs, standards for food safety certification, and competition from well-established regional processors. To learn from neighboring country in region, the patterns vary significantly across Southeast Asian nations. Cambodia's processing sector is rudimentary, dominated by small-scale slaughterhouses with only 25 facilities meeting hygienic standards as of 2014 [14]. The sector faces challenges including shortage of feed as critical constraint, limited extension and veterinary services, and weak marketing channels. Vietnam, by contrast, has attracted major international investment, with companies like JBS planning to invest $100 million in two processing plants to serve regional markets. Thailand maintains more developed infrastructure but still faces challenges in border regions affecting cattle flows [14]. Developing country beef sectors typically lack vertical integration, with fragmented value chains characterized by numerous intermediaries, weak coordination between production and processing stages, limited bargaining power for smallholder producers, and high transaction costs throughout the chain [6].

3.3.4 Distribution Channel Weaknesses

Laos exhibits severe distribution channel weaknesses characteristic of least-developed countries. Due to their lack of access to official markets and information about markets, smallholder farmers are vulnerable to being taken advantage of by middlemen who control village-level marketing. The distribution node reveals governance problems that affect the value chain as a whole. "Unofficial trade dominates" implies widespread tax evasion, untraceability, and vulnerability to cross-border disease transmission. Lao cattle are unable to reach premium export markets that require certified disease-free status due to high transaction costs resulting from "weak SPS" (sanitary and phytosanitary) systems. In the absence of a strong SPS infrastructure, the suggested remedies—GMS rail linkages for cold chain logistics and structured trader associations—address symptoms rather than the underlying issues. Investments in infrastructure are useless if goods don't adhere to the health and safety regulations of importing nations. Globally, developed countries demonstrate efficient distribution systems featuring supermarket-led centralized procurement, modern

cold chain infrastructure, blockchain-enabled traceability, and vertical coordination through contracts or integration. These systems reduce transaction costs, ensure food safety, and maintain product quality. Conversely, developing regions face challenges similar to Laos—including middleman exploitation, information asymmetry, inadequate cold storage, and fragmented chains—though with varying intensity. The technology gap continues widening as developed nations adopt AI-driven logistics and real-time monitoring, while least-developed countries struggle with basic infrastructure deficiencies [15].

Table 1: Challenge and Future plan for Cattle production development

Value Chain Node	**Primary Function**	**Existing State (Savannakhet)**	**Value Addition Opportunity**
Input Supply	Feed, Genetics, Health	Low-quality local feed; reliance on *Bos indicus*; fragmented veterinary access	Investment in quality feed formulation; expanded subsidized AI and crossbreed programs
Production	Rearing, Fattening	Traditional grazing; low input use; slow maturity rates	Implementation of structured, traceable contract farming models (e.g., high-value crossbreed finished cattle)
Processing	Slaughter, Butchering	Licensed small-scale facilities; primary cuts only	Modern, medium-to-large-scale processing, moving to processed meat products for export
Distribution	Trade & Logistics	Unofficial trade dominates; high transaction costs due to weak SPS	Formalization of trader associations; leveraging GMS rail links for efficient, certified cold chain logistics

3.3.5 Lesson learned and implications

Throughout the value chain, a number of interrelated issues limit both productivity and market access in Laos' cattle industry. Seasonal feed and water shortages, which are especially severe from April to July, create a basic bottleneck at the production level that threatens herd health and growth rates. The lack of information and incentives for home producers to use better feeding methods, even when doing so could help with seasonal shortages, exacerbates this problem. The fact that feed production and confined cattle husbandry need significant labor and land inputs—resources that many smallholder families are unable to easily allocate given conflicting household priorities—complicates the situation even more. Beyond nutrition, animal health services are still severely inadequate, with farmers not knowing how to properly use vaccines and unequal access to veterinary care in rural areas. The lack of supporting infrastructure that would allow for disease surveillance and control, such as operational quarantine facilities, diagnostic labs, and adequately equipped slaughterhouses, exacerbates these health vulnerabilities. In the meanwhile, most farmers rely on unimproved indigenous genetics that sustain poor growth rates and subpar market performance due to the lack of commercial breeders and the restricted accessibility of artificial insemination services.

Acknowledging these systemic deficiencies, subsequent attempts seek to concurrently develop infrastructure and capability on several fronts. In order to help farmers, save wet season fodder for use during the dry months, it is important to strengthen agricultural extension networks to teach farmers in feed formulation and management. This is especially important when it comes to promoting techniques for preparing hay and silage. Cooperative approaches promoting group-based forage cultivation would allow resource sharing while fostering social capital among farmers, addressing the labor and land intensity of feed production. In terms of animal health, community-level vaccination capacity would be established through training programs for village veterinarians, which would be supplemented by mobile veterinary units that would serve rural regions that are now inaccessible to official services. The establishment of national and provincial breeding facilities is the main goal of genetic enhancement initiatives, which also aim to increase artificial insemination networks by hiring more specialists and upgrading semen storage facilities. Investments in regional quarantine and inspection facilities would support these production-focused initiatives by enhancing disease control capacities and facilitating export certification, which is essential for gaining access to premium regional markets. Together, these programs offer a thorough, if ambitious, attempt to change Laos' cattle industry from its current low-productivity equilibrium to one that is more competitive and commercially viable. However, success will ultimately depend on coordinated implementation, ongoing funding, and sincere farmer involvement throughout the development process.

4 Conclusion

In Savannakhet, Laos, where smallholders raise five to seven native *Bos indicus* cattle as savings assets, this study examines the beef cattle value chain. Producers, local/district dealers (prices: USD 2.03–3.38/kg), provincial collectors (70% for exports to Vietnam/China), processors (butchers/slaughterhouses at USD 3.55–3.68/kg), and retailers (USD 3.88–4.6/kg) are important players. Despite export quotas (e.g., 500,000 heads/year to China), fragmentation, poor maturity (4-5 years), and low commercialization are caused by constraints such as feed shortages, illnesses, restricted crossbreeding, and inadequate management. Feed, genetics, and extension services interventions might raise GDP contribution (18–21%), satisfy market criteria (e.g., 350 kg via fattening), improve smallholder incomes (up to 50% from livestock), and increase productivity. Focusing policy on cooperatives, SPS standards, and breeding centres would legitimize commerce, lessen vulnerabilities, and encourage inclusive growth. Future research should fill up these gaps by doing longitudinal effect studies for scalable methods, expanding geographically, investigating new concerns (such as infrastructure, zoonoses, and antimicrobials), and adding quantitative analyses (such as cost-benefits).

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