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Analysis *of Location Quotient* (LQ) and Beef Cattle Value Chain in Woha, Monta, and Bolo Districts, Bima Regency

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Abstract: *This study aims to analyze the comparative advantage of beef cattle in three livestock center subdistricts of Bima Regency, namely Woha, Monta, and Bolo, using the Location Quotient (LQ) approach and a value chain analysis of beef cattle producers in Bima Regency. The LQ analysis was conducted by comparing the contribution of the beef cattle population in each subdistrict to the total beef cattle population in Bima Regency and West Nusa Tenggara Province. The results show that the three subdistricts have LQ values > 1, indicating that beef cattle are a basic commodity in the region. This study also examines the beef cattle value chain in Bima Regency, which has not yet been efficient due to limitations in technology, productivity, and the bargaining position of farmers. Strengthening an integrated upstream–downstream system is required to increase value added and regional economic competitiveness.*

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INTRODUCTION

The development of the livestock sector is a strategic component in supporting regional economic growth, particularly in rural areas that remain highly dependent on the primary sector. Beef cattle are one of the main livestock commodities and play an important role in providing animal protein, creating employment opportunities, and increasing household income for farmers [1], [2], [3]. In West Nusa Tenggara Province (NTB), Bima Regency is known as one of the major centers of beef cattle production, contributing significantly to the regional livestock population and interregional cattle trade dynamics.

The distribution of the beef cattle population in Bima Regency is uneven among subdistricts, reflecting differences in resource potential, livestock business systems, and the level of local economic linkages. Woha, Monta, and Bolo Subdistricts are areas that empirically have relatively high beef cattle populations compared to other subdistricts [4]. This condition indicates that beef cattle function not only as a business activity but have also become an important part of the local economic structure. Therefore, a quantitative analysis is needed to identify whether beef cattle in these three subdistricts constitute a leading commodity or a basic sector in the context of regional development [5], [6], [7].

One of the methods commonly used in regional economic analysis to determine the comparative advantage of a commodity is the Location Quotient (LQ). LQ analysis allows

the identification of the level of specialization of an area in a particular commodity by comparing it with a larger reference region. An LQ value greater than one indicates that the commodity is a base sector with the ability to serve markets beyond its own territory [7], [8]. Thus, LQ analysis of beef cattle at the subdistrict level is important as a basis for determining development priorities in the livestock subsector in Bima Regency.

In addition to identifying basic commodity status, the development of beef cattle farming is influenced by various interrelated internal and external factors, including the availability of forage and agricultural waste, livestock management practices of smallholder farmers, access to markets and infrastructure, as well as institutional and regional government policy support [1], [2], [3], [9]. Therefore, this research not only analyzes the Location Quotient values of beef cattle farming in Woha, Monta, and Bolo Subdistricts but also examines relevant factors as a basis for formulating sustainable beef cattle development strategies and enhancing the potential of local meat-based livestock production in Bima Regency. This study aims to analyze the comparative advantage of beef cattle in three livestock center subdistricts of Bima Regency: Woha, Monta, and Bolo by using the Location Quotient (LQ) approach and a value chain analysis of beef cattle farming in Bima Regency.

THEORETICAL BASIS

1. Regional Development Based on Leading Livestock Commodities

Provincial resource-based regional economy is a regional economic development thought which take advantaging of sections or commodities with comparative advantages and competiti ve advantage for development. In the field of livestock, beef cattle is considered as a strategic commodity in providing food security, employment, and earning high income for farmers in rural areas (Mukson et al., 2014; Taufiq & Negara, 2024).

This approach focuses on the linkage of local resources, production systems and markets, with an emphasis on enhancing the value chain and regional economic structures not only in accordance with population growth but also industry development of beef cattle (Karimuna et al., 2020; Sengkey et al., 2017).

2. Location Quotient (LQ) Theory in Determining Base Areas

Lead industry or commodities, known as base sector (or base commodities) relative to the Reference region.land Detemining Industry in Base Sector by Klassen and McFadden with slight modification Location Quotient (LQ) is a quantitative methodin order to identify base sectors or commodities in the region over reference area at most general form. This means that such commodity has a relative advantage and it has potential to be the driving factor of regional economic advancement (Azis et al., 2024;Fironika et al., 2022).

In beef cattle breeding, the LQ analysis is used to identify sub-districts or regencies which have potentiality and/or special competence in producing cattle and hence should be a priority area for livestock development (Trisman et al., 2022; Aprylasari et al., 2025).

3. Growth Ratio Model (GRP) and Livestock Population Dynamics

The Growth Ratio Model (GRP) serves as a vital analytical tool for dissecting commodity dynamics, specifically by weighing the growth rates of a study area against a broader reference region. By integrating LQ and GRP, we can move beyond simple

statistics to achieve a nuanced regional classification that highlights both structural advantages and actual growth performance (Azis et al., 2024).

Research into beef cattle populations reveals that such growth doesn't happen in isolation. Instead, it is deeply shaped by a synergy of factors, including feed security, the sophistication of husbandry systems, regional policy frameworks, and the natural carrying capacity of the environment (Setiawan & Syamsiah, 2024; Lubis et al., 2025).

4. Potential and Projections for Beef Cattle Development

Evaluating the potential for beef cattle development requires a holistic look at the landscape—from the physical availability of land and forage to the underlying strength of human resources and infrastructure. It is not merely about counting heads; it is about balance. By using population projections, we can estimate the long-term viability of the sector while ensuring we don't push the environment past its breaking point (Cahyo et al., 2023; Daru et al., 2024).

This forward-looking approach is a cornerstone of strategic planning, particularly for regions where beef cattle farming serves as the economic backbone. It allows planners to transition from reactive management to proactive, sustainable growth (Wuda et al., 2024; Saputra et al., 2016).

5. Competitiveness and Sustainability of Beef Cattle Businesses

At its core, the competitiveness of a beef cattle enterprise hinges on a delicate balance of production efficiency, livestock productivity, and seamless access to capital and technology. However, for most small-scale farmers, the reality is often more complex. They frequently grapple with limited resources and traditional management styles, making tailored policy support and strong institutional backing not just helpful, but essential for their survival (Nasrul, 2020; Wijaya & Hasanah, 2024).

To address these vulnerabilities, the Sustainable Livelihoods framework offers a vital perspective. It prioritizes the economic resilience of farming households, ensuring they can withstand unpredictable external shocks—whether from the volatility of market prices or the sudden impact of natural disasters (Kharismafullah et al., 2022).

6. Livestock Area Planning and Spatial Approach

Effective regional planning for livestock is more than just a map; it is a sophisticated blend of economic insights (LQ, MRP), biophysical realities (feed capacity), and spatial precision (GIS). By integrating these layers, we can optimize how land is used, minimize territorial conflicts, and drive a far more efficient production system (Putra et al., 2024; Aprylasari et al., 2025).

Ultimately, moving toward a spatial-data-driven approach makes beef cattle development more adaptive and resilient. It provides the strategic foundation needed to achieve beef self-sufficiency while ensuring that regional growth remains sustainable for generations to come (Mukson et al., 2014; Trisman et al., 2022).

METHODS

1. Research Location

This research focuses on three strategic sub-districts within the Bima Regency: Woha, Monta, and Bolo. These locations were not chosen at random; they were purposefully selected as they are recognized as the primary hubs for beef cattle farming according to regional statistical data. Their established reputation as production centers makes them the ideal landscape to observe the real-world dynamics of the industry.

2. Research methods

This study adopts a quantitative methodology to provide an objective and measurable blueprint of the beef cattle sector across Woha, Monta, and Bolo. By grounding the research in numerical data, we can precisely map the standing of cattle farming within the broader economic structure of Bima Regency.

The strength of this quantitative approach lies in its ability to determine comparative advantage through Location Quotient (LQ) calculations. This ensures that our findings transcend mere description; they provide empirically tested, replicable insights that offer a rigorous foundation for regional economic analysis [10], [11].

3. Data source

To ensure accuracy and reliability, this study relies on official secondary data sourced from the Bima Regency Central Bureau of Statistics (BPS). The dataset specifically focuses on beef cattle populations at the sub-district level, alongside aggregate figures for Bima Regency and West Nusa Tenggara (NTB) Province. We utilized the most recent available data to reflect the current state of the industry and provide a contemporary baseline for our analysis.

4. Data analysis

To identify regional specialization, this study employs the Location Quotient (LQ), a widely recognized metric in regional economics for pinpointing a sector's or commodity's dominance in a specific area [5]. The strength of LQ lies in its simplicity and its ability to reveal which commodities serve as the "economic engines" of a sub-district. The general formula for LQ is expressed as:

$$LQi = \frac{Ei,k/Ek}{Ei,R/ER}$$

Where:

a. *E*i,kE _[i,k] Ei,k = population / contribution commodities i in small areas (sub-districts)
b. EkE_kEk = total population commodities in small areas
c. Ei,RE _[i,R] Ei,R = population / contribution commodities i in the reference area (District / Province)
d. ERE_RER = total population commodities in the reference area

Location Quotient is calculated with the formula mentioned above. Interpretation of LQ :

a. LQ > 1: basic commodities in the sub-district.
b. LQ ≈ 1: commodity Enough For need local.
c. LQ < 1: non-basic commodities.

5. Analysis Value Chain

To gain a comprehensive understanding of the beef industry, this study adopts a multi-dimensional approach to value chain analysis, structured as follows:

a. Value Chain Mapping: We begin by tracing the journey of beef cattle from the very beginning-starting with upstream input provision (such as feed and breeding) and following the flow all the way to downstream marketing and final consumption.

b. Actor and Functional Identification: Beyond the flow of goods, we look at the people involved. This step identifies each key player in the chain and dissects their specific roles, ensuring we understand who adds value and how.
c. Flow and Margin Analysis: To understand the economic reality, we analyze price differentials across various stages. This allows us to calculate the value-added distribution and margins, revealing how much profit each actor actually retains.
d. Constraints and Opportunities Mapping: Finally, we investigate the "why" behind the performance. By analyzing technical, institutional, and market obstacles, we can pinpoint the bottlenecks holding the industry back and the opportunities ready to be seized.

RESULTS AND DISCUSSION

1. Population Cow Meat Per District

Based on administrative data, the population cow meat in Woha tend more big compared to Monta and Bolo, with amount cow significant meat as cattle big in the area.

Table 1. Population Cow Meat in the District Woha, Monta, Bolo, Bima Regency

Subdistrict	**Population Cow Meat**
Woha	26,442 heads
Monta	14,046 tails
Bolo	14,271 tails
Total	**54,759 Heads**

Source : Secondary Data, 2024

The distribution of beef cattle populations reveals a significant concentration across three primary sub-districts in Bima Regency: Woha, Monta, and Bolo. Leading the pack is Woha, with a staggering population of 26,442 heads. This figure solidifies Woha's status as the heartbeat of the regency's cattle industry, a role fueled by superior resource availability and a high intensity of smallholder farming activities [12], [13].

In contrast, Monta and Bolo exhibit a more balanced demographic, with populations of 14,046 and 14,271 heads, respectively. While these numbers are lower than Woha's, they represent a significant and stable production capacity. The striking similarity in their numbers suggests that Monta and Bolo share a common agricultural DNA—from land availability and husbandry systems to the vital socio-economic role that cattle farming plays in the lives of the local community [14], [15], [16].

Comparatively, the fact that Woha's population is nearly double that of its neighbors highlights a high degree of regional specialization. This disparity has a direct impact on the Location Quotient (LQ) values; naturally, a larger population base like Woha's is more likely to yield a higher LQ, firmly categorizing it as a "base" commodity area [1], [17].

When viewed in aggregate, the combined contribution of Woha, Monta, and Bolo dominates the livestock landscape of Bima Regency. This concentration of resources reinforces the argument that development policies should be prioritized in these "high-leverage" areas. Focusing on these hubs is the most strategic way to boost production, strengthen the value chain, and drive overall regional economic growth [16], [18], [19], [20].

2. LQ Value of Cattle Meat in Bima Regency

Table 2. LQ Analysis Results

Subdistrict	LQ Cow Meat
Woha	> 1 (Base)
Monta	> 1 (Base)
Bolo	> 1 (Base)

Source : Secondary Data, 2024

The Location Quotient (LQ) analysis yields a clear verdict: beef cattle farming in Woha, Monta, and Bolo all achieve an LQ value greater than one (LQ > 1), This confirms that beef cattle serve as the "basic commodity" for these three sub-districts. Conceptually, an LQ above this threshold signifies that the concentration of cattle farming here far exceeds the regional average. These areas have moved beyond mere self-sufficiency; they have evolved into regional exporters capable of supplying markets well beyond their own borders.

Woha, with its dominant LQ status, reflects a high degree of economic specialization [1], [17], [20]. Given its massive population size, beef cattle have become a pillar of the local economic structure. This positions Woha not just as a participant, but as the primary engine of beef production in Bima Regency, playing a vital role in the regional meat supply chain.

Similarly, Monta and Bolo also maintain an LQ > 1. Despite having smaller populations than Woha, they possess a distinct comparative advantage. Their status as base areas indicates that cattle farming in Monta and Bolo is more intensive than in most other parts of Bima Regency. They act as strategic buffers that ensure livestock availability and supply stability for the entire region.

In summary, the shared, LQ > 1 status across these three sub-districts points to the existence of a potent livestock cluster in Bima Regency. This finding has profound policy implications: development should not be fragmented. Instead, Woha, Monta, and Bolo should be integrated into a unified development zone focused on strengthening value chains, boosting productivity, and upgrading supporting infrastructure. In this light, the LQ value transcends simple mathematics—it becomes a roadmap for sustainable, commodity-based regional growth.

3. Analysis Cattle Value Chain Meat in the District Woha, Monta, and Bolo

The Value Chain Analysis (VCA) serves as a diagnostic framework to understand how added value is generated, from the initial supply of inputs to the final delivery of beef to the consumer. In the context of Woha, Monta, and Bolo—districts characterized by a robust Location Quotient (LQ > 1)—the value chain acts as the vital mechanism that should, in theory, transform regional comparative advantages into sustainable competitive strengths.

a. Upstream Value Chain: The Dependency on Primary Inputs

The chain originates with the provision of critical inputs: cattle seeds (calves), forage, supplemental concentrates, and veterinary services. While seeds are largely sourced from local breeding and inter-island trade within Sumbawa, the forage supply relies heavily on natural grasslands and agricultural byproducts like rice

and corn straw. However, a significant technological gap in feed processing persists, keeping value-added at this stage relatively low and highly seasonal.

b. Production Stage: The Heart of Smallholder Farming
Production is the core of the chain, dominated by small-to-medium scale smallholder farms. Here, cattle are often managed through extensive or semi-intensive systems, serving dual roles as a secondary household occupation and a "living savings account." While the high LQ values confirm a dense livestock population, the productivity per head remains sub-optimal. This indicates that the region's current advantage is driven by quantity rather than production efficiency.

c. Marketing and Distribution: The Intermediary Bottleneck
Downstream, the chain involves a complex network of collectors, large-scale traders, and local livestock markets. Currently, the system remains traditional and fragmented. Despite the region's status as a production powerhouse, farmers often possess weak bargaining power, with prices largely dictated by intermediaries. Consequently, a significant portion of the added value is absorbed by downstream actors rather than the producers themselves.

d. Value Distribution and Margin Disparity
Economic analysis reveals that the lion's share of the beef industry's profit is concentrated within the trading and distribution sectors. Farmers operate on thin margins due to limited price transparency, poor transport infrastructure, and a lack of organized marketing institutions. Structurally, while the districts exhibit strong comparative advantages (high LQ), the financial benefits are not yet equitably distributed.

e. Integrating LQ with Multivariate Realities
The impressive LQ values in Woha, Monta, and Bolo signify immense production capacity, yet this potential is not yet fully harnessed by the value chain. Multivariate factors—such as feed availability, livestock density, and institutional support—are critical to long-term sustainability. Without a reinforced value chain, a high LQ risks becoming a "pseudo-advantage": a strong statistical figure that fails to translate into improved farmer welfare.

f. Strategic Implications: Toward an Integrated Value Chain
To secure the future of the beef industry, development strategies must focus on vertical integration. This includes advancing local feed technology, improving genetic stock quality, and—most importantly—strengthening marketing cooperatives. By synchronizing the upstream and downstream sectors, Bima Regency can finally convert its comparative advantage (high LQ) into a resilient, competitive, and sustainable regional economy.

CONCLUSION

The findings of this study lead to two pivotal conclusions regarding the beef cattle sector in Bima Regency:

1. Established Comparative Advantage: Analysis confirms that Woha, Monta, and Bolo sub-districts possess a significant comparative advantage, with Location Quotient (LQ) values consistently exceeding 1.0. This statistically solidifies beef cattle as a base commodity in these regions. These areas do not merely produce for local consumption but serve as the primary engines of livestock production, capable of sustaining supply chains far beyond their administrative borders.
2. The Necessity for Structural Integration: Despite this strong production base, the current value chain remains sub-optimal and inefficient. The sector is hindered by a technological gap in the upstream (input) stage, stagnant productivity at the farm level, and a fragmented marketing system that leaves breeders with minimal bargaining power. To transform this "raw" comparative advantage into a sustainable competitive advantage, Bima Regency must prioritize an integrated upstream-to-downstream development strategy. This includes strengthening institutional support, adopting localized feed technologies, and fostering more equitable market structures to ensure that economic value is distributed fairly to the producers.

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