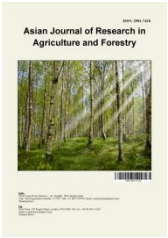

Asian Journal of Research in Agriculture and Forestry

Volume 10, Issue 3, Page 1-12, 2024; Article no.AJRAF.118960
ISSN: 2581-7418

Analysis of Beef Cattle Farming Development for Enhancing Food Security and Regional Development in Simalungun Regency, Indonesia

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI: https://doi.org/10.9734/ajraf/2024/v10i3295

Open Peer Review History:
This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: https://www.sdiarticle5.com/review-history/118960

Original Research Article

Received: 09/04/2024
Accepted: 12/06/2024
Published: 21/06/2024

ABSTRACT

Simalungun Regency possesses substantial geographic potential, including ample land area and a suitable climate, conducive to the development of the beef cattle farming sector. This study aims to analyze the development of beef cattle farming to enhance food security and regional development in Simalungun Regency. The analysis employs the Location Quotient (LQ) and SWOT methods to identify strengths, weaknesses, opportunities, and threats in the development of beef cattle farming in this region. The findings indicate that the beef cattle farming subsector in Simalungun Regency is

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Cite as: *Taufiq, Amar, Satia Negara Lubis, and Agus Purwoko. 2024. "Analysis of Beef Cattle Farming Development for Enhancing Food Security and Regional Development in Simalungun Regency, Indonesia". Asian Journal of Research in Agriculture and Forestry 10 (3):1-12. https://doi.org/10.9734/ajraf/2024/v10i3295.*

a base subsector with an average LQ value > 1, signifying significant development potential. Internal supporting factors include strategic geographic location, adequate human resources, and institutional support, while external opportunities encompass high market demand and government backing. Implementing these strategies is expected to optimally develop beef cattle farming in Simalungun Regency, significantly contributing to food security and promoting sustainable regional economic growth.

Keywords: Beef cattle farming; food security; regional development; location quotient; SWOT; simalungun regency.

1. INTRODUCTION

The livestock subsector plays a critical role in the overall agricultural development efforts in Indonesia. This subsector not only has strategic value in meeting the rising food demand due to population growth but also significantly contributes to increasing farmers' average income and living standards [1]. The shift in consumption patterns from carbohydrates to animal proteins such as meat, eggs, and milk indicates the successful development of this subsector, influencing the community's consumption habits (Jhon, 2010).

Despite the positive impact of this shift, domestic meat production still faces challenges in meeting the growing demand. This situation highlights that, despite significant contributions from the livestock subsector, there is still a need for production enhancements to optimally meet domestic needs [2]. Beef cattle, especially those raised for meat, play an essential role not only in providing high-economic-value food but also in supplying other resources such as milk, manure, hides, and bones. These resources are crucial in the agricultural ecosystem by converting low-nutrient materials into high-nutrient products [3,4].

The current state of beef cattle farming in Indonesia faces significant challenges, particularly in the supply of local feeder cattle. The growth of the cattle population has not kept pace with national needs, leading to the importation of feeder cattle and beef [5]. Local cattle farmers, the cattle fattening industry, and beef imports are the main sources of beef supply in Indonesia. Although local cattle farming remains the primary reliance, policy support is required to ensure the sustainability of livestock resources to maintain future food security.

The cattle population in Simalungun Regency has shown a positive upward trend over the past few years. In 2018, the cattle population was recorded at 109,578 heads, which significantly increased to 159,286 heads in 2019, and continued to rise to 167,400 heads in 2020, 173,540 heads in 2021, and 176,568 heads in 2022. This consistent growth indicates a positive prospect for developing the beef cattle farming sector in Simalungun Regency [6].

Developing the beef cattle farming sector in Simalungun Regency can make a significant contribution to meeting local food needs and supporting the regional economy. With the increasing cattle population, there is substantial potential to boost local beef production, which in turn can meet the community's food requirements and support economic growth [7]. Integrating beef cattle farming with agricultural activities, such as utilizing agricultural waste as feed, can further enhance the efficiency and sustainability of this sector.

Simalungun Regency, with its vast land area and abundant agricultural and plantation potential, provides an ideal basis for livestock farming endeavors. The potential to integrate beef cattle farming with oil palm plantations offers a unique opportunity to optimize the use of agricultural waste as livestock feed [8]. This integration not only supports sustainable livestock farming but also contributes to the overall agricultural ecosystem by maximizing resource utilization.

The development of beef cattle farming in Simalungun Regency should focus not only on increasing the number of livestock but also on enhancing productivity, implementing appropriate technologies, and improving farm management [9]. By leveraging existing potentials, Simalungun Regency can become a center for sustainable beef cattle farming development, significantly contributing to food security and regional economic development. Strategic integration of livestock farming with other agricultural sectors can create synergistic effects, optimizing resource use, and boosting overall productivity.

Facing the uncertainty of food needs and regional development, it is clear that updates in beef cattle farming management strategies are necessary. These updates must not only respond to market changes and consumer needs but also serve as an integral strategy to support sustainable economic growth [10]. Initiatives to increase productivity, apply appropriate technologies, and improve farm management efficiency are crucial for achieving sustainable growth in the beef cattle farming sector.

Understanding the importance of updating the beef cattle farming sector as part of a sustainable development strategy is essential. A holistic approach that considers resilience and sustainability aspects can ensure that development efforts in this sector not only benefit the sector itself but also contribute to overall regional economic growth. Investment and focus on updating the beef cattle farming sector in Simalungun Regency are key to unlocking significant economic potential, strengthening food security, and supporting sustainable economic growth at local and regional levels [11]. Moreover, Satia Negara Lubis and Arga Abdi Rafiud Darajat Lubis [12] emphasized that progress in agricultural technology in Indonesia has played a crucial role in enabling the growth of various agricultural sectors, including both large-scale plantations and those controlled by local communities. This advancement in technology could similarly benefit the beef cattle farming sector, fostering sustainable development and enhancing economic resilience [13].

2. METHODS

2.1 Location and Time of Research

This research was conducted in Simalungun Regency, North Sumatra Province. The location was purposively chosen due to its significant potential in beef cattle farming, which can contribute substantially to regional development. The research was carried out in February 2024.

The research proposal was initiated in February 2024, with stages carried out progressively. Initially, a preliminary survey was conducted to gather data on the distribution of beef cattle farms, the physical characteristics of the region, and the economic conditions of the farmers in Simalungun Regency. This data analysis formed the basis for determining priority areas for beef cattle farm development based on the region's physical characteristics. Subsequently, a strategic plan for integrated beef cattle farming development with comprehensive regional development was prep ared to support food security enhancement in Simalungun Regency. This research also explores potential challenges and formulates the best strategies to ensure beef cattle farming becomes a vital element in sustainable regional development.

2.2 Types and Sources of Data

This study utilizes two main types of data: primary and secondary data, to detail the development of beef cattle farming in efforts to develop the region in Simalungun Regency. Primary data were obtained through a series of in-depth interviews and questionnaires filled out by stakeholders involved in formulating the beef cattle farming development plan. Additionally, direct observations at the research site were conducted to gain a deep understanding of the real conditions in the field.

Secondary data were systematically recorded and directly sourced from relevant government agencies. Relevant information includes beef cattle farming production values in each sub-district of Simalungun Regency from 2013 to 2023. Sources of secondary data involve the Central Statistics Agency (BPS) of Simalungun Regency, BPS of North Sumatra Province, and supporting research and literature relevant to this study. This secondary data forms the basis for understanding the trends in beef cattle farming production, economic conditions, and other factors that can influence beef cattle farming development in the area. Therefore, the combination of primary and secondary data is expected to provide a comprehensive and accurate picture to formulate an integrated and sustainable beef cattle farming development plan in Simalungun Regency.

2.3 Research Respondents

The respondents in this study are parties involved in the development of beef cattle farming in Simalungun Regency. A total of six respondents were determined, comprising the Head of the Simalungun Regency Agriculture Office, the Head of the Food Security Office, the Small and Medium Enterprises Cooperative Office, the Industry and Trade Office, the Head of the General Subdivision of Bappeda, and members of farmer groups; the Head of the Agricultural Extension Center (BPP).

2.4 Data Analysis Methods

The data analysis method used to address the first hypothesis, which aims to identify base and non-base areas in the development of beef cattle farming in Simalungun Regency, is the Location Quotient (LQ) analysis method. The LQ method is commonly used to evaluate the economic conditions of a specific sector, focusing on identifying specialization activities within that sector.

The LQ method helps determine sectors that serve as bases with the potential to drive growth and development in other sectors and positively impact job creation. In the context of this research, the LQ method is applied to identify areas in Simalungun Regency that have specialization and potential in beef cattle farming development. To obtain the LQ value, this study refers to the formula proposed by Bendavid-Val as elaborated in Kuncoro's (2004) research. This method is expected to provide a deeper understanding of the distribution of beef cattle farming in Simalungun Regency, serving as the primary basis for developing the beef cattle farming sector in the region.

$$LQ = \frac{\frac{VR_1}{VR}}{\frac{V_1}{V}}$$

Explanation:
LQ = Location Quotient Value
VR1 = Beef cattle density in Simalungun Regency (heads)
VR = Total livestock density in Simalungun Regency (heads)
V1 = Beef cattle density in North Sumatra (heads)
V = Total livestock density in North Sumatra (heads)

Based on this formulation, there are three possible LQ values that can be obtained (Bendavid-Val in Kuncoro, 2004):

LQ = 1: This indicates that the sector is a non-base sector. Its potential only meets its own area without supplying surrounding areas.

LQ > 1: This value indicates that the sector is a base sector. The potential of this livestock sector can be developed not only for the needs of the local area but also to meet the needs of surrounding areas.

LQ < 1: This value indicates that the sector is non-base. This area is not a good potential for livestock development.

To address the second hypothesis, which formulates strategies for developing beef cattle farming to enhance food security and regional development in Simalungun Regency, data were analyzed using the SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis of internal and external factors, followed by the Quantitative Strategic Planning Matrix (QSPM) analysis to determine the priority strategies for beef cattle farming development.

The SWOT analysis is used to analyze internal and external environments, providing a systematic approach to decision-making (Yüksel and Dağdeviren, 2007). The goal of this analysis is to present strategies that can assist in decision-making. The SWOT analysis consists of strengths, weaknesses, opportunities, and threats. SWOT compares external factors (opportunities and threats) with internal factors (strengths and weaknesses). To address this, further prioritization is needed to identify strategic policies that require more attention to achieve established goals.

To determine strategy priorities, the weights derived from the interrelation of SWOT components mentioned in the strategy formulation are summed. Table 1 shows the calculation of the order of strategies for developing beef cattle farming areas, showing the comparison between internal and external factors. The SWOT analysis allows for strategic decision-making to generate directions for the beef cattle farming development plan in Simalungun Regency.

To formulate strategies from several future beef cattle farming development alternatives, the QSPM analysis is used. QSPM is a tool that allows strategy formulation to evaluate alternative strategies objectively based on key internal and external success factors previously identified. The QSPM matrix analysis aims to determine which strategy is best implemented. The main components of QSPM are: key factors, strategic alternatives, weights, attractiveness score (AS), total attractiveness score (TAS), and sum attractiveness score. The QSPM technique is designed to determine the relative attractiveness and objectively evaluate alternative strategic choices that can be implemented based on internal and external

success factors identified in the EFE and IFE matrices.

3. RESULTS AND DISCUSSION

3.1 Overview of the Research Location

3.1.1 Geographical conditions

Simalungun Regency is located in North Sumatra Province, Indonesia. The regency comprises 32 districts, covering an area of 438,660 hectares or 6.12% of North Sumatra Province's total area. It is situated between 2°36'–3°18' North Latitude and 98°32'–99°35' East Longitude, with an elevation ranging from 0 to 1,400 meters above sea level. Given its strategic geographical location, Simalungun Regency has the potential to enhance its economy, serving as a hub for trade and education.

3.1.2 Climate

Simalungun Regency experiences a moderate climate, with the highest temperatures recorded between March and May, averaging 24.88°C. The average humidity is 84%, peaking at 87% in October. Evaporation averages 0.05 mm per day, and there are typically 14 rainy days per year, with the highest rainfall occurring in November.

3.1.3 Administrative boundaries

Simalungun Regency, the third largest in North Sumatra after Mandailing Natal and Langkat Regencies, is strategically located near the tourist area of Lake Toba - Parapat. It consists of 32 districts, 386 villages, and 27 sub-districts. The administrative boundaries of Simalungun Regency are as follows:

North: Serdang Bedagai Regency and Batubara Regency.

South: Toba Samosir Regency and Lake Toba
West: Karo Regency.

East: Asahan Regency.

Based on data from BPS (2024), Hatonduhan District is the largest, covering 336.26 km², while Jawa Maraja Bah Jambi District is the smallest, at 38.97 km². Given its vast area, Simalungun Regency has significant potential to develop its regional economy.

3.1.4 Demographics

In 2023, Simalungun Regency had a population of 1,035,920, comprising 521,262 males and 514,658 females, with a population density of 237 people per km². The district with the highest population is Bandar, with 83,226 inhabitants, while Haranggaol Horison has the lowest, with 7,694 inhabitants. Table 1 shows the population distribution and sex ratio in each district.

3.1.5 Employment

In 2023, there were 566,621 people in the workforce in Simalungun Regency, with 536,291 employed and 30,330 unemployed. The Labor Force Participation Rate (LFPR) in 2023 was 72.15%, and the Open Unemployment Rate (OUR) was 5.35%.

3.1.6 Education level

Simalungun Regency places significant importance on education in its regional development. Data from BPS (2024) indicates the Gross Enrollment Rate (GER) and Net Enrollment Rate (NER) in Simalungun Regency in 2023. The enrollment rates at the elementary level were 105.56% for GER and 95.02% for NER. At the junior high school level, GER was 93.88% and NER was 77.26%. At the senior high school level, GER was 89.61% and NER was 56.44%. For higher education, GER was 29.95% and NER was 19.59%.

3.1.7 Gross regional domestic product (GRDP)

The GRDP of Simalungun at Current Market Prices (CMP) in 2023 was IDR 52.239 trillion. The agriculture, forestry, and fisheries sectors were the main contributors, with a value of IDR 28.406 trillion (54.38%). Other categories contributed a total of 29.88%. Based on constant prices in 2010, the GRDP of Simalungun in 2023 was IDR 31.510 trillion, with the transportation and warehousing category experiencing the highest growth rate of 10.35%.

3.1.8 Livestock conditions in simalungun

Livestock farming in Simalungun Regency is dominated by poultry and ruminants. Data in Table 2 shows that the beef cattle population is the largest and has significant economic value, with a positive growth trend each year. In 2023, the beef cattle population was 171,632 heads. This sector has promising prospects and requires special attention for continued development.

Table 1. Population distribution in simalungun regency

No	District	Population (Thousands)	Population Density (per km²)	Sex Ratio
1	Silimakuta	18,59	251	100
2	Pematang Silimahuta	14,278	179	100
3	Purba	29,134	169	103
4	Haranggaol Horison	7,694	188	101
5	Dolok Pardamean	15,732	232	103
6	Sidamanik	31,702	329	99
7	Pematang Sidamanik	20,614	150	102
8	Girsang Sipangan Bolon	18,943	146	99
9	Tanah Jawa	56,957	327	101
10	Hatonduhan	28,167	84	99
11	Dolok Panribuan	23,109	155	102
12	Jorlang Hataran	20,215	216	99
13	Panei	30,382	390	98
14	Panombean Panei	26,689	362	101
15	Raya	31,591	121	99
16	Dolok Masagal	14,694	139	100
17	Dolok Silou	18,846	62	100
18	Silou Kahean	20,04	88	101
19	Raya Kahean	22,725	111	101
20	Tapian Dolok	46,778	390	105
21	Dolok Batu Nanggar	47,147	441	103
22	Siantar	76,101	1029	100
23	Gunung Malela	43,571	450	102
24	Gunung Maligas	35,916	699	106
25	Hutabayu Raja	37,085	194	98
26	Jawa Maraja Bah Jambi	23,564	605	99
27	Pematang Bandar	40,684	461	102
28	Bandar Huluan	30,335	283	101
29	Bandar	83,226	827	102
30	Bandar Masilam	31,558	346	101
31	Bosar Maligas	44,229	155	102
32	Ujung Padang	45,624	200	102
SIMALUNGUN		**1035,92**	**237**	**101**

Source: BPS Simalungun Regency, 2024

Table 2. Livestock population by type in simalungun regency

Livestock Type	2019	2020	2021	2022	2023
Beef Cattle	159,286	167,400	173,540	176,568	171,632
Buffalo	7,229	6,058	3,523	1,409	846
Horse	266	157	105	91	21
Dairy Cattle	293	274	205	178	47
Goat	66,199	13,362	14,238	14,570	14,432
Sheep	11,195	60,259	64,997	64,929	63,006
Pig	163,578	13,944	20,430	34,243	34,977
Rabbit	2,855	911	413	418	213

Source: *BPS Simalungun Regency, 2024*

Table 3. LQ calculation results for livestock commodities in simalungun regency

Livestock Type	2019	2020	2021	2022	2023	Average LQ
Beef Cattle	1.07	1.07	1.08	1.08	1.09	1.08
Buffalo	0.41	0.36	0.22	0.10	0.06	0.23
Horse	1.12	0.82	0.60	0.61	0.14	0.66

Source: Processed Data, 2024

Table 4. Identification of internal and external factors

Internal Factors	External Factors
Strength	**Treaths**
1. Geographical location	1. High market demand
2. Adequate human resources	2. Consistently good cattle prices
3. Land carrying capacity	3. Functioning Artificial Insemination (AI) posts
4. Role of livestock group institutions	4. Good marketing distribution channels
5. Presence of a cattle farming base area	5. Government support
6. Support from local institutions	6. Producers' proximity to concentrated feed
Weakness	**Opportunities**
1. Limited business capital	1. Unclear land ownership status
2. Fluctuating meat prices	2. Land conversion
3. Low knowledge and skills of farmers	3. Pressure from meat importers
4. Farming as a side business	4. Inter-regional competition
5. Inadequate marketing system	5. High slaughter rates of productive females
6. Suboptimal use of production factors	**6.** Stability of seedling supply

Source: Data Processed, 2024

Table 5. Internal factor evaluation (IFE) matrix

Internal Factors	Weight	Rating	Score
Strengths			
- Strategic geographic location	0.086	2	0.172
- Adequate human resources	0.119	3	0.357
- Land carrying capacity	0.109	3	0.327
- Institutional role of farmer groups	0.047	2	0.094
- Existence of beef cattle base area	0.077	2	0.154
- Support from local institutions	0.152	3	0.456
Subtotal	0.590		1.56
Weaknesses			
- Limited business capital	0.102	3	0.306
- Fluctuating meat prices	0.093	3	0.279
- Low knowledge and skills of farmers	0.110	3	0.330
- Farming as a side business	0.032	3	0.096
- Inadequate marketing system	0.042	3	0.126
- Suboptimal use of production factors	0.031	2	0.062
Subtotal	0.410		1.199
Total IFE	1.000		2.759

Source: Processed Data, 2024

3.2 Location Quotient (LQ) Analysis

The LQ analysis utilizes sector characteristics to determine regional specialization. Population data of beef cattle is used to calculate whether Simalungun Regency is a base or non-base sector. According to Hendayana (2003), for non-land-based commodities like livestock, the calculation basis is the livestock population.

Table 3 shows the LQ analysis results for livestock commodities in Simalungun Regency. The findings indicate that the beef cattle subsector in Simalungun Regency is a base subsector with an average LQ > 1. In contrast, the buffalo and horse subsectors are classified as non-base subsectors with an average LQ < 1.

3.3 SWOT Analysis

The SWOT analysis qualitatively identifies internal and external factors influencing the successful development of beef cattle farming. These factors include strengths, weaknesses, opportunities, and threats, as presented in Table 4.

3.3.1 Internal factor evaluation (IFE) matrix

The IFE matrix summarizes and evaluates major strengths and weaknesses in functional areas, providing a basis for identifying and evaluating relationships to develop strategies. The total weighted score ranges between 1.0 (lowest) and 4.0 (highest), with an average of 2.5. Table 5 presents the IFE matrix for beef cattle farming development analysis in Simalungun Regency. The total IFE score is 2.759, indicating that internal factors are fairly strong.

3.3.2 External factor evaluation (EFE) matrix

The EFE matrix summarizes and evaluates economic, social, cultural, demographic, environmental, political, legal, technological, and competitive information. The total weighted score ranges between 1.0 (lowest) and 4.0 (highest), with an average of 2.5. Table 6 presents the EFE matrix for the beef cattle farming development analysis in Simalungun Regency. The total EFE score is 3.109, indicating a fairly good response to external opportunities and threats.

Table 6. External factor evaluation (EFE) matrix

External Factors	Weight	Rating	Score
Opportunities			
- High market demand	0.070	4	0.280
- Favorable cattle prices	0.050	3	0.150
- Functioning AI center	0.102	3	0.306
- Good distribution channels	0.139	3	0.417
- Government support	0.125	4	0.500
- Proximity to feed sources	0.059	2	0.118
Subtotal	0.545		1.771
Threats			
- Unclear land ownership status	0.105	3	0.315
- Land conversion	0.085	3	0.255
- Meat import pressures	0.021	3	0.063
- Regional competition	0.027	2	0.054
- High productive female slaughter	0.112	3	0.336
- Seed supply stability	0.105	3	0.315
Subtotal	0.455		1.338
Total EFE	1.000		3.109

Source: *Processed Data, 2024*

Table 7. SWOT matrix

External Factors / Internal Factors	Strengths (S)	Weaknesses (W)
Opportunities (O)	**Strategies S-O**	**Strategies W-O**
	1. Establishing a beef cattle breeding center (S1, S3, S5, O1) 2. Enhancing the role of farmer group institutions with support from relevant agencies (S1, S2, S4, S6, O1, O4, O5) 3. Optimizing individual farmer skills and the role of farmer group institutions in developing beef cattle farming by considering market potential and high	1. Investment in business capital (W1, W4, O1, O5) 2. Improving farmers' knowledge and skills (W1, W3, W4, W6, O2, O3) 3. Coordination between government agencies in price monitoring and distribution of livestock facilities and infrastructure to reduce dependence

External Factors / Internal Factors	Strengths (S)	Weaknesses (W)
	product demand (S1, S2, S4, S6, O1, O4) 4. Improving cattle quality by adding concentrated feed and AI centers to enhance market competitiveness (S1, O2, O3, O6)	on livestock products from other regions (W2, W6, O1, O2, O4, O6) 4. Enhancing the marketing system (W5, O5)
Threats (T)	**Strategies S-T** 1. Protecting the domestic market (S1, S3, S5, T2, T3) 2. Forming cooperatives of farmer groups to assist in product marketing to counteract imported livestock product pressures (S2, S4, T3) 3. Addressing reproductive and health disturbances in livestock (S1, S3, S5, T2, T3, T4) 4. Coordination among relevant agencies to protect livestock land from conversion by considering biophysical and spatial potential as well as comparative and competitive regional advantages (S6, T1, T2) 5. Tightening supervision and imposing sanctions on the slaughter of productive females (S4, T5, T6)	**Strategies W-T** 1. Developing financial growth in Simalungun Regency (W1, W3, W4, T2, T3, T4) 2. Increasing business efficiency (W4, W5, W6, T2, T3, T4, T6) 3. Formulating land use policy directives that do not overlook farmers (W1, W2, T1) 4. Central government role and assistance in balancing domestic and imported livestock prices (W2, T3, T5)

Source: Processed Data, 2024

3.3.3 SWOT analysis diagram

The results of the IFE and EFE matrix analysis are presented using a SWOT diagram that identifies positions within four quadrants. The X-axis on the SWOT diagram represents the result of subtracting the total score of strength factors from the total score of weakness factors. The Y-axis represents the result of subtracting the total score of opportunity factors from the total score of threat factors.

The SWOT diagram position in this study is in quadrant I with coordinates (0.361; 0.433), indicating that the development of beef cattle farming in Simalungun Regency is in a favorable situation.

3.3.4 SWOT matrix

The SWOT matrix is used to determine alternative strategies for developing beef cattle farming by combining internal factors (strengths and weaknesses) with external factors (opportunities and threats).

Table 7 shows the results of the SWOT matrix analysis in formulating alternative strategies for developing beef cattle farming in Simalungun Regency. Some of the main strategies generated include:

- Establishing a beef cattle breeding center
- Enhancing the role of farmer group institutions with support from relevant agencies
- Optimizing individual farmer skills and the role of farmer group institutions in developing beef cattle farming
- Improving cattle quality by adding concentrated feed and AI centers

3.4 Quantitative Strategic Planning Matrix (QSPM) Analysis

The QSPM matrix represents the final stage of strategy formulation analysis, where the best

Table 8. Ranking of alternative policy strategies

Rank	Alternative Strategy	TAS
1	Enhancing the role of farmer group institutions with support from relevant agencies	14.43
2	Protecting the domestic market	12.37
3	Coordination between government agencies in price monitoring and distribution of livestock facilities and infrastructure to reduce dependence on livestock products from other regions	12.23
4	Improving cattle quality by adding concentrated feed and AI centers to enhance market competitiveness	11.94
5	Forming cooperatives of farmer groups to assist in product marketing to counteract imported livestock product pressures	11.60
6	Developing financial growth in Simalungun Regency	11.30
7	Central government role and assistance in balancing domestic and imported livestock prices	10.74
8	Formulating land use policy directives that do not overlook farmers	10.53
9	Enhancing the marketing system	10.20
10	Optimizing individual farmer skills and the role of farmer group institutions in developing beef cattle farming in Simalungun Regency by considering market potential and high product demand	10.07
11	Establishing a beef cattle breeding center	8.92
12	Coordination among relevant agencies to protect livestock land from conversion by considering biophysical and spatial potential as well as comparative and competitive regional advantages	8.91
13	Tightening supervision and imposing sanctions on the slaughter of productive females	8.67
14	Increasing business efficiency	8.42
15	Investment in business capital	7.62
16	Addressing reproductive and health disturbances in livestock	7.50
17	Improving farmers' knowledge and skills	6.88

Source: Processed Data, 2024

alternative is selected. The Total Attractiveness Score (TAS) indicates the most suitable strategy to implement.

Table 8 shows the ranking of alternative policy strategies for developing beef cattle farming in Simalungun Regency. The top five priority strategies are:

1. Enhancing the role of farmer group institutions with support from relevant agencies (TAS: 14.43)
2. Protecting the domestic market (TAS: 12.37)
3. Coordination between government agencies in price monitoring and distribution of livestock facilities and infrastructure to reduce dependence on livestock products from other regions (TAS: 12.23)
4. Improving cattle quality by adding concentrated feed and AI centers (TAS: 11.94)
5. Forming cooperatives of farmer groups to assist in product marketing (TAS: 11.60)

Based on the TAS calculations, these strategies are expected to positively impact the development of beef cattle farming in Simalungun Regency, supporting food security and enhancing the regional economy.

4. CONCLUSION AND RECOMMENDATION

Simalungun Regency possesses substantial geographic potential and favorable natural conditions conducive to the development of beef cattle farming. The region's ample land area, suitable climate, and strategic location facilitate good market access. Over the years, the beef cattle population in Simalungun Regency has demonstrated a positive upward trend, despite occasional fluctuations, indicating promising prospects for the sector. The Location Quotient

(LQ) analysis reveals that the beef cattle farming subsector in Simalungun Regency is a base subsector with an average LQ > 1, signifying its potential as a key driver of the regional economy. Internal factors supporting the development include strategic geographic location, adequate human resources, good land carrying capacity, the institutional role of farmer groups, and local institutional support. However, challenges such as limited business capital, fluctuating meat prices, low farmer knowledge and skills, inadequate marketing systems, and suboptimal use of production factors need to be addressed.

To optimize the development of beef cattle farming in Simalungun Regency, several recommendations are proposed. Firstly, enhancing the role of farmer group institutions through more intensive guidance from relevant agencies is crucial. Training and skill development for farmers are essential to improve productivity and livestock quality. Secondly, the government should protect the domestic market for beef cattle products to compete with imports by implementing favorable regulations and policies. Effective coordination among various government agencies is necessary for price monitoring, distribution of livestock facilities and infrastructure, and supportive policies. Efforts to improve cattle quality through the addition of concentrated feed and optimization of AI centers should continue to increase market competitiveness. Lastly, forming cooperatives comprising farmer groups is recommended to assist in product marketing, improve farmers' bargaining power, and optimize the livestock supply chain from farmers to consumers. Implementing these recommendations is expected to significantly contribute to food security and promote sustainable regional economic growth in Simalungun Regency.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Peer-review history:
The peer review history for this paper can be accessed here:
https://www.sdiarticle5.com/review-history/118960