








# Potency and Strategy for Developing Beef Cattle Business in South Kalimantan

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**Abstract.** The study aimed to identify the potential and develop a strategy for developing the beef cattle sector in South Kalimantan by maximizing the use of local resources. A mix of survey techniques, focus group discussions, and literature reviews were used to carry out the study. The potential analysis comprises livestock density analysis, feed supply estimation from local resources, demand of feeds and the carrying capacity. SWOT analysis is used to create a development strategy that takes both internal and external development aspects for beef cattle into account. The findings showed that South Kalimantan has a comparatively high potential for improving the beef cattle industry. The level of farm density and the area density with sparse categories, with values of 0.10 and 5.55, respectively, serve as indicators of this. Economic density falls under the sparse category as well (49.8). 5.04 million tons of feed are potentially available from local resources, which can feed an additional 1.5 million heads of cattle, much beyond the needs. Utilizing the sizeable land area, the South Kalimantan beef cattle development strategy should prioritize optimizing locally adapted beef cattle to fulfill domestic and international market needs. The main strategies to be adopted are using abundant agricultural/plantation by-products as a source of feed, building animal feed processing units based on agricultural/plantation by-products, employing financing policies for farmers, and empowering farmers through technical guidance, training, and cultivation aid. The strategy cannot be executed successfully without coordinated government policies between the Central and Regional Governments through programs and activities.

**Keywords:** Beef cattle · Local resources · South Kalimantan

## 1 Introduction

Given that nation's population of beef cattle and meat production are still unable to fulfil consumer demand, beef cattle farming is a very strategic and viable livestock sub-sector business in Indonesia [1]. The availability of supporting data and potential for attracting future policies are among the aspects that impact the fulfilment of the

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nation's beef demands [2]. On the other hand, Indonesia has the potential for natural resources in the form of sizable land areas and extremely sufficient human resources as capital for the development of location-specific beef cattle businesses [3]. Concerning the development pattern, the Directorate General of Livestock and Animal Health stated that community farms have the greatest potential for ruminant farm development because 90% of domestic cattle production is carried out by smallholder farmers [4].

South Kalimantan is one of the provinces in the Eastern Indonesia that relies on agriculture for food. In addition to the food crop sub-sector, the livestock sub-sector is the mainstay of South Kalimantan Province. One of them is beef cattle farming, which can produce 584 tons of beef and represents about 76.34% of total meat production on the island of Kalimantan [5]. The number of beef cattle in South Kalimantan accounts 172,551 heads, with the majority of those being in the regencies of Tanah Laut (82,536), Tanah Bumbu (20,112), Banjar (18,520), Kota Baru (15,560), and Barito Kuala (8,357 heads). Thus, the population of beef cattle is concentrated in Tanah Laut Regency at 47.83% [6].

The sluggish transfer of technology to farmers and limited budget investment from the public and private sectors are common issues and impediments to the development of beef cattle farming in South Kalimantan. Meanwhile, the beef cattle industry has unique challenges such as the scarcity of cattle offspring in terms of both quantity and quality, the high slaughter of productive cows, and the scarcity of animal fodder during the dry season [7]. Due to the low performance of the beef cattle business in Indonesia, a strategy to accelerate through breeding and fattening business is required [8].

Based on the aforementioned issues, the purpose of this research is to identify the potential and develop strategies for improving the beef cattle industry in South Kalimantan by maximizing the use of local resources.

## 2 Materials and Methods

Both primary and secondary data were used to figure out the state of the beef cattle farming business, resource usage at the farmer level, potential for development, also internal (strengths and weaknesses), and external (opportunities and threats) variables in beef cattle farming. Primary data were gathered through questionnaires, focus groups, and in-depth interviews with study participants, who included farmers, extension workers, and representatives from related agencies. Secondary data were gathered from literature study, the BPS's publications and reports, as well as the Agriculture and Livestock Services.

Analysis of the potential development of the beef cattle business includes livestock density analysis, feed supply estimation from local resources, feed demands, and carrying capacity. Economic density, farm density, and region density are the three types of livestock density. When the density of livestock falls into the sparse category, the availability of animal feed exceeds the need for animal feed, and the carrying capacity falls into the high category, the high-potential beef cattle business emerges.

The density of livestock was calculated using the method as follows [9]:

$$\text{Economic density} = \frac{\sum \text{beef population (AU)}}{\sum \text{human population}} \times 1000 \quad (1)$$

Criteria:

Very dense >300  
 Dense 100–300  
 Medium 50–100  
 Sparce <50

$$\text{Farm density} = \frac{\sum \text{beef population(AU)}}{\text{Arable landarea (ha)}} \times 1000 \quad (2)$$

Criteria:

Very dense >2  
 Dense 1–2  
 Medium 0,25–1  
 Sparce <50

$$\text{Region density} = \frac{\sum \text{beef population (AU)}}{\text{Area (km2)}} \times 1000 \quad (3)$$

Criteria:

Very dense >50  
 Dense 20–50  
 Medium 10–20  
 Sparce <10

Another method for determining the potential is to estimate animal feed availability using the calculation as shown in Table 1.

The feed required for one Animal Unit (AU) is 9.1 kg of DM feed, hence the total feed needs are a multiplication of the feed requirements for animal unit and the total number of livestock. Furthermore, Carrying Capacity (CC) can be determined by using:

$$CC = \frac{\text{Total feed potential in one region}}{\text{Feed requirement for 1 AU}} \quad (4)$$

The strategy is arranged by using a SWOT analysis, which involves an examination of the internal and external environments and serves as a guide in determining priorities for the development of the beef cattle business. The internal environment is examined to determine the variables of strength that can be used and the variables of weakness that must be addressed. While analysis of the external environment is aimed executed to identify the main opportunities and threats.

**Table 1.** Formula for estimating animal feed availability from forage and agricultural by-products

No	Description	Formula
1	Availability of Grass	
–	Grazing land*	$(0,23 \times 60 \text{ ton} \times \text{land area}) \text{ ton DM/year}$
–	Paddy field*	$(0,77591 \times \text{land area} \times 0,06 \times 6,083) \text{ ton DM/year}$
–	Dry land*	$(1,062 \times \text{land area} \times 0,09785 \times 6,083) \text{ ton DM/year}$
–	Forest land*	$(2,308 \times \text{land area} \times 0,05875 \times 6,083) \text{ ton DM/year}$
2	Availability of Agricultural by-product	
–	Paddy straw**	$(2,5 \times \text{harvest area} \times 0,70) \text{ ton DM/year}$
–	Corn straw**	$(6,0 \times \text{harvest area} \times 0,75) \text{ ton DM/year}$
–	Soybean straw**	$(2,5 \times \text{harvest area} \times 0,60) \text{ ton DM/year}$
–	Peanut straw**	$(2,5 \times \text{harvest area} \times 0,60) \text{ ton DM/year}$
–	Sweet potato leaves**	$(1,5 \times \text{harvest area} \times 0,80) \text{ ton DM/year}$
–	Cassava leaves	$(1,0 \times \text{harvest area} \times 0,30) \text{ ton DM/year}$

Note: DM = dry matter. Source: \*) [11] \*\*) [2]

### 3 Results and Discussion

#### 3.1 General Overview of South Kalimantan

South Kalimantan is a province in southern Kalimantan Island, bordered on the west by Central Kalimantan Province, on the east by Makassar Strait, on the south by the Java Sea, and on the north by East Kalimantan Province. The province of South Kalimantan is located between 114 19' 13'' and 116 33' 28'' East Longitude and 1 21' 49'' and 4 10' 14'' South Latitude [6].

South Kalimantan covers approximately 37,530.52 km<sup>2</sup>, accounting for 6.98% of Kalimantan Island and 1.96% of Indonesia. South Kalimantan has a small area compared to other provinces on the island of Kalimantan, and it is divided into 11 regencies and two municipalities. Forests (30.16%) were the largest land use, followed by plantations and mixed gardens (26.09%), rice fields (10.98%), settlements (2.33%), and mining (1.44%) [6].

In 2018, the total population was 4,182.70 thousand people, with 2,122.00 thousand male and 2,060.70 thousand female residents (Table 2). The agricultural sector provides a living for the majority of the population (33.79%), and the large portion of those who work (46.16%), attend elementary schools. This data reveals that agriculture is the primary source of income for the people of South Kalimantan, while education levels remain low [6].

**Table 2.** The number of residents aged 15 years old and up who work according to their major livelihoods and level of education, 2018.

Livelihoods	Degree of education				Totals (person)	Percentage (%)
	ES	Junior HS	Senior HS	College		
Agriculture	481,265	1114,421	80,405	7,104	683,195	33.79
Processing industry	168,035	70,087	106,021	17,554	361,697	17.89
Services	283,916	173,241	317,966	201,651	976,774	48.32
Totals (person)	933,216	357,749	504,392	226,309	2,021,666	100.00
Percentage (%)	46.16	17.70	24.95	11.19	100.00	

Note: ES = elementary school; HS = high school, Source: [6]

**Table 3.** Livestock resources of south Kalimantan Province

Description	Totals
Large and small ruminant population (AU)	208,295
Total population (person)	4,182,700
Land area (km <sup>2</sup> )	37,530.52
Cultivated farmland area (paddy, corn, peanut, soybean, oil palm) (ha)	2,103,883

Note: AU = animal unit

### 3.2 Livestock Resource Potential

Table 3 shows the South Kalimantan region parameters utilized in the computation of livestock density, supply and demands of feed. South Kalimantan Province has a population of approximately 4.18 million people and an area of approximately 37.5 thousand km<sup>2</sup>. In 2018, the number of ruminant livestock increased to 208,295 AU after being converted to the Livestock Unit, with 72.6 thousand households raising beef cattle [6]. The scale of beef cattle ownership in South Kalimantan is in the low category, at 2.87 heads.

Economic density, farm density, and regional density are all in category range, with values of 49.80, 0.10, and 5.55, respectively (Table 4). The findings of this beef cattle density analysis indicate that the beef cattle industry in South Kalimantan has the potential to expand by increasing livestock populations in order to achieve optimal density and enhance meat production. The carrying capacity of the area, particularly the availability of feed in the form of forage (grass and legumes) and agricultural/plantation by-products, should be addressed in the development of livestock in an area. As a result, a feed availability study is required.

**Table 4.** Density profile of beef cattle in South Kalimantan

Description	Value*	Category
Economic density	49,80	Sparce
Farm density	0,10	Sparce
Regional density	5,55	Sparce

Note: \* Author's calculation

**Table 5.** Estimated cattle feed availability in South Kalimantan.

Description	Feed estimation (ton DM/year)
A. Forage/grass:	
- Grassing grounds	2,378,430.00
- Paddy field	143,528.03
- Dry land	297,353.63
- Forest	1,468,172.56
Totals	4,287,484.22
B. Availability of agricultural by-products:	
- Rice straw	487,992.75
- Corn straw	247,372.65
- Soybean straw	9,228.60
- Peanut straw	9,129.90
- Sweet potato leaves	1,318.80
- Cassava leaves	967.50
Total	756,010.20
A + B	5,043,494.40

Source: [6]; author's calculation

The amount of agricultural waste that can be used as raw material for animal feed can be predicted based on the area of farming that is currently being cultivated in South Kalimantan. Based on the formula in Table 2, the predicted availability of animal feed from forage and agricultural by-products reached 5,043,494.4 tons of DM/year (Table 5). The estimated availability of feed is 85.01% from land-grown forage/grass and 14.99% from agricultural by-products. This forage can also be obtained from farmer-owned grasslands; grazing fields; grass gardens; waste from agricultural land of food crops/horticulture; forage and waste from plantation land; and forage from forest land.

Meanwhile, with a population of 208,295 AU, the annual demand for animal feed is 691,851.84 tons of DM. The estimation of feed availability and feed needs of beef cattle show firmly that South Kalimantan has the potential and opportunity for cattle development since feed availability is notably greater in quantity than the needs per year.

Additionally, these results show that South Kalimantan has a lot of potential for raising cow numbers and developing beef cattle industries, especially with the use of feed from the region's plentiful local resources. Of course, the increase in beef cattle population takes into account human resource, social, economic, cultural, and local environment factors. Furthermore, according to the capacity (CC) formula, South Kalimantan still has the ability to accommodate 1,518,438.78 AU of beef cattle. In comparison to the 208,295 AU cattle populations in 2018, this suggests that the cattle population can still be grown by 628.98%. Several activities, including as breeding and fattening businesses, can be used to expand population. This action will result in the spread of superior beef cattle breeds, resulting in increased productivity and profitability [8].

### 3.3 Identification of Internal Factors, External Factors and SWOT Matrix

Several qualities of internal and external factors can be gathered from the findings of the FGD with stakeholders, which can be used to prepare a plan for establishing a beef cattle business in South Kalimantan using a SWOT analysis (Table 6). This result is likely to have an effect on the success of the beef cattle industry in accordance with the specific conditions of the region. This analysis has been widely used and reported by several researchers [2, 4].

According to Table 6, the four strengths that can be properly managed to develop the beef cattle business in South Kalimantan are (i) the availability of local beef cattle that are adaptable and have good tolerance in poor conditions, (ii) the large amount of agricultural and plantation by-products as a source of feed, (iii) the availability of sufficient labor, and (iv) the farmer's experience in raising beef cattle. One of the strengths is South Kalimantan has local beef cattle that are adaptable and have good tolerance, as seen by the province's high cattle population when compared to other provinces on the island of Kalimantan. The quantity of agricultural and plantation by-products has not been utilized to its full potential as a source of cattle feed. This is due to a shortage of cattle population, therefore the amount of potential feed generated is still larger than the needs, resulting in the large portion of by-products being squandered. The usage of these by-products may help to boost the growth and production of cattle. The availability of adequate labor is a capital used in the growth of cattle with good market potential. Farmers' experience growing beef cattle is another possible feature that might support and assist in the success of their business.

Meanwhile, there are numerous weaknesses in the internal environment of beef cattle farming in South Kalimantan, including (i) low cattle productivity, (ii) limited capital, (iii) farmers' lack of knowledge and skills about good beef farming practices, (iv) the simplicity of the technology used, and (v) reliance on nature and seasons for feed provision. Internal factors of weakness include the fact that cattle productivity remains relatively low, which can be attributed to issues such as breeding, feed, and livestock management. The answer to this shortcoming is to expand assisting in the form of training for farmers or small entrepreneurs with the aim of increasing livestock productivity. Capital is one of the most prevalent weaknesses of farmers in Indonesia, particularly South Kalimantan, and to address this, the government has developed programs such as KUPS, KUR, and other low-interest loan facilities. Farmers' lack of knowledge and abilities in good beef cattle raising procedures can be solved by offering training to

**Table 6.** Identification of internal and external factors in beef cattle development in South Kalimantan

Internal factors	
Strengths	Weaknesses
The availability of local beef cattle that are adaptable and have a high tolerance in poor condition	Low cattle productivity
Agricultural/plantation by-products that has not been efficiently utilized	Farmers' lack of capital
The availability of adequate labor/manpower	Farmers' lack of knowledge and capabilities
	Reliance on nature and seasons for feed provision
External Factors	
Opportunities	Threats
The domestic market is sizeable	High slaughtering rate of productive cows
Availability of enough land and feed sources	Imported cattle and meat
Credit policy support from government, private sector, and financial institutions	Unstable provision of good quality cattle breeds
Science and technology advancement	Fluctuations in feed availability

deliver the essential technology advancements as well as appropriate, simple, and low-cost cattle raising management. Farmers' livestock maintenance is still simple, and the feed provided is still primarily based on nature and the season. The solution that can be given is to enhance farmers' awareness and desire to cultivate forage and use agricultural by-products as animal feed using existing technical innovations.

The indicators of opportunities and threats provide insight into the beef cattle industry's external environment. The domestic market for beef cattle is very large in both South Kalimantan and on the island of Kalimantan, coupled with the availability of sufficient land and feed sources. Other chances for beef cattle development include the advancement of science and technology, as well as the support of loans from the government, banks, and financial institutions. Furthermore, beef cattle development is aimed at minimizing threats by optimizing strength and benefiting on opportunities. The concern in the beef cattle industry today is the continued slaughter of productive cows. Furthermore, the import of cattle and meat from abroad or from other provinces is considered to be a serious threat to the existing livestock industry in South Kalimantan, because the lower price of imported cattle and meat than that produces domestically. Another concern that the beef cattle farmers face is unstable supply of good cattle seeds since farmers often obtain cattle breeds whose quality varies from market. Another threat is the availability of feed, which varies tremendously depending on the season.



Following the identification of internal (strengths and weaknesses) and external (opportunities and threats) factors, a SWOT matrix containing several alternative strategies for the development of the beef cattle industry was created, as shown in Table 7. There are four alternative strategies for optimizing strengths to seize opportunities (S-O), three strategies for strengthening strengths to minimize threats (S-W), four alternatives for minimizing weaknesses to seize opportunities (W-O), and two strategies for minimizing weaknesses and eliminating threats (W-T). The focus of development is selected by evaluating the internal and external environments of the beef cattle industry in South Kalimantan using the alternative approach.

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### **3.4 Analysis of Internal Environment, External Environment and Development Strategy Priorities**

The internal environment is analysed by scoring and weighting each indicator of strengths and weaknesses, yielding priority results of indicators of strengths and weaknesses that require attention. Table 8 shows the findings of the analysis.

The presence of local beef cattle and the availability of feed are the key strengths of the beef cattle business in South Kalimantan, as shown in Table 8, because these two variables have the highest weighted score values. Meanwhile, of the four highlighted weaknesses, the dominant weakness encountered by beef cattle farmers today is inadequate capital, and the technology used is still simple/conservative. Nonetheless, the beef cattle industry's strength is currently more dominant than its strength because the total weighted score for the strength indicator is bigger than the total weighted score of the strength indicator.

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Table 9 presents an analysis of the beef cattle industry's external environment. The large local market for beef, combined with the availability of land and sufficient feed availability in South Kalimantan, is the most important opportunity, with scores of 0.51 and 0.47, respectively. In addition to these two main opportunities, farmers must also be aware of potential risks. The threat is the continued slaughter of female cows (0.32) and

**Table 7.** SWOT matrix for alternative strategies of beef cattle development in South Kalimantan

<p><b>S-O Strategy</b></p> <ul style="list-style-type: none"> <li>• Cattle farming optimization of adaptable local beef by the utilization of large area of land and abundant agricultural/plantation by-products as a feed source.</li> <li>• The establishment of breeding centers for adaptive local beef cattle to increasing cattle populations by utilizing vast land areas to meet the large domestic market</li> <li>• The establishment of feed processing units based on agricultural/plantation byproducts as a feed source, as well as the use of credit policies</li> <li>• Optimum empowerment of a large and experienced farmer workforce in the establishment of a beef cattle business through technical supervision, training, and farming support in order to boost beef cattle production to meet domestic demand.</li> </ul>	<p><b>W-O Strategy</b></p> <ul style="list-style-type: none"> <li>• Improving cattle productivity by making better use of existing land and feed sources, with the help of technological advances in cattle rearing and breeding.</li> <li>• Capital constraints can be overcome by leveraging existing credit policy assistance.</li> <li>• Farmers' limited knowledge and skills, as well as technology, can be encouraged by the availability of innovation and technology, as well as the aid or support of credit/capital, so that their business is better developed to meet the domestic market.</li> <li>• The use of technical improvements in the preparation of cattle feed will reduce reliance on nature and the seasons for the supply of food</li> </ul>
<p><b>S-T Strategy</b></p> <ul style="list-style-type: none"> <li>• Establishment of breeding units for adaptable local beef cattle to enhance the cattle population, hence suppressing the slaughtering of productive cows and reducing imports of cattle and meat</li> <li>• Breeding of adaptable local beef cattle in order to solve the scarcity of good quality breeds</li> <li>• Utilization of agricultural/plantation waste availability to overcome feedstuffs availability</li> </ul>	<p><b>W-T Strategy</b></p> <ul style="list-style-type: none"> <li>• Use of healthy cattle farming technology innovation to boost livestock productivity, hence lowering slaughter of productive cows and reducing imported cattle/meat.</li> <li>• Technical guidance, training, and assistance for farmers to improve their knowledge and abilities in cattle raising, breeding, and feed production to ensure feed supply.</li> </ul>

importation of cattle and meat from outside Kalimantan and Indonesia (0.26). The total opportunity score of 1.83 and the total threat score of 0.96 suggest that the opportunities for beef cattle business development are still greater than the threats faced by farmers.

The priority development strategy is the SO strategy because the forces are more dominant in the internal environment and the opportunities are more dominant in the external environment. The SO strategy is the priority development strategy because strength are more dominant in the internal environment and opportunities are more dominant in the external environment. The priorities of South Kalimantan's beef cattle business development strategy are: (1) optimizing the fattening business of adaptive local beef cattle and disease resistant by utilizing large areas of land and a large amount of agricultural/plantation by-products as a source of feed, (2) building an adaptive local beef cattle breeding unit to increase the cattle population by utilizing large areas of land to meet the sizeable domestic market, (3) development of feed processing units by utilizing large amounts of agricultural plantation by-products as a source of feed and utilizing credit policies from the government, private sector, and financial institutions, and (4)

**Table 8.** Analysis of the internal environment of the beef cattle business

Strengths	Weight	Rating	Score
The presence of local beef cattle that are adaptable and have a high tolerance under adverse situations.	0.16	2.90	0.45
The abundance of unused agricultural/plantation by-products	0.16	2.90	0.45
Sufficient supply of labor	0.12	2.70	0.32
Farmers are already quite experienced	0.11	2.60	0.29
<b><i>Sub Total of Strengths</i></b>			<b><i>1.51</i></b>
<b>Weaknesses</b>	<b>Weight</b>	<b>Rating</b>	<b>Score</b>
Low cattle productivity	0.10	2.30	0.23
Farmers' lack of capital	0.13	2.70	0.36
Farmers' lack of knowledge and skill	0.11	2.30	0.24
Simple technology used	0.12	2.50	0.29
<b><i>Sub Total of Weaknesses</i></b>			<b><i>1.13</i></b>
<b>IFE</b>			<b>2.65</b>

**Table 9.** Analysis of the external environment of beef cattle business

Opportunities	Weight	Rating	Score
The domestic market is sizeable	0.18	2.90	0.51
Availability of enough land and feed sources	0.16	2.90	0.47
Credit policy support from government, private sector, and financial institutions	0.15	2.80	0.41
Science and technology advancement	0.16	2.80	0.44
<b><i>Sub Total of Opportunities</i></b>			<b><i>1.83</i></b>
<b>Threats</b>	<b>Weight</b>	<b>Rating</b>	<b>Score</b>
High slaughtering rate of productive cows	0.12	2.80	0.32
Imported cattle and meat	0.10	2.70	0.26
Unstable provision of good quality cattle breeds	0.07	2.70	0.20
Fluctuations in feed availability	0.07	2.40	0.17
<b><i>Sub Total of Threats</i></b>			<b><i>0.96</i></b>
<b>EFE</b>			<b>2.79</b>

optimality of empowering the available experienced farmer workforce in developing beef cattle farming businesses through technical guidance, training, and cattle farming assistance in order to increase beef cattle production to meet domestic market demand.

## 4 Conclusions

South Kalimantan's potential is the sparse category of farm density and region density, as well as the potential availability of feed both agricultural/plantation by-products and forage, indicating that there is opportunity to enhance the development of beef cattle business to support the beef self-sufficiency program. Based on estimations of animal feed forage and agricultural waste produced, South Kalimantan has a large chance for cattle population development and expansion. The results of the SWOT analysis, which considers both internal and external factors, are known to prioritize beef cattle development strategies in South Kalimantan, specifically optimizing adaptive local beef cattle farming by utilizing the availability of large areas of land and a large amount of agricultural/plantation by-products as a source of feed; establishment of adaptive local beef cattle breeding center to boost cattle populations by utilizing large land areas available to meet the large domestic market; development of animal feed processing facilities through the use of a large volume of agricultural/plantation by-products as a feed source and credit policies; empowerment of available and experienced farmer labor in building beef cattle farming businesses through technical guidance, training, and farming assistance in order to enhance beef cattle production to fulfil domestic demand. This strategy's priority must be supported by government policies that are coordinated between the Central and Regional Governments through actionable activities.

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