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POTENTIAL ANALYSIS AND DEVELOPMENT STRATEGY OF BEEF CATTLE IN CENTRAL JAVA PROVINCE

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ABSTRACT

Central Java Province is one of the provinces with the potential to be a source of beef cattle. The increase in the beef cattle population in Central Java province is expected to increase the national beef cattle population significantly. This study aims to assess the potential of beef cattle and develop a strategy for its development in the Province of Central Java. A study was done using the survey method, and secondary data were obtained from related agencies. Samples were taken using the stratified proportional method as many as 112 farmers. Data were analyzed using LQ analysis, trend analysis, and SWOT analysis. LQ analysis showed that beef cattle's potential base area was in the Grobogan Regency and Kendal Regency. Estimation of beef cattle population in Central Java Province based on trend analysis shows that the areas of Salatiga City, Demak Regency and Grobogan Regency have the potential to become beef cattle base areas. Based on the carrying capacity, areas that can potentially increase livestock populations are Semarang Regency, Salatiga City, and Grobogan Regency. The results of the SWOT analysis show that the right strategy in developing beef cattle is in quadrant I, namely supporting the growth of an aggressive strategy that uses strength to gain opportunities. The recommendation that can be given from this study is that the implementation of strategies in each region will differ according to the potential of each region.

Keywords: *beef cattle, LQ, potential, SWOT, trend population*

BACKGROUNDS

The national development program priorities set out in the National Medium-Term Development Plan for 2020-2024 place meat production (including beef) as a national target within the framework to increase food security. In order to meet the demand for beef at this time still depends on imports. Based on data from Statistics Indonesia (2020) and Directorate General of Livestock and Animal Health (2021), with a population of 267 million people and meat consumption of 2.56 kg/capita/year, the demand for meat is 683.29 thousand tons, while the production of domestic meat is 404.59 thousand tons, resulting in a deficit in domestic meat production of 278.70 thousand tons (40.79%) or equivalent to 1.24 million heads. The high demand for beef must be balanced with an increase in the domestic beef cattle population.

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Based on data from Directorate General of Livestock and Animal Health (2021), Central Java Province is one of the beef cattle population centers in Indonesia, with a beef cattle population of 1.8 million or second place nationally, thus increasing the beef cattle population in Central Java will have an impact on increasing the national beef cattle population. The population of beef cattle in Central Java from 2017 to 2020 has increased to 125 thousand heads. The beef cattle population in Central Java is considered vital because it contributes as a supplier of cattle for needs in the Jabodetabek area (Rachman et al., 2017). Related to the matter, to accelerate the improvement of the resilience of food national, the Government has determined that the Kedungsepur Area (Kendal Regency, Semarang Regency, Semarang City, Salatiga City, Demak Regency, Grobogan Regency) is appropriate (Regulation President Number 79 of 2019) as one of area with superior agriculture sector to prioritize in regional and national development. The subsector development farm is part of the development sector of agriculture. Subsector farms have marked strategies to fulfill the need for continuous food increase along with growth in total population, income, and awareness of nutrition, as well as change in patterns and eating (Mayulu et al., 2010).

The Kedungsepur area is a potential area for the development of beef cattle as can be seen in each region's beef cattle population and the number of farmers in 2020 (Table 1). However, over the last four years, the percentage of the beef cattle population in the Kedungsepur area compared to the beef cattle population in Central Java Province has steadily decreased (Table 2).

Table 1. Population of Beef Cattle and Beef Cattle Farmers in the Kedungsepur Area in 2020

No	Regency/City	Population of Beef cattle (head)[1]	Population of Beef Cattle Farmers (people)[2]
1.	Grobogan Regency	198,158	131,255
2.	Semarang Regency	48,748	24,375
3.	Kendal Regency	22,258	10,682
4.	Demak Regency	5,944	1,477
5.	Semarang City	4,039	1,387
6.	Salatiga City	1,345	585

Source: [1]Statistics Indonesia (processed), 2022; [2] Department of Livestock and Animal Health of Central Java Province, 2021

Subsector farms' potency, precisely the commodity of beef cattle, could be developed finely. However, this potential still needs to be utilized optimally. According to Prawira et al. (2015), this is because human resources, natural resources, technology, and livestock facilities have not been used optimally. This study aims to analyze the potential and develop strategies for the development of beef cattle in Central Java Province.

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Tabel 2. Comparison of Beef Cattle Populations in the Kedungsepur Area and Central Java Province in 2010-2020

No	Year	Population of Beef Cattle (head)		Percentage (%)
		Central Java Province	Kedungsepur Area	
1	2010	1,554,458	249,549	16.05
2	2011	1,937,551	291,808	15.06
3	2012	2,051,407	314,639	15.34
4	2013	1,500,077	217,597	14.51
5	2014	1,592,638	243,137	15.27
6	2015	1,642,578	259,863	15.82
7	2016	1,674,573	265,257	15.84
8	2017	1,710,769	265,677	15.53
9	2018	1,751,799	269,781	15.40
10	2019	1,786,932	274,757	15.38
11	2020	1,826,885	280,492	15.35

Source: Statistics Indonesia (Processed), 2022

RESEARCH METHODS

The research was conducted in April - July 2022 in the Central Java Province region, which was purposively chosen with 6 Regencies/Cities designated as the Kedungsepur Area referring to Presidential Regulation Number 79 of 2019, namely Kendal Regency, Semarang Regency, Semarang City, Salatiga City, Demak Regency, Grobogan Regency. The study used survey methods to obtain current or past data about the opinions, beliefs and characteristics of the sample using interview or questionnaire techniques. Samples were taken by using stratified proportional method as many as 112 beef cattle farmers (Slovin's formula) consisted of Kendal Regency with 6 farmers, Semarang Regency with 14 farmers, Semarang City with 5 farmers, Salatiga City with 5 farmers, Demak Regency with 5 farmers, Grobogan Regency with 77 farmers. Secondary data were obtained from related government agencies, including the general condition of the research area, beef cattle population, number of farmers and carrying capacity.

Potency development analysis of beef cattle in the Province of Central Java used LQ (Location Quotient) and trends analysis by instructions of (Hendayana, 2003) and (Sumadi, 2017). In addition, drafting strategy development of beef cattle in the Province of Central Java used SWOT analysis (strengths, weaknesses, opportunities, threats).

1. LQ analysis was used to identify commodity priority in an area. Equality LQ analysis refers to (Hendayana, 2003) as follows:

$$\text{LQ beef cattle} = (pi/pt)/(Pi/Pt)$$

Information:
pi : population of beef cattle in Regency /City i
pt : population of ruminants in the Regency /City i
Pi : population of beef cattle in the Province of Central Java
Pt : population of ruminants in the Province of Central Java

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The results of the LQ calculation have produced three criteria, namely:

a. LQ > 1, meaning that the beef cattle commodity is the basis or source of development in Regency/City I, whose output can not only meet the needs of Regency/City but can also be exported
b. LQ = 1, meaning that the beef cattle commodity is non-basic, the yield of which is only sufficient to meet the needs of Regency/City I and cannot be exported
c. LQ < 1, meaning that the beef cattle commodity is non-basic, the results of which cannot meet the needs of Regency/City I, so it needs supplies from outside or imports.

2. Trend analysis with least squares method was used to calculate the estimated population potential of beef cattle in one area with fixed technical parameters (Sumadi, 2017). Equality analysis trend as follows:

$$Y = a + bX$$

Information :
Y : estimation data
a : constant
b : regression coefficient
X : time

3. SWOT analysis was conducted to identify various factors in a manner systematic to formulate strategy development of efforts. The analysis was based on the logic to maximize strengths and opportunities and minimize weaknesses and threats. The Analysis of Internal-External Factors was conducted before SWOT analysis. Analysis of internal factors aimed to identify critical internal factors that become strengths and weaknesses in the development of beef cattle. At the same time, analysis of external factors aimed to identify external factors including the opportunities and threats for the development of beef cattle.

RESULTS AND DISCUSSION

General Description of Central Java Province

Central Java is geographically strategic, because it is located surrounded by East Java Province (at East), the special region of Yogyakarta dan Indian Ocean (at South), West Java Province (at West), and Java Sea (at North). The farthest distance from West to East is 263 km and from North to South is 226 km (excluded Karimunjawa Island). Central Java Province is divided into 29 regencies and 6 cities. The area of Central Java Province is recorded 3.28 million hectares or about 25.04% of Java Island area or 1.70% of Indonesia's area (Statistics Indonesia, 2022).

The topography of Central Java Province is diverse, including mountains, highlands, lowlands, and coasts. The type of land in the Central Java Province includes organosol, alluvial, planosol, litosol, regosol, andosol, grumosol, mediterranean, latosol and podzolic, which are dominated by latosol, alluvial and gromosol soils type. Those soil types of land are very fertile. According to Statistics Indonesia (2022), the average air temperature in the Province of Central Java in 2021 ranges between 26.5°C - 28.9°C. Regions located nearby beaches have relatively high temperature, and the humidity varies from 70 to 92 %.

In August 2021, the population of Central Java Province aged 15 and up was 27.25 million. The majority of the 8.29 million are students, housewives, unemployed, disabled, and elderly, with 17.84 million in the labor force. In terms of education, Elementary School graduates made up 43.09%

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of the work force in Central Java Province in August 2021. In comparison, graduates of Senior High Schools account for 27.63% of the second composition, followed by residents with graduates of Junior High Schools accounting for 19.78% and residents with university degrees accounting for only 9.50%. The condition of the workforce in Central Java Province indicates that the level of education in Central Java Province still needs to be encouraged to produce quality human beings in the competitive world of work. Agriculture (23.74%); processing industry (22.17%); wholesale and rehead trade (19.47%); and construction (8.29%) continue to dominate the labor market in Central Java Province.

One of the areas that has become a national rice barn is Central Java Province. Rice production in Central Java Province is expected to be 9.77 million tons in 2021, with a harvest area of 1.71 million hectares. This is extremely beneficial to the development of beef cattle farming in Central Java Province. Goats had the largest population with 3,785.91 thousand, followed by sheep with 2,325.82 thousand and beef cattle with 1,863.33 thousand. There are 142.12 thousand dairy cows, 61.01 thousand buffaloes, 7.58 thousand horses, and 99.56 thousand pigs. If compared to the previous year, the beef cattle population increased by 27.61 thousand.

Over a five-year period (2017-2021), the development of the beef cattle population in Central Java Province has increased, with an increase of 152,558 heads or 8.91%. Table 3 depicts the evolution of the beef cattle population in Central Java Province.

Table 3. Population Beef cattle in the Province of Central Java

No	Year	Population Beef Cattle (head)
1	2017	1,710,769
2	2018	1,751,799
3	2019	1,786,932
4	2020	1,835,717
5	2021	1,863,327

Source: Statistics Indonesia, 2022

Characteristics of the Respondents

The respondent's identity is a general description of the respondent's condition. Kalangi et al. (2014) contend that age, education level, farming experience, main job, number of livestock ownership, and livestock ownership status have an effect on a farmer's ability to raise beef cattle. Respondents in this study were beef cattle farmers. Table 4 shows the identities of beef cattle farmer respondents in Central Java Province.

Table 4. The Identity of beef cattle farmer respondents in the Province of Central Java

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Characteristics	Respondents (people)	Percentage (%)
Age (years)		
15-59	85	75.89
60-64	15	13.39
>64	12	10.71
Amount	112	100.00
Level of education		
Elementary school	44	39.29
Junior high school	29	25.89
Senior high school	35	31.25
Bachelor	4	3.57
Amount	112	100.00
Farming experience (years)		
2-7	25	22.32
8-13	28	25.00
14-19	23	20.54
≥ 20	36	32.14
Amount	112	100.00
Beef cattle business		
Main job	22	19.64
As a sideline	90	80.36
Amount	112	100.00
Total livestock ownership (heads)		
1-2	61	54.46
3-5	41	36.61
6-10	8	7.14
11-12	2	1.79
Amount	112	100.00
Livestock ownership status		
One's own	76	67.86
Profit sharing	20	17.86
Own and profit sharing	16	14.29
Amount	112	100.00

Age of Respondents

A total of 100 people (89.29%) are of working age. Statistics Indonesia (2020) reports that the productive age range is 15 to 64 years, while those under 15 and over 64 years are considered non-productive ages. Most of farmers in Central Java Province are in productive age and have significant potential for beef cattle development. The productivity age has a positive effect on beef cattle development because people at that age have a strong desire to introduce technology (Chamdi, 2003) and are able to coordinate and take effective steps for beef cattle development (Prawira et al., 2015).

Level of Education

Most of the beef cattle farmers in Central Java Province have only completed elementary school, with 44 respondents (39.29%) (Table 4). The educational level of beef cattle farmers in Central Java Province still needs to be improved, which can impede the adoption of innovation and the development of technology and information. Purwaningsih et al. (2021) assert that farmers' lack

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of formal education will make it difficult to develop beef cattle because the lower the education level, the more difficult it is to absorb innovation and apply technology to increase productivity and income. Because it is related to an individual's ability to understand something, the low level of education in Central Java Province is a weakness in the development of beef cattle farming.

Experience with Livestock Raising

Most respondents, as many as 36 or 32.14%, have more than 20 years of experience raising beef cattle. Farming experience makes farmers more proficient in livestock work, allowing them to increase their income. Purnomo et al. (2017) contend that farming experience can help farmers run their livestock business indefinitely. Farming experience allows a farmer to quickly identify existing problems and become more skilled in their livestock business.

Main Job

Ninety respondents, or more than 80%, raise beef cattle as part-time job to increase their income. This condition makes the development of beef cattle industry did not optimally develop. Central Java Province is a development area for agricultural commodities, food crops, and horticulture, therefore beef cattle farming is an important part of people's livelihoods.

Number and Status of Cattle Ownership

Beef cattle ownership in Central Java Province is still on a small business scale (less than five heads), with 1-2 heads owned by 61 respondents or 54.46% and 3-5 heads owned by 41 respondents or 36.61%. The low number of livestock owners is due to the fact that they also run a food crop/horticulture business in addition to raising beef cattle. Therefore, the farmer made the decision to reduce the number of beef cattle in order to devote more time to the food crops/horticulture business. The private sector owns most of the beef cattle (76 respondents, or 67.86%), while profit sharing ("commotion") is owned by 20 respondents, or 17.86%. The status of livestock ownership influences livestock farming motivation, which in turn influences livestock business efficiency (Kalangi et al., 2014).

Beef Cattle Livestock Potential

LQ analysis provides an overview of the area's potential for beef cattle development. LQ analysis is a statistical model used to determine the characteristics of a commodity by determining the specialization of a region for certain commodities, which determines whether the commodity is a basic or non-base commodity (Santosa et al., 2013). According to Hendayana (2003), the LQ value indicates the degree of specialization or concentration of a commodity in an area. The greater the LQ value, the greater the degree of concentration in that area. Table 5 shows the LQ analysis results.

Table 5. LQ Analysis Results of Beef Cattle in the Central Java Province

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Regency/City	2017	2018	2019	2020	2021	Means	Information
Kendal Regency	1.04	1.05	1.00	1.03	1.02	1.03	Base
Semarang Regency	0.69	0.63	0.67	0.65	0.65	0.66	Non-Base
Semarang City	0.79	0.79	0.77	0.74	0.75	0.77	Non-Base
Salatiga City	0.40	0.30	0.39	0.38	0.38	0.37	Non-Base
Demak Regency	0.35	0.37	0.36	0.35	0.31	0.35	Non-Base
Grobogan Regency	1.45	1.43	1.43	1.39	1.40	1.42	Base

Source: Statistics Indonesia (Processed), 2022

Based on the description of Table 5, it can be seen that of the 6 regencies/cities as locations for in-depth research based on beef cattle development, Grobogan Regency and Kendal Regency have an average LQ value of > 1, namely 1.42 and 1.03. This demonstrates that the Grobogan and Kendal Regencies have the potential to develop beef cattle because beef cattle is the leading commodity in those areas. Meanwhile, Semarang Regency, Semarang City, Salatiga City, and Demak Regency have average LQ<1 values of 0.66, 0.77, 0.37, and 0.35, respectively, and those do not include the base region for the development of beef cattle. According to Hendayana (2003), areas with LQ value > 1 can be developed to meet the needs of the area as well as the needs of the surrounding area. As a result, the government's involvement in structuring the beef cattle supply chain in Central Java Province is required.

Beef Cattle Population Estimation

Trend analysis is used to predict beef cattle population estimation. Trend analysis necessitates the collection of information (data) over an extended period of time. Estimating the buffalo population in Central Java requires at least 5 years of population data (Sumadi, 2017). A linear regression equation is obtained using beef cattle population data from 2013 to 2021, as shown in Table 6.

Table 6. Estimated Linear Equations about the Potential Population of Beef cattle in the Central Java

Regency/City	Linear Equations
Kendal Regency	y = -147.63x + 22442
Semarang Regency	y = -403.08x + 51316
Semarang City	y = -68.65x + 4626.9
Salatiga City	y = 7.2667x + 1296.6
Demak Regency	y = 231.87x + 3974.9
Grobogan Regency	y = 7110.8x + 144749

Source: Statistics Indonesia (Processed), 2022

Table 6 shows three regencies/cities that received negative feedback and three regencies/cities that received positive feedback. Kendal Regency, Semarang Regency, and Semarang City have a negative sign. This indicates that the beef cattle population in the area is expected to decline year after year unless the management and population development improve. Meanwhile, Salatiga City, Demak Regency, and Grobogan Regency showed signs of improvement. This indicates that if the technical

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coefficient of beef cattle remains constant or increases, the estimated population of beef cattle in an area will increase.

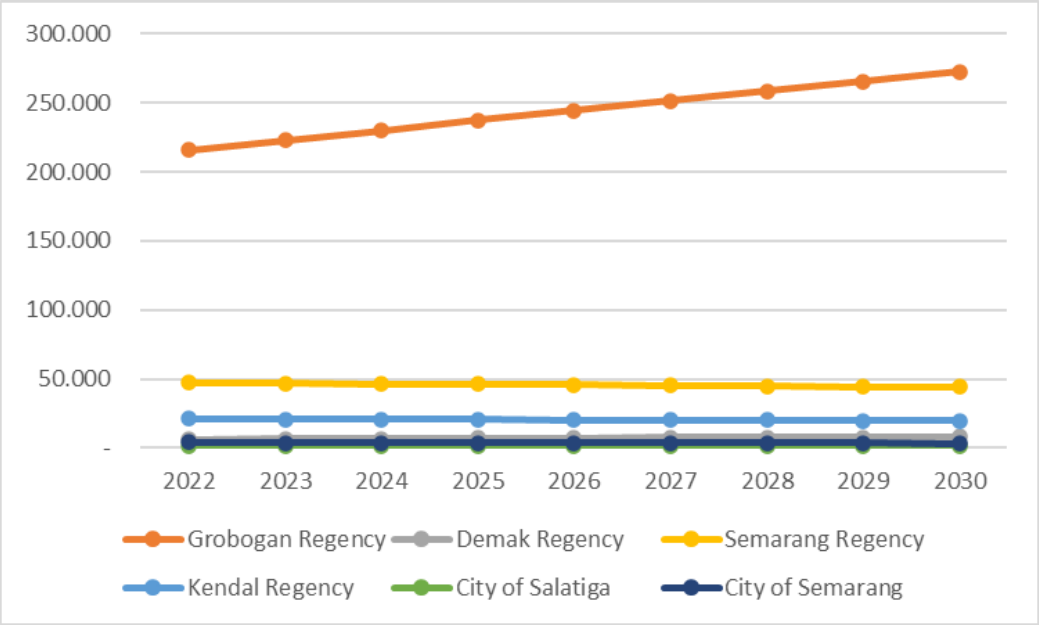

Figure 1. Estimation of Potency Population Beef cattle in the Province Central Java

Grobogan Regency has the potential to develop beef cattle, as the population grows each year (Figure 1). The beef cattle population in Grobogan Regency is expected to reach 272,743 heads by 2030, with an annual growth rate of 7,111 heads. The City of Semarang, on the other hand, is experiencing negative growth, with a 14% decrease in the beef cattle population between 2022 and 2030. The decline of beef cattle population in Semarang City possibly because of the conversion of functional agricultural land to non-agricultural land. Putri (2015) argues that the area of agricultural land in urban areas in Central Java Province will shrink as the population grows.

The Potential of Carrying Capacity

The development of beef cattle requires an area or grouping based on the size of the area and the prospects for the development of beef cattle based on the carrying capacity that indicates the availability of the fibrous feed. Carrying capacity in Central Java Province can be seen in Table 7.
Feed-carrying capacity is the ability of a region to accommodate several specific livestock populations optimally (Priyanto, 2011). Ardhani (2008) defines regional carrying capacity for traditional livestock as the region's ability to produce forage that is sufficient for the needs of livestock both fresh and dry form without requiring special processing or additional feed. Based on carrying capacity data in Central Java Province, there are three regencies/cities with feed surplus: Semarang Regency, Salatiga City, Grobogan Regency, and 3 regencies/cities with feed deficit: Kendal Regency, Semarang City, Demak Regency. The calculation of carrying capacity in Central Java Province comes from superior grass, field grass, and agricultural waste (rice straw, corn straw, cassava leaves, sweet potato leaves, soybean straw, peanut leaves, sugarcane leaves, and other leaves). Adinata (2020) argues that carrying capacity is affected by the area of agricultural land, grass harvested, and the ruminant livestock population.

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Table 7. Carrying capacity in Central Java Province

Regency/City	Population (animal unit)	Carrying Capacity (animal unit)	Difference (animal unit)
Kendal Regency	175,908	104,239	(- 7,.669)
Semarang Regency	179,593	1,504,452	1,324,859
Semarang City	18,528	4,986	(-13,542)
Salatiga City	8,901	9,359	458
Demak Regency	191,287	112,394	(-78,893)
Grobogan Regency	209,578	237,694	28,116

Source: Department of Livestock and Animal Health of Central Java Province. 2021

Areas with ruminant populations that exceed the feed-carrying capacity require feed processing technology, especially to overcome feed scarcity during the dry season (Mukson et al., 2014). In addition, non-conventional agricultural waste can be mixed in the ruminant feed formulation as complete feed. The examples of non-conventional agricultural byproducts for animals' feed are corn cobs, bagasse, peanut shells (Purbowati et al., 2021), and water spinach waste (Hasanah et al., 2020) in the form of pelleted feed. (Adiwinarti et al., 2023) reported that corn cobs, bagasse, and peanut shells can replace 50% of Napier grass in lamb's ration without affected the product (slaughter weight, carcass weight, and edible portion of carcass and offal). According to Purbowati et al. (2021), agricultural waste (corn cobs, bagasse, and peanut shells) that were used as an alternative to replace grass up to 50% containing crude protein content of 10.73%; 10.36%; and 10.41%, respectively. Hasanah et al. (2020) found that water spinach waste can replace up to 20% of grass in ruminant feed with a crude protein content of 10.65%.

Beef Cattle Development Strategy in Central Java Province

The internal and external environments can be identified to develop a beef cattle development strategy. One environmental analysis technique based on this logic is to maximize strengths and opportunities while simultaneously minimizing weaknesses and threats, which is commonly referred to as SWOT analysis. Internal factors, such as natural resources, human conditions, finance, operations/production, management, and marketing, are analyzed to identify strengths and weaknesses in developing a cattle business. External factor analysis is used to identify key factors that become opportunities and threats for business development, such as environmental, social, and economic factors, as well as government policies and technology. Table 8 shows the outcomes of identifying internal and external factors.

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Table 8. Identification of Internal and External Factors

Internal factors	External Factors
Strength	Opportunity
1. Experience in raising beef cattle. 2. Farmer Age 3. Motivation of raising beef cattle 4. Willingness of farmers to join a group of beef cattle farmers. 5. The quality of feeder calves and replacements heifers are very good and abundantly available 6. Abundant forage during the rainy season and concentrate feed 7. There is integration with food crop farming	1. The demand for beef cattle increases every year 2. Facilities and infrastructure to support beef cattle business at the farmer level are available 3. There is government support to increase the beef cattle population 4. There are low-interest loans 5. There are livestock by-products and waste that have economic value 6. There is an increased of knowledge, income, and public awareness of nutrition
Weakness	Threat
1. Low formal education of farmers 2. Beef cattle business as a side business 3. Small-scale livestock ownership 4. Farmers are less interested in access to capital 5. Low understanding of farmers about reproduction, disease, feed and agricultural byproduct processing 6. Groups of beef cattle farmers are less active 7. The selling price of livestock is low 8. Limited forage during the dry season	1. Limited information on feed technology and fattening management of beef cattle by the Government 2. Foot and Mouth Disease Outbreak 3. Changes in people's purchasing patterns for beef 4. The quality of the feeder calves and replacement heifers are not good 5. There are imported cattle and beef 6. The role of broker is dominant in determining prices at the farm level. 7. Changing the function of agricultural land into non-agricultural land

Based on the environmental strategy analysis, the development of beef cattle can be analyzed by both internal and external factors. Internal factors are identified based on the conditions in the research field. The results showed that the average difference in strengths and weaknesses score was 3.10 - 2.93 = 0.17 (x), as shown in Table 9.

Table 9. Internal Factors in the Development of Beef Cattle in the Central Java Province

No	Strength	Ratings	Weight	Score
1.	Experience in raising beef cattle	2.63	0.12	0.32
2.	Farmer Age	3.65	0.17	0.63
3.	Motivation of raising beef cattle	2.43	0.11	0.28
4.	Willingness of farmers to join a group of beef cattle farmers	2.79	0.13	0.37
5.	The quality of feeder calves and replacements heifers are very good and abundantly available	3,47	0.16	0.57
6.	Abundant forage during the rainy season and concentrate feed	3,32	0.16	0.52
7.	There is integration with food crop farming	2.96	0.14	0.41
	Total		1.00	3.10

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	Weakness			
1.	Low formal education of farmers	3.01	0.14	0.41
2.	Beef cattle business as a side business	2.80	0.13	0.35
3.	Small-scale livestock ownership	3.06	0.14	0.42
4.	Farmers are less interested in access to capital	3,44	0.16	0.53
5.	Low understanding of farmers about reproduction, disease, feed and agricultural byproduct processing	2.67	0.12	0.32
6.	Groups of beef cattle farmers are less active	1.22	0.06	0.07
7.	The selling price of livestock is low	3,41	0.15	0.52
8.	Limited forage during the dry season	2.54	0.11	0.29
	Total		1.00	2.93

External factors include business environmental factors that analyze opportunities and threats for beef cattle farms in the research location (Table 10). The difference of the opportunity and the threat average score was 2.85 - 2.84 = 0.01 (y), which is presented in Table 10.

Table 10. External Factors that Influence the Development of Beef Cattle Business in the Central Java Province

No	Opportunity	Ratings	Weight	Score
1.	The demand for beef cattle increases every year	3.29	0.19	0.64
2.	Facilities and infrastructure to support beef cattle business at the farmer level are available	3.14	0.19	0.59
3.	There is government support to increase the beef cattle population	2.86	0.17	0.48
4.	There are low-interest loans	2.57	0.15	0.39
5.	There are livestock by-products and waste that have economic value	2.43	0.14	0.35
6.	There is an increased of knowledge, income, and public awareness of nutrition	2.57	0.15	0.39
	Total		1.00	2.85
	Threat			
1.	Limited information on feed technology and fattening management of beef cattle by the Government	2.57	0.13	0.34
2.	Foot and Mouth Disease Outbreak	3,29	0.17	0.55
3.	Changes in people's purchasing patterns for beef	2.71	0.14	0.37
4.	The quality of the feeder calves and replacement heifers are not good	3.00	0.15	0.46
5.	There are imported cattle and beef	2.86	0.14	0.41
6.	The role of broker is dominant in determining prices at the farm level	2.71	0.14	0.37
7.	Changing the function of agricultural land into non-agricultural land	2.57	0.13	0.34
	Total		1.00	2.84

Alternative Strategy

The SWOT matrix can be used to develop alternative beef cattle development strategies. The SWOT matrix explains the internal factors of beef cattle development in conjunction with external factors to produce an alternative formulation of beef cattle development strategies. Gürel and Tat

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(2017) divides the SWOT matrix into four quadrants, with different strategies for each, namely quadrant I, the Strength-Opportunities (SO) strategy, quadrant II, the Strength-Threats (ST) strategy, quadrant III, the Weakness-Opportunities (WO) strategy, and quadrant IV, the Weakness-Threats (WT) strategy. The interaction of internal and external factors resulted in four alternative strategies for beef cattle development in Central Java Province. Table 11 contains information on the four alternative strategies. Detailed four alternative strategies are presented in Table 11.

Table 11. SWOT Matrix of Beef cattle in the Province of Central Java

	Strength (S)	Weakness (W)
	1. Experience in raising beef cattle 2. Farmer Age 3. Motivation of raising beef cattle 4. Willingness of farmers to join a group of beef cattle farmers 5. The quality of feeder calves and replacements heifers are very good and abundantly available 6. Abundant forage during the rainy season and concentrate feed 7. There is integration with food crop farming	1. Low formal education of farmers 2. Beef cattle business as a side business 3. Small-scale livestock ownership 4. Farmers are less interested in access to capital 5. Low understanding of farmers about reproduction, disease, feed and agricultural byproduct processing 6. Groups of beef cattle farmers are less active 7. The selling price of livestock is low 8. Limited forage during the dry season
Opportunities (O)	SO strategy	WO strategy
1. The demand for beef cattle increases every year 2. Facilities and infrastructure to support beef cattle business at the farmer level are available 3. There is government support to increase the beef cattle population 4. There are low interest loans 5. There are livestock by-products and waste that have economic value 6. There is an increased of knowledge, income, and public awareness of nutrition	1. Increasing livestock production by utilizing available (human and natural) resources, technology, partnership patterns, capital networks, and government assistance by implementing an agricultural area approach 2. Increasing collaboration with universities in feed processing by utilizing existing land, waste treatment and reproduction management to increase farmer income. 3. Collaborating with various parties to streamline marketing networks to take advantage of market demand opportunities that are relatively unreachable	1. Provision of knowledge, technology and access to capital for farmers to increase beef cattle production adapted to local conditions 2. Carrying out training and mentoring programs accompanied by demonstrations (pilots) to increase farmers' understanding 3. Activating farmer groups in each village so that they can access capital and government assistance to maintain the sustainability of livestock products 4. Running partnerships between government agencies, universities, and the private sector to direct the

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	4. Promoting beef cattle products by socializing the benefits of local beef and creating processed products based on local beef 5. Efforts are needed to establish partnerships with Livestock Business Actors (private, State-Owned Enterprises, and Regionally-Owned Enterprises) as an implementation of Minister of Agriculture Regulation Number 41 of 2019 that Livestock Business Actors are required to empower farmers in the form of raising cattle 6. Development of livestock businesses through corporate social responsibility (CSR) of surrounding companies and farmer cooperatives with a revolving system or profit sharing	determination of economic business and market information

Threat (T)	ST Strategy	WT Strategy
1. Limited information on feed technology and fattening management of beef cattle by the Government 2. Foot and Mouth Disease Outbreak 3. Changes in people's purchasing patterns for beef 4. The quality of the feeder calves and replacement heifers are not good 5. There are imported cattle and beef 6. The role of broker is dominant in determining prices at the farm level. 7. Changing the function of agricultural land into non-agricultural land	1. Utilizing existing counseling and training as well as collaboration with universities to improve the ability to master technology and innovation as well as good livestock business 2. Strengthening policies on the prevention and control of infectious animal diseases to increase livestock productivity 3. Creating a conducive business climate by establishing partnerships with various parties related to the marketing of livestock/livestock products. 4. Increasing production efficiency and establishing relationships with various feeder/cattle suppliers.	1. Improving the quality of farmer human resources technically and financially through training activities to maximize the production and competitiveness of local livestock products. 2. Improving business management and strengthening the roles and functions of beef cattle farmers groups 3. Establishing cooperation with various agencies in the development of beef cattle

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5. Collaborating with various parties to increase livestock production and maintain consumer confidence in the quality of local products through better production management	

The position of the Central Java Province beef cattle development strategy is determined by internal and external factors. Internal factor analysis has a value of 0.17 if the total score of strengths is subtracted by the total score of weaknesses, and external factor analysis has a value of 0.01 if the total score of opportunities is subtracted by the total score of threats. As shown in Figure 2, the strategic direction in the development of beef cattle in Central Java Province is in quadrant I, where strengths are used to capitalize on existing opportunities.

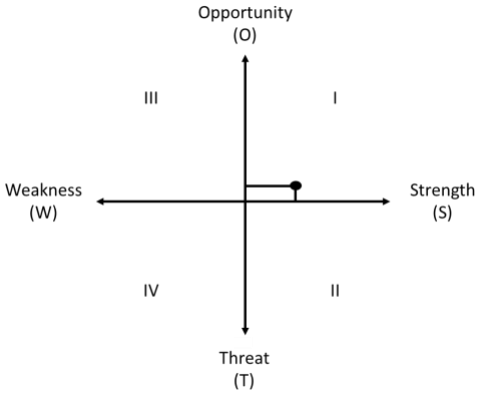

Figure 2. The SWOT Analysis of Beef Cattle business development in Central Java Province

The best beef cattle development strategy in Central Java Province is in quadrant I, which means it supports an aggressive growth strategy (SO strategy). Quadrant I is a favorable condition, with strengths that can capitalize on existing opportunities. Central Java Province has both strengths and opportunities to develop beef cattle. There are managerial implications in the development of beef cattle in Central Java Province based on the study's strategy analysis results. This means that the Regional Spatial Plan is being evaluated by the government. Provision of sustainable agricultural land, as well as efforts to anticipate plans other than beef cattle breeding; strategic alignment between the government, universities, and the private sector in beef cattle development; Previously, it was necessary to disseminate information about the benefits of implementing the agricultural area approach, as well as monitor and evaluate to obtain feedback so that the beef cattle farming area implementation could run smoothly.

Beef Cattle Development

An overview of beef cattle development areas based on LQ analysis, trend analysis, and carrying capacity can be seen in Table 12.

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Table 12. Description of beef cattle development areas

Regency/City	LQ Analysis	Trend Analysis	Carrying Capacity
Kendal Regency	Base	Negative	Surplus
Semarang Regency	Non-Base	Negative	Surplus
Semarang City	Non-Base	Negative	Deficit
Salatiga City	Non-Base	Positive	Surplus
Demak Regency	Non-Base	Positive	Deficit
Grobogan Regency	Base	Positive	Surplus

Based on Table 12, each region has different potential characteristics and problems. The characteristics of the area can be grouped as follows:

1. Region base – Positive population trend – Carrying capacity surplus
   Regions with these characteristics are superior areas for the development of beef cattle population. With a positive population trend, beef cattle are the primary commodity in this region, and feed is abundantly available based on carrying capacity analysis. Grobogan Regency is included in this characteristic. The strategy that can be implemented for this area is to increase the beef cattle population. Furthermore, this area can be developed into a beef cattle population center in the Kedungsepur area.
2. Region base – Negative population trend – Carrying capacity surplus
   Regions with these characteristics are promising for the development of beef cattle population. The primary commodity in this region is beef cattle, which has a surplus of feed but a declining population trend. Kendal Regency is one such area. According to Presidential Regulation Number 79 of 2019, Kendal Regency will be converted into an industrial zone. The strategy that can be implemented is clustering beef cattle development areas, with the Northern region serving as the industrial sector cluster and the Southern region serving as the agricultural sector cluster. This is because the industrial area is located in the northern part of Kendal. Beef cattle will be developed in the southern part of Kendal using surplus animal feed.
3. Non-base area – Positive population trend – Carrying capacity surplus
   Regions with these characteristics are progressive in the development of beef cattle population. Regions with positive beef cattle population trends and feed surpluses, but beef cattle are not the primary commodity in this region. Salatiga City is one such location. Salatiga City is not a beef cattle commodity base area, but dairy cattle base area. Farmers receive bogus capital from investors who want to raise beef cattle, which leads to the development of beef cattle. Corporate social responsibility (CSR) is one strategy that can be used to increase the population of beef cattle. In addition, it is necessary to improve beef cattle management in order to increase productivity and final body weight by using local feed and the addition of concentrates feed.
4. Non-base area – Positive population trend – Carrying capacity deficit
   Regions with these characteristics are progressive areas in the development of beef cattle population. Regions with positive beef cattle population trends are not an essential commodity in these areas with feed deficit conditions. Demak Regency is an area with this characteristic. Because the food crop sub-sector (rice commodity) is highly developed in this area as the primary source of income for the people, most beef cattle business are for savings. The strategy that can be implemented in this area is to increase feed sources form non-traditional agricultural waste, which is processed into complete feed to meet the demand for animal feed.
5. Non-base area – Negative population trend – Carrying capacity surplus

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Regions with these characteristics are non-leading areas for beef cattle commodities. Beef cattle are not an essential commodity in this region; the population trend is negative but has the advantage of a feed surplus. Semarang Regency is an area with this characteristic. Many farmers in Semarang Regency raise dairy cows. According to Minister of Agriculture Decree No. 830 of 2016, Semarang Regency is a dairy cattle development area. The strategy that can be implemented is that farmers remain focused on developing dairy cattle commodities because this commodity has a comparative advantage over other commodities. In addition, beef cattle can be developed by fattening male calves from dairy cows.

6. Non-base area – Negative population trend – Carrying capacity deficit

Regions with these characteristics are non-leading areas in the livestock sub-sector. Beef cattle are not an essential commodity in this region, population trends are negative, and feed deficits mean that the areas with these characteristics are not recommended for beef cattle development. Semarang City is an area with these characteristics. To meet the demand for beef in Semarang City is accomplished by importing beef cattle from other regions. A strategy that can be implemented is that the government has to focus on monitoring livestock products and infectious animal diseases that enter in the city of Semarang.

The government and the Regional Government of Central Java Province can prioritize the development of beef cattle in superior areas. These areas, which are included in the beef cattle population base area and have a positive population trend, as well as areas with a surplus of feed, are used to increase the beef cattle population. In addition, identifying the characteristics of potential and problems in each regency/city allows for strategy specialization for each region without ignoring other commodities.

CONCLUSIONS AND SUGGESTIONS

According to LQ analysis, the potential base areas for beef cattle development are the Regencies of Grobogan and Kendal. Based on trend analysis, the estimated beef cattle population in Central Java Province for 2022-2030 is Salatiga City, Demak Regency, and Grobogan Regency. Based on the carrying capacity, areas that can potentially increase livestock populations are Semarang Regency, Salatiga City, and Grobogan Regency. Based on the study's findings, it is possible to conclude that the beef cattle development strategy in Central Java Province employs an aggressive growth strategy, namely: (i) Increasing livestock production by utilizing available resources (human and natural), technology, partnership patterns, network capital and assisting the government in implementing an agricultural area approach; (ii) Increasing cooperation with feed processing universities by utilizing existing land, processing waste and managing reproduction to increase farmers' income; (iii) Collaborating with various parties to streamline network marketing in order to take advantage of market opportunities whose demands have not been met; (iv) Promoting beef cattle products by disseminating information about the benefits of local beef and creating processed products based on local beef; (v) Efforts are needed to establish partnerships with Livestock Business Actors (private, State-Owned Enterprises, and Regionally-Owned Enterprises) as an implementation of Minister of Agriculture Regulation Number 41 of 2019 that Livestock Business Actors are required to empower farmers in the form of raising cattle; and (vi) Development of livestock businesses through corporate social responsibility (CSR) of surrounding companies and farmer cooperatives with a revolving system or profit sharing.

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Suggestions that can be given from this study are: (i) the implementation of strategies in each region will differ according to the potential of each region; (ii) it is necessary to improve the management of beef cattle maintenance and government support in anticipating negative trends in the beef cattle population in Kendal Regency, Semarang Regency, and Semarang City; (iii) It is hoped that in the development of beef cattle in Central Java Province by the government, livestock business actors, and through CSR, the focus will pay attention to the socio-economic conditions of the farmers, which include age, level of formal education, farming experience, primary occupation, number of cattle ownership, and ownership status; (iv) there is a need for the utilization of non-conventional agricultural wastes such as corn cobs, bagasse, and peanut shells as well as water spinach waste as animal feed in the form of pelleted complete feed; and (v) there is a need for livestock price guarantee at the farmer level by using measuring instruments/scales as the basis for price determination.

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