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Competitiveness and Impact of Government Policies on Beef Cattle Business in East Kolaka District, Indonesia: A Policy Analysis Matrix Approach

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ABSTRACT

Beef is one of the main food commodities, so to realize beef self-sufficiency, the government has made many policies to realize the beef self-sufficiency program.The objective of this study was to analyze the competitiveness and impact of government policies on beef cattle in East Kolaka District, Southeast Sulawesi Province. This research was conducted in East Kolaka Districtin 2024, a total of 120 beef cattle farmers were surveyed using systematic purposive sampling and data were analyzed using the Policy Analysis Matrix (PAM) an economic tool for evaluating competitiveness and policy effects. The respondents were obtained by applying systematic purposive sampling with survey method and analyzed with PAM. The results showed that beef cattle farming in East Kolaka Districtispersonally and socially profitable. This explains that beef cattle farming is still profitable for farmers even without government policy. This business also has competitiveness both competitively and comparatively. This can be seen from the Domestic Resource Cost Ratio (DRC) svalue of 0.59 and Private Cost Ratio (PCR) of 0.81. Government policies on *outputs* and *inputs* of beef cattle business in East Kolaka District reduce incentives for producers, are ineffective in protecting production and cause higher production costs compared to potential profits without these policies.

Keywords: *Beef Cattle, Competitiveness, PAM,Policy Impact*

Introduction

The agricultural sector has a strategic role in Indonesia's development, mainly as a provider of food, feed, industrial raw materials, labour absorption, source of foreign exchange, source of income and environmental conservation through the application of environmentally friendly farming practices (Dinata*et al.,* 2024; Rouf *et al.,* 2014). One of the important subsectors in agriculture is the livestock sector (Atika *et al.,* 2024; Yunomo, 2024) which is believed to have great potential as the main driver of the national economy and maintaining food security (Ardans*et al.,* 2016; Izha 2017; Patriani*et al.,* 2024). This potential is supported by various factors such as the abundant quantity and diversity of livestock resources, strong linkages between the livestock industry and other sectors both upstream and downstream, utilization of local resources and comparative advantages in terms of livestock resources.

Livestock products that are currently prioritized by the government include meat (Afiyah*et al.,* 2024) which is one of the main animal food sources besides eggs and milk (Ding 2021). In Indonesia, meat needs are met from various types of livestock, one of which is cattle (Rahman andKusumawati, 2025). Beef is one of the main food commodities so to achieve beef self-sufficiency, the government has made many policies, including the implementation of the Beef Self-Sufficiency Program (BSSP) (DIRGEN PKH, 2021; Ministry of Agriculture, 2017). This program aims to increase the potential of domestic livestock and reduce dependence on imports of feeder cattle and beef.

Competitiveness is the ability of local beef cattle to compete with imported meat or imported feeders. One common method to analyse the competitiveness as well as the impact of government policies on this sector is the Policy Analysis Matrix (PAM) which can help in formulating more effective policy strategies (Pearson *et al.,* 2005). Government policies include all policies or regulations set by the government in the field of agriculture, such as policies that establish beef cattle production centres in this study. PAM is an approach to agricultural policy analysis for decision-makers or analysts that provides both concepts for understanding policy effects and techniques for measuring the magnitude of a policy's impact (Priyanka *et al.,* 2015). PAM is conceptually an economic analysis method used to assess efficiency, competitiveness

and policies related to domestic resource utilization in a sector including the livestock sector.

Southeast Sulawesi Province has the potential for domestic resources used as beef cattle *inputs*, namely people who raise livestock very much, there is a lot of land for food crops, plantations that can be combined with livestock, there is enough land for grazing and there are many forests (Nafiu *et al.,* 2020; Nafiu, 2018). The potential available forage for beef cattle is 1,938,433 tons of BK/year and straw as beef cattle feed is 494,467 tons/year (Aljumiati*et al.,* 2021). This province is one of the provinces in eastern Indonesia with a land area of 36,159.71 km² (BPS, 2024) consisting of 15 districts and 2 cities. Of the 17 districts/cities in Southeast Sulawesi Province, all have beef cattle businesses.

East Kolaka District plays a significant role in supporting the population and production of beef cattle in Southeast Sulawesi Province. The increase in beef cattle population from 14,849 heads in 2018 to 22,983 heads in 2022 is supported by an area of 3,634.74 km². This region has 364,462 hectares of agricultural land, accounting for 91.07% of the total area, with rice paddies being the most extensive food crop commodity, which can be utilized as local feed for beef cattle. However, until now, there is no information available that can be used as a reference to assess the competitiveness of beef cattle enterprises in this region. Therefore, detailed data is needed to understand the potential of abundant domestic resources that can be optimally utilized as inputs in beef cattle farming. One of the main questions that needs to be answered is whether beef cattle farming in East Kolaka District is competitive or comparative. These questions aim to examine the private and social returns, assess the competitiveness and also analyze the impact of government policies on beef cattle enterprises. If beef cattle in this region are competitive, the increased demand for cattle from outside (both in the form of meat and imported feeders) should be able to be met through increased cattle supply from East Kolaka District, which helps Southeast Sulawesi Province.

However, if it turns out that competitiveness has not been achieved,is necessary to improve the competitive advantage of beef cattle farming in this area. With these efforts, the advancement of beef cattle farming in East Kolaka District is expected to be strengthened can achieve high competitiveness both competitively and comparatively with the influence of appropriate policies from the government. Ultimately, the region can meet its beef needs independently, while contributing to the fulfillment of beef needs at the national level in assisting Southeast Sulawesi Province. In addition, this study adds value to research already conducted by Gerhana *et al.,* (2025a) which focused on assessing the competitiveness and profitability of Bali cattle in South Konawe and Muna Districts. Therefore, the objective of this study is to evaluate the competitiveness and the effects of government policies on beef cattle farming in East Kolaka District, Southeast Sulawesi Province.

Materials and Methods

The research was carried out in East Kolaka Regency in 2024, utilizing primary data as the main source of information.Primary data were collected from beef cattle farmers including characteristics and production factors such as *inputs* and *outputs* while secondary data were collected from various related institutions. From 12 sub-districts in East Kolaka District, a total of 120 respondents were purposively selected, with 10 farmers representing each sub-district. Key respondents in this study were beef cattle farmers as the main actors in beef cattle business.In PAM (Policy Analysis Matrix) analysis, the number of respondents required is not too large. According to Nurmalina *et al.,* (2023), the data used in PAM research can come from the number of farmers. This is because the data included in PAM are central tendency values, not parameters estimated through econometric models that require a statistically valid sample size.

Policy analysis matrix

This study employed the Policy Analysis Matrix (PAM) to evaluate both the competitiveness of beef cattle farming and the impact of government policies. Additionally, the analysis incorporated sensitivity testing to examine how fluctuations in input and output prices influence profitability and competitiveness. As outlined by Nurmalina *et al.,* (2023), this approach is instrumental in determining the degree to which competitive and comparative advantages can be realized through the efficient use of domestic resources and tradable inputs.

Table 1. Policy Analysis Matrix (PAM) Variables and Indicator Calculations

Description	Revenue	Input Cost		Profit
		Tradable	Non tradable	
Privat price	A	B	C	D
Social price	E	F	G	H
Policy Impact	I	J	K	L

Source: Nurmalina *et al.,* (2023)

Input costs in the PAM analysis were classified into foreign and domestic components based on the types of inputs used. Inputs used in beef cattle business include feeder cattle, grass, rice/corn straw, rice bran, tofu pulp, water, salt, vitamins, traditional medicine, labour, cages, wells, hoes, shovels, sickles/machete, baskets, sacks, ropes, electricity and lights, and fuel oil. Of these inputs, the tradable components are vitamins, salt, and fuel. This classification refers to official sources

that show that these inputs are mostly imported or influenced by international market prices according to the Coordinating Ministry for Maritime Affairs and Investment (2023), Ministry of Trade (2024), and Minister of Energy and Mineral Resources Regulation (2020).

The basic price determination that is established cannot be directly used in economic analysis because it does not reflect the social cost (opportunity cost). A commodity would have a cost equal to the market cost in a perfectly competitive market. Therefore, in order to obtain a value that approximates the social cost, an adjustment must be made.The social price is calculated by approximating the shadow price of the good. According to Ferrari *et al.,* (2023) for exported commodities, the Free on Board (FOB) price is used, while for imported commodities, the Cost Insurance Freight (CIF) price is applied. Since the FOB price represents the price at the export port, transportation and handling costs from wholesalers to the port must be deducted. Meanwhile, transportation and handling costs from the port to the research location must be added to the CIF price, which reflects the price at the import port.

Explanation of indicators and formulas Table 1:

- Private Profit (D). Measures the actual profit earned by producers based on market (private) prices, which is the difference between total revenue (A) and the total cost of tradable inputs (B) and domestic factor costs (C). Formula: D=A-(B+C)
- Social Profit (H). Measures the profit earned by producers based on social (economic) prices that reflect economic efficiency without policy distortions. Formula: H=E-(F+G)
- Output Transfer (I). Difference between market price revenue (A) and social price revenue(E). Describes policy-induced distortions in output. Formula: I=A-E
- Input Transfer (J). The difference between the cost of tradable inputs based on market prices (B) and social prices (F). Describes distortions in inputs. Formula: J=B-F
- Transfer Factor (K). The difference betweendomestic factor costs based on market prices (C) and social prices (G). Indicates distortionsin domestic factor costs. Formula: K=C-G
- Net Transfer (L). Measures the total impact of the policy on producer profits. Calculated as the difference between private profits (D) and social profits (H), or through other formulas involving output, input, and factor transfers. Formula: L=D-H=I-(J+K)
- Private Cost Ratio (PCR). Indicates the efficiency of private costs to generate profits. A value smaller than 1 indicates high competitiveness. Formula: PCR=C/(A-B)
- Domestic Resource Cost Ratio (DRC). Measures the efficiency of using domestic resources in production. A value of DRC < 1 indicates a comparative advantage. Formula: DRC=G/(E-F)
- Nominal Output Protection Coefficient (NPCO). Measures the degree of output protection due to government policy. A value greater than 1 indicates positive protection. Formula: NPCO=A/E
- Nominal Input Protection Coefficient (NPCI). Measures the degree of distortion of tradable input prices due to policy. Values greater than 1 indicate a subsidy on inputs. Formula: NPCI=B/F
- Effective Protection Coefficient (EPC). Indicates the net level of protection a producer gets from the policy. Formula: EPC=(A-B)/(E-F)
- Coefficient of Profit (PC). Measures the relative advantage of the policy. PC value>1PC> 1PC>1 indicates that producers get greater profits due to the policy. Formula: PC=D/H
- Producer Subsidy Ratio (SRP). Measures the proportion of subsidies received by producers to social revenue. Formula: SRP=L/E

Assessment matrix

The competitiveness assessment matrix is reflected by the range of commodities, whether they are very high, high, medium, low or very low in competitiveness. The criteria are presented in Table 2.

Table 2. Competitiveness Assessment Criteria

Indicator	Score criteria				
PP	+	-	-	-	-
SP	+	+	-	-	-
PCR	+	+	+	-	-
DRC	+	+	+	+	-
Combined value	4+	3+ 1-	2+ 2-	1+ 3-	4-
Competitiveness	Very high	High	Medium	Low	Very low

Source: Gerhana *et al.,* (2025b)

Description: Private Profit (PP), Social Profit (SP) Private Cost Ratio (PCR), dan Domestic Resource Cost Ratio (DRC)

The variation in the competitiveness level of a commodity can be utilized to establish the priority scale for its development (Gerhana *et al.,* 2025b):

- Commodities that have very high competitiveness are highly prioritized for development.
- Commodities that are highly competitive remain a priority for development; however, those with exceptionally high competitiveness are given the highest development priority.

- Moderately competitive commodities have two potential outcomes: they may be developed or not, depending on the presence of policy distortions or market failures.
- Meanwhile, commodities with low or very low competitiveness should not be prioritized for development.

Sensitivity analysis

The next analysis after the competitiveness and the influence of government policies are known, a sensitivity analysis is conducted. Sensitivity analysis is an analysis that complements PAM analysis in order to see changes in various factors to an economic feasibility if there are events that are different from the estimates that have been made on the competitiveness of beef cattle in East Kolaka District. Sensitivity analysis is an analysis used to look back at the effects that will occur as a result ofchanging circumstances including *input* policies, *output* policies and others on profits and competitiveness in the PAM matrix. These changes occur based on assumptions of conditions that may occur (Nurmalina *et al.,* 2023).

Results and Discussion

Competitiveness of beef cattle businesses in east Kolaka District

PAM is an agricultural policy analysis tool for decision makers or analysts that provides both concepts for understanding policy effects and techniques for measuring the magnitude of policy impacts (Pearson *et al.,* 2005). PAM is conceptually an economic analysis method used to assess efficiency, competitiveness and policies related to domestic resource utilization in a sector including the livestock sector.

Table 3. Variables and Calculation of Beef Cattle Business PAM Indicatorsin East Kolaka District (IDR/head/year)

Description	Revenue	Input cost		Profit
		Tradable	Non tradable	
Privat price	9,703,703	1,937,544	6,287,665	1,478,494
Social price	19,092,373	8,434,547	6,250,365	4,407,461
Policy impact	(9,388,670)	(6,497,004)	37,300	(2,928,967)

Source: Primary data (processed, 2025)

The PAM analysis of the beef cattle business (Table 3) indicates that income is earned by cattle farmers through the sale of live beef cattle in the market the form of feeders, 8-12 months of maintenance after feeders and the sale of cattle feces. Table 3 shows the benefits of farmers in cultivating beef cattle. Farmers earned a personal profit of IDR 1,478,494 head/year. Table 3 also illustrates the difference in personal and social farmer benefits. Where farmers get social benefits of IDR 4,407,461 head/year. This is consistent with the study by Gerhana *et al.,* (2024) in the Bali cattle development center area of South Konawe District, Southeast Sulawesi which is a neighbor of East Kolaka District, where the benefits obtained by farmers in the region are the personal benefits of farmers of IDR 1,614,465 head/year and social benefits of IDR 6,806,079 head/year, indicating the efficiency and viability of raising livestock in the region.

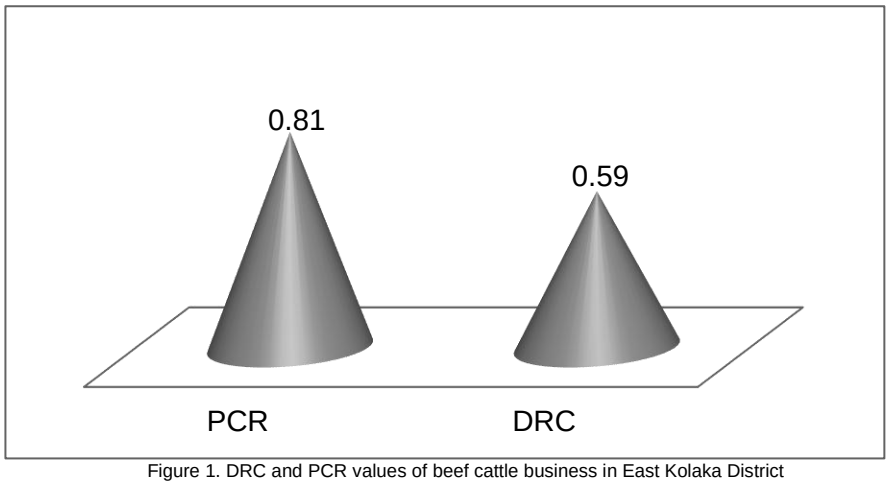

Figure 1. DRC and PCR values of beef cattle business in East Kolaka District
Source: Primary data (processed, 2025)

East Kolaka District is one of the contributors to beef cattle population and production in Southeast Sulawesi Province. Figure 1 shows the DRC value in East Kolaka District with a value of 0.59. The DRC value illustrates that the beef cattle business has a comparative advantage that has provided economic benefits and foreign exchange savings. DRC is a indicates a country's comparative advantage by calculating how much domestic resource cost can be saved to produce one unit of foreign exchange (Sudirman *et al.,* 2018). If the DRC value is <1, the economic activity

is considered economically efficient or possesses a comparative advantage. Conversely, if the DRC > 1, it indicates that the social utilization of domestic resources is greater, or there is wasteful use of domestic resources (Lestari *et al.,* 2017). Beef cattle farmers in East Kolaka Districthave a comparative advantage as indicated by the DRC value of 0.59, meaning that they save IDR 100 domestic factor costs of IDR 41 from beef cattle business. The comparative advantage of beef cattle business is available because farmers in East Kolaka Districtuse feed sources from the garden.

This is similar to the research by Bukifan *et al.,* (2021) in East Nusa Tenggara Province, which is one of the main beef cattle production centers. The DRC value for Bali cattle fattening in Kupang District was found to be 0.77. This value indicates that the shadow value of net domestic inputs in the Bali cattle business is lower than the shadow value of tradable inputs. Therefore, the Bali cattle business has a comparative advantage, as it requires only USD 0.77 of domestic input to produce USD 1 of value.Research by Rahayu *et al.,* (2022) stated that the comparative advantage of a region can be seen from the potential availability of land and a large enough source of forage. This is a strong basis to support the development of ruminants, especially beef cattle (Abadi *et al.,* 2019). Furthermore, with these resources, the region has a great opportunity to optimally develop the livestock sector, which in turn can improve the local economy. These comparative advantages also support the advancement of beef cattle farming (Zahra *et al.,* 2025).

The a PCR value of 0.81 for beef cattle enterprises in East Kolaka District is illustrated in Figure 1. The PCR value of beef cattle enterprises in East Kolaka District reflects the ability of farmers to cover the cost of domestic production factors at prevailing market prices, indicating the presence of a competitive advantage. With a PCR value of less than 1 specifically 0.81 these enterprises can generate an output worth IDR 100 using only IDR 81 of domestic inputs. This supports the conclusion that beef cattle farming in the district has a competitive advantage, as indicated by the PCR (Private Cost Ratio) indicator. The research by Sudirman *et al.,* (2018) shows that the PCR value for Bali cattle farming in Plampang District, Sumbawa, West Nusa Tenggara, across three commonly used farming typologies, indicates a comparative advantage: 0.32 for the 66 typology, 0.46 for the tethered typology, and 0.35 for the limited typology. Similarly, Bukifan *et al.,* (2021) found a PCR value of 0.28. In addition, the study by Zahra *et al.,* (2025) on beef cattle farming in North Sumatra Province demonstrates that the beef cattle farming sector in the region is highly competitive.

Table 4.Criteriafor Assessing the Competitiveness of Beef Cattle BusinessesinEast Kolaka District

Indicator	Value	Score criteria
PP	1,478,494	+
SP	4,407,461	+
PCR	0.81	+
DRC	0.59	+
Combined value		4+
Competitiveness		Very high

Source: Primary data (processed, 2025)

According to Gerhana *et al.,* (2025b) that a livestock commodity that has very high competitiveness is highly prioritized for development. The assessment results in Table 4 show that the values of PP (+1,478,494), SP (+4,407,461), PCR (+0.81) and DRC (+0.59)are included in the positive criteria, indicating that they possess very high competitiveness for East Kolaka District. So if these values are combined, a positive value of 4 will be obtained. This combined value indicates that the beef cattle business in East Kolaka Districtis very competitive. Similarly, Rorimpandey and Umboh (2024) found that the level of competitiveness of cattle production in South Minahasa Districtis relatively very high. Understanding this market demand is important for beef cattle entrepreneurs because it can assist in decision making and provide a competitive advantage (Edward *et al.,* 2024). Lombok Timur sustainable competitive advantage is created through the utilisation of potential food crop waste as a feed source for local beef cattle (Anwar and Iskandar, 2024).

Impact of government policies on beef cattle businesses in east Kolaka District

The results of the PAM analysis reveal the presence of divergence effects, resulting in differences between actual and social prices. According to Nurmalina *et al.,* (2023), this divergence occurs due to market failures and policy distortions. In this study, the divergence is depicted in Figure 2.

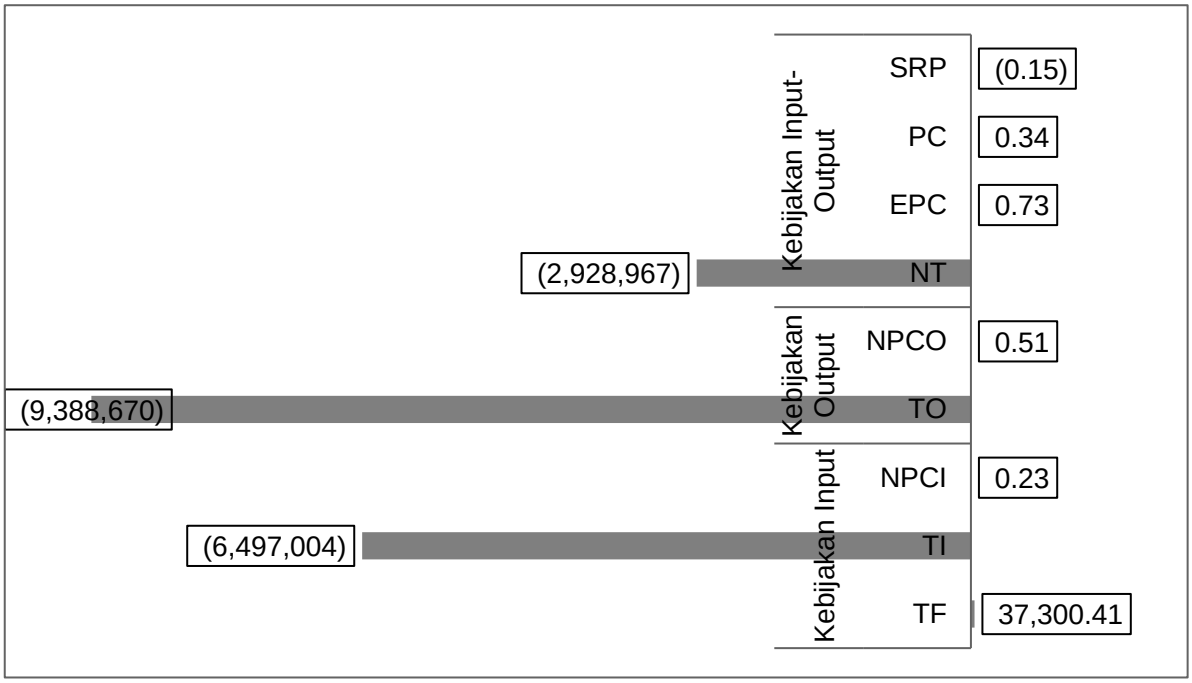

Figure 2. Impact of government policies on beef cattle businesses in East Kolaka District.
Source: Primary data (processed, 2025)

Furthermore, Figure 2 also shows the impact of government policies on beef cattle enterprises in East Kolaka District, particularly on input-output relationships, which represent a combination of input and output policies. The results of the analysis show that the NT value obtained is negative at IDR 9,388,670 which means that farmers experience losses due to applicable policies, because there is a transfer of resources from farmers to other parties. The EPC value of 0.73 indicates that government policies have not provided effective protection to farmers, and even tend to cause a decrease in the price of output received. Furthermore, the PC value of 0.34 indicates that the financial benefits obtained by farmers are only about 34% of the economic benefits that could have been obtained under conditions without policy distortions. Meanwhile, the SRP value of -0.15 indicates that there is no subsidy received by farmers, instead there is a policy burden that reduces their income by 15% of the output value.

A negative SRP value indicates that the policy does not provide enough subsidy to cover some of the production costs so that the policy burdens farmers. The SRP value is as negative as the SRP value obtained by Sudirman *et al.,* (2018), where cattle farmers in Plampang Subdistrict received subsidy indicators with varying SRP values: loose typology -99%, tethered typology 6%, and restrained typology -10% of their offset costs. Meanwhile, Lestari *et al.,* (2017) reported an SRP value of -20%. The subsidies in question currently occur in East Kolaka District such as the provision of breeding females, assistance with medicines and vaccinations for beef cattle.

Sensitivity analysis competitiveness of beef cattle businesses in east Kolaka District

The sensitivity analysis was conducted following the assessment of competitiveness and government policy impacts, to evaluate how changes in key variables affect the beef cattle enterprise. Sensitivity analysis is an analysis that complements PAM analysis in order to see changes in various factorsof economic viability if there are events that differ from the estimates made for beef cattle competitiveness in East Kolaka District.

Table 5. Resultsof Sensitivity Analysis of Beef Cattle Business Competitiveness in Kolaka Timur District

Sensitivity Analysis	Indicator		Change gap	
	PCR	DRC	PCR	DRC
Current condition	0.81	0.59	-	-
20% increase in feeder purchase price	0.87	0.59	-0.06	0
20% reduction in live cattle selling price	1.08	0.59	-0.27	0

Source: Primary data (processed, 2025)

Sensitivity analysis can be conducted to determine changes in input prices and output prices on indicators of competitiveness of beef cattle enterprises in East Kolaka District. Table 5 shows that if the selling price of live cattle as the main output of beef cattle business in region decreases by 20%, the DRC value remains 0.59 in East Kolaka Districtfrom the current DCR condition, while the PCR value decreases to 0.87 from the current condition. If the condition when the

purchase price of feeder as the main input increases by 20% where the DRC value also remains 0.59 while the PCR value changes further decrease to 1.08 in East Kolaka District. This shows that if outputs and inputs change by 20%, it does not change the competitiveness condition to keep producing beef cattle locally in the region, but the East Kolaka Districtarea in producing beef cattle has decreased in financing local production so that the results can be taken into consideration from government policy in reducing the selling price of live cattle in particular.

Research in another region of Southeast Sulawesi by Gerhana *et al.,* (2025a) showed that a 15% decrease in the sale price of live cattle reduced the DRC value to 1.12 in South Konawe and 0.79 in Muna. Similarly, the PCR value decreased to 0.94 in South Konawe and 0.63 in Muna. If the purchase price of Bali feeder cattle increases by 15%, the DRC value changes to 0.88 in South Konawe and 0.65 in Muna while the PCR value shifts to 0.82 in South Konawe and 0.55 in Muna.Making the right development strategy to improve competitiveness (Simanjuntak *et al.,* 2025). Natural resources such as grazing land can increase the productivity and competitiveness of local beef cattle products (Nainggolan *et al.,* 2025). East Kolaka Regency continues to maximise the potential of feed resources in the form of forage, rice straw and bran, as well as cocoa shells as the main source of feed that is always available throughout the year so that it remains competitive.

Conclusion

Beef cattle farming in East Kolaka District is profitable both personally and socially. This explains that beef cattle farming is still profitable for farmers even without government policy. This business also has competitiveness both competitively and comparatively. This can be seen from the DRC value of 0.59 and PCR of 0.81. Government policies on outputs and inputs of beef cattle business in East Kolaka District reduce incentives for producers, are ineffective in protecting production and cause higher production costs compared to potential profits without these policies.Therefore, policy adjustments are needed to improve efficiency and support for beef cattle farmers. This includes redirecting subsidies to productive inputs, improving the accuracy of subsidy targeting, improving cattle market access and reducing input dependency through local feed development. Such policy shifts will increase the effectiveness of government interventions and strengthen the long-term competitiveness of the region's beef cattle sector.

Conflict of interest

The authors have no conflict of interest to declare. All authors have seen and agree with the contents of the manuscript.

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