



Farming Sustainability of Beef Cattle in Pesisir Selatan, West Sumatera, Indonesia

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Abstract | Demands for livestock product tends to increase and therefore Indonesian government issued various policies and programs related to the development of beef cattle enterprises. The farmer's capability to provide animal feed, especially forage by utilizing agricultural and plantation waste becomes an essential factor in developing a sustainable beef cattle business. We aimed to determine the potential for beef cattle development, and analyze the index and sustainability status based on four sustainable dimensions. We collected data from 60 beef cattle farmers in Pesisir Selatan Regency, West Sumatera, Indonesia. Livestock feed requirements are based on dry matter digestible (DM) originating from food crop waste. The sustainability of the beef cattle business was assessed based on four indicators economic, social, environmental, and institutional. The total feed availability of Pesisir Selatan regency was 251,378 Tons DM/year, while the current total feed needs are 78,823.93 Tons/DM/year. The ability of the area to accommodate ruminants based on the total availability of feed in the Pesisir Selatan regency is 220,057 ST, with an IDD value of 3.19, which means it is safe for the development of ruminant livestock. Analysis of sustainability showed that the status of the economic dimension, ecological dimension, and environmental dimension were fairly sustainable, and the institutional dimension was less sustainable.

Keywords | Beef cattle, Development, Dimension, Dry matter, Potential, Sustainability

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INTRODUCTION

Agricultural land development is carried out to achieve agricultural development for the benefit of local communities, especially farmers. Economic efficiency becomes difficult due to a decline in the control over farmland (Murtiningrum *et al.*, 2023). Livestock currently play prominent role in societies around the world (Busch, 2023). The livestock sector is a pillar of the world's food system, contributing to poverty reduction, food security, and agricultural development. According to FAO, livestock contributes to 40% of global agricultural production and supports the livelihoods and food and nutrition security of

approximately 1.3 billion people (World Bank, 2022). The increase in animal protein demand is an opportunity which is very good to develop livestock. Efforts to develop beef cattle in Indonesia have been made well by the government, researchers, businessmen and observers in the field of livestock. The beef cattle business is an important part of the agricultural sector as it provides animal protein for the community and contributes significantly to the meat supply (Reni *et al.*, 2023). State institution support from the central to district/city through technical institutions has been considered very adequate with various productive female animal rescue, cattle optimization movement, independent IB, community seedling central, and other

several programs. The effort to increase the population and even beef self-sufficiently is still far from the expectation. The obstacle in supporting beef self-sufficiently in Indonesia still experiences a lack of beef cattle since the increase in population is not the same as the increase in national demand. The Indonesian business of beef cattle livestock is traditional and the management method still uses the available technology and only as a support. Therefore, the results achieved are not maximal. Another problem that still happens in beef cattle livestock in Indonesia includes low productivity, low population, unstable breed supply, insufficient animal feed, low knowledge about livestock technology and uncontrolled animal breeding (Soeprapto and Abidin, 2008).

West Sumatera focuses on the development of beef cattle, as seen from the program that has been done by the government and the related departments, such as the development of beef cattle central area, development of beef cattle seedling ranches, as well as the implementation of various program invented by the central government. Pesisir Selatan District is a district with the largest beef cattle population in South Sumatra, which by 2022 reached 86,630 tail (BPS Sumbar, 2023). Pesisir Selatan District is the beef cattle livestock center, especially Pesisir cattle certainly has natural resources that can support the development of beef cattle in the area. Pesisir Selatan Regency has raw materials for animal feed that come from food crops (rice and secondary crops), horticulture, and plantations. The food crops that are cultivated relatively widely in Pesisir Selatan Regency are rice and corn with a harvest area of 82% for rice and 17% for corn when viewed from the total harvested area of food crop commodities. However, if seen from the cattle ownership, the number of cattle owned by farmer households is 1-5 cattle, the farmer does not consider the beef cattle business as their main priority to utilize the resource they have. The resources owned by farmers are very limited causing the beef cattle business to exist as farmer life support which is always put in a marginalized position. Limited technology access and various situations place farmer in a very difficult position in increasing their capacity in raising cattle. The farmer's capability to provide animal feed, especially forage by utilizing agricultural and plantation waste becomes an essential factor in developing a sustainable beef cattle business. The sustainability of the community beef cattle business depends on the aspects of the economy, society, and environment. The economic aspect can be seen from the profit obtained from the beef cattle business, input availability, market access, and capital. Meanwhile, the social aspect is seen from cattle ownership status, breeder education level, the breeder's interaction with the supporting institution, and business safety. Furthermore, the environmental aspect can be seen from the interaction of the business with the environment such as the utilization

of agricultural waste as animal feed, livestock waste management, as well as livestock management in terms of disease medication and prevention. Several studies about sustainable development in livestock involve sustainability dimensions, including social, environmental, and economic (Ismail and Wahab, 2014), ecology, economy, social, technology and institution (Arofi *et al.*, 2015).

The objective of this research is to determine the potential for beef cattle development in Pesisir Selatan Regency based on food crop waste and to analyze the sustainability of the beef cattle business seen from the economic aspects, social, environmental, and institution. Based on the sustainability index of the beef cattle business, the aspects that support and do not support the sustainability efforts of beef cattle business. The aspect that lack of participation is expected to be the reference for the government to make policies to encourage the sustainability of the beef cattle business.

MATERIALS AND METHODS

RESEARCH SITES

This research was conducted in the Pesisir Selatan District. The location selection was based on considering that Pesisir Selatan District has the largest beef cattle population in West Sumatera. We used desk study and survey methods. To measure the development potential of beef cattle, the desk study method was used as the data used was secondary and sourced from the Central Statistics Agency of the Pesisir Selatan District in 2023. Meanwhile, for the second objective, a survey method was used where data were collected from beef cattle breeders in the Pesisir Selatan district with a sample of 60 breeders using the accidental sampling technique, and a questionnaire as a research instrument.

STUDY VARIABLES AND MEASUREMENTS

Variables measured in this research were: (1) potential for beef cattle development based on food crop waste (rice straw, corn straw, soybean straw, peanut straw, and cassava leaves); (2) the sustainability of beef cattle business, seen from the aspects of economic, social, environmental, and institutional.

DATA ANALYSIS

The data analysis used was descriptive quantitative analysis. The availability of inputs in the development of beef cattle farming, namely the potential of animal feed based on food crop waste was measured by calculating the total production of dry matter in one year based on the area of harvest (hay) per ton per hectare. The equation for calculating the potential of forage is described as follows Syamsu *et al.*, (2003). The availability of straw was measured by calculating the production index multiplied by the harvested area and

dry matter index (0.9). The production index for rice straw (3.86), corn straw (0.86), soybean straw (1.59), peanut straw (2.14), and cassava leaves (0.92). The region's ability to develop beef cattle farming can be calculated using the formula:

$$IDD = \frac{\text{Total Feed Availability in Digestible Dry}}{\text{Total Feed Requirements}}$$

IDD has four criteria, including: Very critical areas, namely areas with $IDD < 1$, Critical areas, namely the area with $IDD = 1$, Vulnerable areas, namely areas with $IDD = 1.5-2$,

and Safe areas, namely areas with $IDD > 2$.

Livestock Unit (ST) is a unit for the ruminant livestock population which was obtained from the total population multiplied by a conversion factor. Livestock uniformity follows (Ashari, 1995), namely cattle 0.7 ST, buffalo 0.8 ST, and goat 0.08 ST. So, to calculate the livestock population in ST use the following formula:

Livestock population in ST = livestock population (tail) x conversion factor of each cattle (0.7); buffalo (0.8): and goat (0.08).

Table 1: Tabulated form of questionnaire in measuring the sustainability of beef cattle business.

Sustainability aspect	Statement	Criteria	Score (0 / 1 / 2)
Economic	Profits obtained from beef cattle farming	0 = Loss, 1 = Paid off, 2 = Profit	0 / 1 / 2
	Access for breeders to obtain cattle feed	0 = difficult to obtain, 1= easy by less superior, 2= easy to obtain the superior breed	0 / 1 / 2
	The type of feed given by the farmer	0 = forage feed only, 1= concentrate feed only, 2= Forage and concentrate feeds	0 / 1 / 2
	Breeders' access to beef cattle market	0 = local market (one district), 1= Market to the outside region (one province), 2= market to outside region (national)	0 / 1 / 2
Social	Livestock and land ownership status	0= The livestock and land owned by other people, 1= Land owned by the breeder but the livestock owned by other people, 2= Both livestock and land are owned by the breeder himself	0 / 1 / 2
	Farmer's education level	0 = no education obtained, 1= Graduate from elementary school until high school, 2= graduate from Diploma-S1	0 / 1 / 2
	Involvement of a breeder in the social system	0 = Individual, 1= Group, but not active, 2= Group, active	0 / 1 / 2
	The level of security of farmers from the risk of livestock theft	0 = There is livestock theft, 1= Livestock theft is rare, 2= Livestock theft never happens	0 / 1 / 2
Environmental	Interaction between breeders and existing agricultural institutions	0 = no interaction with the agricultural institution, 1= Only interact with the farming group, 2= Interact with the group and institution in the agricultural scope	0 / 1 / 2
	Management of livestock waste that has been carried out by farmers	0= the livestock waste is not managed, 1= The livestock waste is managed into organic fertilizer, 2= Livestock waste is managed into biogas and organic livestock	0 / 1 / 2
	Cage sanitation system carried out by breeders	0= Cage sanitation is rarely done, 1= Cage sanitation is only done inside the cage but routine, 2= Sanitation is done inside and outside the cage routinely.	0 / 1 / 2
	Farmers use food crop waste as animal feed	0= does not utilize waste, 1= utilize agricultural waste of only one type, 2= utilizing agricultural waste of more than one type	0 / 1 / 2
	Disease attacks on livestock have occurred	0= The livestock is often attacked by disease for more than three times in a year, 1 = the livestock is rarely attacked by disease; 1-2 times in a year, 2= The livestock is never attacked by disease	0 / 1 / 2
	Mortality level of the livestock	0= there is mortality of more than two livestock in a year, 1= There is mortality of 1-2 livestock in a year, 2= no mortality.	0 / 1 / 2
	Institutional	Counseling activities about beef cattle farming	0 = never, 1= rarely, 2= often
Government assistance that has been obtained is related to the beef cattle business		0 = never, 1= not evenly distributed, 2= evenly distributed	0 / 1 / 2
Involvement of financial institutions in funding beef cattle farming		0= never accessing financial institution, 1= only a small portion of funding comes from financial institutions, 2= All funding comes from financial institutions	0 / 1 / 2

The following calculation is used to determine the minimum requirement for ruminant forage:

$$K = 2,5\% \times 250 \times 50\% \times 365 = 1.14 \text{ tonnes DM/year}$$

Sustainability was measured based on four indicators including economic, social, environmental, and institutional referred to research conducted by (Ismail and Wahab, 2014; Isyanto and Dehen, 2015). The indicator of sustainability measurement of each aspect can be seen in the following Table 1.

Based on Table 1 sustainability decisions are taken based on the sum of the values of all indicators given to economic, social environmental, and institutional aspects. The basis of classification measurement refers to the Sturges formula (Dajan, 2008) as follows:

$$Z = \frac{X - Y}{k}$$

Information: Z= Class interval; X= Highest value; Y= Lowest value, and k= Number of classes or categories.

Each indicator is given the highest score of 2 and the lowest is 0. If each aspect consists of 5 indicators, then the highest score for each aspect is 10 and the lowest is 0. Furthermore, the sustainability value is divided into 3 categories, namely low sustainability, moderate sustainability, and high sustainability shown in Table 2.

Table 2: Indicator and sustainability measure.

Indicator of sustainability	Score	Sustainability status
Economy aspect	0-3	Low sustainability (less sustainable)
	>3-6	Moderate sustainability (fairly sustainable)
	>6-10	High sustainability (sustainable)
Social aspect	0-3	Low sustainability (less sustainable)
	>3-6	Moderate sustainability (fairly sustainable)
	>6-10	High sustainability (sustainable)
Environmental aspect	0-3	Low sustainability (less sustainable)
	>3-6	Moderate sustainability (fairly sustainable)
	>6-10	High sustainability (sustainable)
Institutional aspect	0-2	Low sustainability (less sustainable)
	>2-4	Moderate sustainability (fairly sustainable)
	>4-6	High sustainability (sustainable)

RESULTS AND DISCUSSION

SOCIAL ECONOMY CHARACTERISTICS OF BEEF CATTLE FARMERS

FARMER'S AGE

Age affects someone's in learning, understanding, and

acceptance renewal towards the increase of someone's performance productivity. The results showed that all farmers are in productive age (15-64 y). This was in line with Sugiarto *et al.* (2017) who reported that most respondents (82%) were of productive age (15-56 y), ensuring the availability of workers with sufficient physical ability to manage cattle operations. This condition offers the potential to be exploited for the development of cattle breeding enterprises. Respondents of productive age have a high spirit to develop their agricultural business. This shows that the farmer in the research location is potential enough to do the beef cattle business activities.

FORMAL EDUCATION OF FARMER

The farmers have sufficiently high education levels. For those with high education levels, productivity will also be high since they are rational in thinking compared to the low education level people who generally have difficulty in adopting innovation and are relatively hesitant in making decisions. Gandasari *et al.* (2021) said that the older the farmers are, the less active they are in seeking information from outside sources and more active they are in seeking information from within. The younger the farmers, the more interested in learning about breeding (cosmopolitan). Based on Riyanti (2003), education is one of the factors supporting the success of small-scale businesses with the assumption that the higher the education level, the better their knowledge in managing their business. People with high education levels are identical with people who have knowledge and have high and wide thinking patterns.

EXPERIENCE IN BEEF CATTLE FARMING

Experience is the base of developing a business and affects their business success. The average farmer's experience in Pesisir Selatan District is 15.3 years. This situation shows that cattle farming has become their culture and was passed down through generations. This was in line with Sugiarto *et al.* (2017) who reported that most farmers (86%) had experience raising beef cattle for a long time (>10 years). This situation shows that cattle farming has become their culture and is passed down through generations. Slightly different from Dinku *et al.* (2019) that 57% of study participants in West Hararge, Ethiopia had 6-10 years of experience in cattle fattening. This indicates that the farmers are sufficiently experienced in beef cattle farming.

BUSINESS STATUS

The livestock business position in the family will affect the farmer in managing their livestock business and also determine their business sustainability. The farmer who place beef cattle livestock business as their main occupation will pay attention and focus on their livestock. The results

indicate that only a small part (10%) of the farmers place beef cattle farming as their main business. Meanwhile, farmers are generally only supporting the business of their agricultural business. This was in line with *Amistu et al. (2023)* that smallholder farmers in Ethiopia, particularly in the study area, do not engage in commercial beef cattle production (cow-calf, stocker, grower, and finisher).

BEEF CATTLE OWNERSHIP

On average, the ownership of beef cattle in Pesisir Selatan District is seven cattle with intensive and semi-intensive breeding systems which is considered to be sufficient considering the subsistent farmer in Indonesia has 1-3 cattle per household. This is due to the availability of land such as farms, gardens, and dry land. The availability of the dry land and garden gives opportunity to the respondents to access the forage feed.

POTENTIAL FOR BEEF CATTLE DEVELOPMENT IN PESISIR SELATAN REGENCY

LIVESTOCK POPULATION

Livestock population is a general indicator that can be used as a measure for livestock development. Regional suitability and land potential are indicators for livestock development. The ruminant livestock population in Pesisir Selatan Regency is beef cattle, buffalo, and goats. Each ruminant livestock during its growth has different levels of feed requirements which can be influenced by the type of animal, animal elements, etc. The number of cattle commodities in each sub-district is shown in *Table 3*.

Table 3 shows livestock composition of ruminants in the Pesisir Selatan regency is dominated by cattle at 86.7%, while goats are only 3%. The high beef cattle population is supported by several efforts made by the government of Pesisir Selatan Regency through the application of Artificial Insemination (IB) technology and good management of cattle. The development of AI that has been applied by some breeder communities in Pessel, and can increase the cattle population. Pesisir Selatan Regency has a land area large enough to be used as a place to develop beef cattle with an area of 5,749.89 km². According to *Wahyuni and Aldillah (2021)*, the population and availability of ruminant feed in an area will influence the ability of that area to increase its livestock population in the future.

POTENTIAL OF ANIMAL FEED BASED ON FOOD CROP WASTE

The potential availability of animal feed based on food crop waste was measured by calculating the total production of dry matter in one year based on the area of harvest (hay) per ton per hectare sourced from rice straw, corn straw, peanuts straw, and cassava leaves. *Martin et al. (2016)* reported that animal production requires adequate land and water resources. Approximately 33% of the area

that can be grown for food crops is used for animal feed (fodder crops), and a total of approximately 70% of the world's agricultural land is used for livestock production. According to *Suherman and Kurniawan (2017)*, the development of an advanced and independent livestock area can be formed from the integration of each sector or integration between the livestock, food crops, horticulture, and plantation sectors, in terms of the use of by-products from each subsector. *Table 4* shows the amount of feed availability based on agricultural waste.

Table 3: Ruminant livestock population in pesisir selatan regency (in ST).

Subdistrict	Ruminant livestock population (ST)		
	Cow	Buffalo	Goat
Silaut	2776,9	16,0	96,3
Lunang	1470,7	77,6	120,7
Basa Ampek Balai Tapan	982,1	1382,4	231,0
Ranah Ampek Hulu Tapan	825,3	1198,4	239,2
Pancung Soal	3355,8	459,2	75,1
AirPura	2911,3	544,0	72,0
Linggo Sari Baganti	6285,3	506,4	75,3
Ranah Pesisir	7515,2	216,8	52,5
Lengayang	10461,5	380,0	340,2
Sutera	6323,1	368,8	187,7
Batang Kapas	5210,8	1075,2	238,4
IV Jurai	3859,8	37,6	230,6
Bayang	3446,8	188,8	275,2
IV Nagari Bayang Utara	303,8	0,0	4,2
Koto XI Tarusan	4912,6	601,6	81,4
Silaut	60641	7052,8	2319,9
Lunang	2776,9	16,0	96,3
Jumlah Total (ST)	1470,7	77,6	120,7

Table 4: Total potential of feed sourced from agricultural waste (Tons of DM/Year).

Feed Source from food crop waste	Quantity (tons DM/year)
Rice straw	234,731.0
Corn straw	16,121.3
Peanut straw	289.7
Cassavas leaves	236.0
Total	251,378.0

The largest proportion of feed availability based on agricultural waste comes from rice straw (93.38%) and the lowest is cassava leaves (0.09%). The total feed availability of Pesisir Selatan regency is 251,378 Tons DM/year, while the current total feed needs are 78,823.93 Tons/DM/year. These results indicate that the Pesisir Selatan regency has excels in feed availability for the future which

is sourced from food crop waste. The ability of the area to accommodate ruminants based on the total availability of feed in the Pesisir Selatan regency is 220,057 ST, with an IDD value of 3.19. This indicates that Pesisir Selatan Regency has a safe status. These results show the Pesisir Selatan regency has great potential to develop ruminant livestock. The study of *Iyai et al. (2023)* found that grass and forage availability in Manokwari's low land valley was dominated by sufficient availability, followed by very poor availability (scarc) and abundant availability (abundant).

BEEF CATTLE FARMING SUSTAINABILITY IN PESISIR SELATAN DISTRICT

The sustainability of agriculture is often described as a whole thematic area including environment, economy, and social sustainability. The development of livestock is affected by several factors including physical, social cultural, and economic factors. *Torres et al. (2023)* said the environmental, social, and economic approaches can all be used to ensure production sustainability. *Fauzi and Oktavianus (2014)* considered that the sustainability concept can be detailed into three comprehension aspects; economic sustainability which means that the development can produce goods and services constantly to maintain the sustainability of the government and avoid the occurrence of agricultural production. Environmental sustainability in the context of the environment should be able to maintain the stability of the resource, avoid exploitation of natural resources, and function of environment absorption. Social sustainability means a system that can achieve balance, and provide social services including health, education, gender, and political accountability. The results of measurements on the sustainability of beef cattle farming in Pesisir Selatan Regency are shown in *Table 5*.

Table 5 shows that the sustainability of beef cattle farming was measured from four dimensions, namely the economic, social, environmental, and institutional aspects. In line with several previous studies, some livestock farming

research involves several dimensions of sustainability, including social, environmental, and economic (*Ismail and Wahab, 2014*), economic, social, environmental, and quality (*Castellini et al., 2012*), ecological, economic, social, technology and institution (*Arofi et al., 2015*).

ECONOMY ASPECT

The measurement of beef cattle business sustainability in Pesisir Selatan District from the aspect of the economy includes the profit of livestock business, the availability of animal feed, and access to marketing and capital. It can be seen from the economic aspect that 53.3% of the respondents are in the high sustainability category, while the other 46.7% breeders are in the moderate sustainability category. Thus, as a whole, the beef cattle business sustainability from the economic aspect is in the high category. *Torres et al. (2023)* stated that in terms of economics, it is desired that the productive activity should be profitable for farmers to develop their productive systems while also improving their quality of life.

The indicator of business profit, breed availability, and beef cattle feed in Pesisir Selatan regency is in profitable condition with the availability of breed and animal feeds that are sufficient and easy to obtain. The farmer usually obtains breed from the closest livestock market or livestock market outside Pesisir Selatan. The cattle species maintained are Pesisir, Simental, Limousin, Brahman, and Bali. Meanwhile, for the animal feeds, the farmer uses forage feed in the form of grass and concentrate. Meanwhile, the indicators that need to be improved are access to marketing and capital. For marketing, as much as 46.7% of the farmers are still marketing their products in the Pesisir Selatan District area, while 53.3% market their products outside the Pesisir Selatan District, but still in West Sumatera Province. Furthermore, there is no marketing done outside the province. If the marker network is extended, then an opportunity for future business development will be better.

Table 5: Indicator of beef cattle sustainability in Pesisir Selatan district.

Indicator of sustainability	Score	Frequency (number of respondents)	Percentage (%)	Sustainability status
Economy aspect	0-3	0	0,0	Low sustainability (less sustainable)
	>3-6	28	46.7	Moderate sustainability (fairly sustainable)
	>6-10	32	53.3	High sustainability (sustainable)
Social aspect	0-3	6	10.0	Low sustainability (less sustainable)
	>3-6	54	90.0	Moderate sustainability (fairly sustainable)
	>6-10	0	0.0	High sustainability (sustainable)
Environmental aspect	0-3	2	3.3	Low sustainability (less sustainable)
	>3-6	56	93.3	Moderate sustainability (fairly sustainable)
	>6-10	2	3.3	High sustainability (sustainable)
Institutional aspect	0-2	58	96.7	Low sustainability (less sustainable)
	>2-4	2	3.3	Moderate sustainability (fairly sustainable)
	>4-6	0	0.0	High sustainability (sustainable)

SOCIAL ASPECT

The social aspect was analyzed covering the status of livestock ownership, farmers education level, business management, interaction with the other farmers or farmers group or with other institutions, and safety of the livestock environment. Torres *et al.* (2023) measured the social sustainability of livestock farming in Moyamba, focusing on efforts to improve access to social services and social capacity.

The sustainability of beef cattle farming in terms of social aspects in Pesisir Selatan District shows that 90% of respondents were in moderate sustainability. The indicator that needs to be improved from the social side are the business management system and interaction with the farmer's group and other institutions. Most of the respondent is not involved in farming-breeding groups, therefore they run their business individually. It means that the farmers have not utilized groups or other institutions as a place to exchange thoughts or encourage the existence of farmers. Through the farmer's group, it is expected that the farmers can interact with each other so that they affect the ability to manage the beef cattle livestock business system. Isyanto and Dehen's (2015) resulted in the sustainability of the beef cattle business from the sociocultural dimension showing less sustainability status, the sustainability of beef cattle business from the socio-cultural dimension showing less sustainability status with the frequency of extension and training of beef cattle fattening is the dominant characteristic.

ENVIRONMENTAL ASPECT

The environmental aspect of sustainability includes the management of livestock waste, cage sanitation, agricultural waste, disease attacks and mortality rates. Of all respondents, 93.7% were in moderate sustainability, and 3.3% were in high sustainability. The condition that still needs to be improved is in the context of livestock waste management and the utilization of agricultural waste as animal feed. Most of the farmers have not utilized agricultural feeds as animal feeds. The main animal feed material used is in the form of forage feeds which are grass and concentrate. However, agricultural waste has not been utilized and there was no effort made by the farmer to manage the agricultural waste as animal feed.

INSTITUTIONAL ASPECT

The institutional aspect is seen from the counseling activities indicator, government assistance related to the beef cattle business development, and access to capital. Seen from these three indicators, 96.7% of them are in low sustainability. This is based on the beef cattle counseling that is rarely held so most of the farmers stated that they never participated in a counseling activity. In addition,

90% of the farmers stated that they never got assistance from the government related to beef cattle livestock. This is argued because most of the farmers manage their businesses individually, or are not involved in a farmer's group, while government assistance is usually for farmer group.

These results are not much different from those of Isyanto and Dehen (2015) who reported that beef cattle fattening in Ciamis regency, West Java Province, has a less sustainable status with a 37,66% index. Ecology and Economic dimensions have quite (fairly sustainable) status Socio-cultural dimensions have less sustainable status, while technology, infrastructure and institutional dimensions are poor (unsustainable). Siswandari (2018) revealed that the business sustainability level in the farmer group was high, whereas in the non-fer group was classified as moderate.

CONCLUSIONS AND RECOMMENDATIONS

The total feed availability in Pesisir Selatan regency is 251,378 tons DM/year, surpassing the current total feed needs of 78,823.93 tons DM/year within an area capacity to accommodate ruminants, with a total availability of 220,057 ST and an IDD value of 3.19, indicating its suitability for the development of ruminant livestock. Sustainability analysis indicates that the economic, ecological, and environmental dimensions are fairly sustainable, while the institutional dimension is less sustainable. In the economic dimension, the dominant attribute is the income from the beef cattle business. In the social dimension, attributes such as beef cattle and land ownership are prominent, while the environmental dimension is characterized by the livestock mortality rate. The institutional dimension is chiefly defined by financial institutions.

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NOVELTY STATEMENT

No study examines the development of sustainable beef cattle farming based on the utilization of local feed potential in Pesisir Selatan Regency.

All authors contributed to the research design, data collection, data acquisition, data analysis and reporting, and manuscript preparation.

CONFLICT OF INTEREST

The authors have declared no conflict of interest.

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