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Beef Cattle Farming Strategy in Baluran National Park

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Abstract

Sidomulyo Hamlet, Sumberwaru Village, which serves as buffer zones of Baluran National Park, has 2,220 beef cattle as a potential economical source. At the same time, the beef cattle farming business's potential threatens Baluran National Park's existence due to being grazed illegally. The condition urges an efficient strategy so cattle farming can develop without disturbing the conservation zone of the national park. The study's objective was to find out the characteristics of beef cattle farmers in Sidomulyo Hamlet and to determine a strategy to improve beef cattle farming efficiency in Sidomulyo. The research was conducted in Sidomulyo Hamlet, Sumberwaru Village, from 1st June to 18th July 2022. The research method used a descriptive quantitative method with a SWOT analysis. The respondents were 72 cattle farmers. The research results showed that most of the cattle farmers in Sidomulyo are male, aged between 41-50 years old; the education level is mostly Elementary School, 11-20 years of cattle farming experience, and livestock ownership scale under 4 Animal Unit (AU). Increasing cattle farming efficiency is an SO strategy that supports aggressive growth: 1) Optimizing land use by planting forage. 2) Optimization of farmers' potencies and the availability of resources. 3) Cooperate with government and academicians to increase farmers' knowledge and skill. 4) Application of feed processing and livestock manure technology.

Keywords: Illegal grazing, Aggressive growth, Feed processing, Manure technology

Introduction

Beef cattle farming is the potential to be developed as a national food source. Beef is one of the mainstay commodities from the Agriculture Ministry of the Republic of Indonesia

through UPSUS SIWAB (Special Effort of Mandatory Cattle Breeding) and SIKOMANDAN (Mainstay Commodity of Cow and Buffalo) programs. Palanca-Tan & Bayog (2021) state that public dependency on agricultural products makes agriculture the most important sector that can absorb labor, contributing to a country's economy.

Cattle farmers in Baluran National Park (BNP) have a generation-to-generation problem with illegal grazing in the conservation zone. Sidomulyo Hamlet in Sumberwaru Village, Banyuputih Subdistrict, is a beef cattle center in Situbondo Regency, East Java. Based on data from the Central of Animal Health (PUSKESWAN) Sumberwaru (2021), there were 2,220 beef cattle in Sidomulyo, and the potential to increase. However, the potential development should be in an inappropriate manner that does not hurt the conservation zone of the national park. Buffer zones are zones outside a protected area where the community or people who live in the area can take advantage of the park. However, they are still obliged to pay attention to the sustainability of the natural living environment and biological system administrations. Therefore, an increase in the cattle population not accompanied by management improvement will not affect cattle farmers' welfare. The cause is inefficient cattle farming management. Efficient cattle farming is the key to cattle farming. Inefficient cattle farming in illegal grazing is caused by forage shortage in the national park, especially during drought.

The development of cattle farming in Sidomulyo is intended to increase national food security and improve production input efficiency. The reason is that Sidomulyo farmers have extensive traditional farming management; thus, they are highly vulnerable to poverty. An analysis is required of internal and external factors of cattle farming in Sidomulyo. The cattle farmers must face an analysis of strengths, weaknesses, opportunities, and threats to develop their cattle farming. Such analysis is intended to describe cattle farming and the efficiency strategy of cattle farming in Sidomulyo. A measurable and targeted strategy is needed to increase and develop the beef cattle farming prospects in Sidomulyo, Sumberwaru Village, Banyuputih Subdistrict, and Situbondo Regency.

Literature Review

Based on Alamanda et al. (2022) The level of readiness of beef cattle farmers in Sidomulyo village to implement a livestock intensification program is still in the pre-planning stage. The program is still in the early planning stages and aims to educate the farming community about ideas that could alleviate the problem. Alternative strategies that should be implemented are: (1) introduce information about the problem; (2) visit and spend time with community leaders; (3) review the efforts that have been made to determine goals and success rates; (4) conduct group discussions to discuss issues and develop strategies; and (5) increased media exposure. Adaptive strategies carried out by breeders to maintain the vulnerability of feed availability, namely: increasing skills in feed technology, feed fermentation (silage), concentrate feed, feeding in the form of rice harvest waste, planting forage, cultivating manure and urine, regular maintenance of breeder pens, and utilize wild forage that grows on the side of the road, in rice fields and ponds (Syam et al., 2019).

SWOT analysis is a technique for determining strategies and analyzing certain business situations. This analysis assesses strengths and weaknesses, as well as opportunities and threats related to business or program development planning. The main objective of SWOT analysis is to capture opportunities and minimize threats by realizing successful strategies to achieve program goals. In various types of programs, SWOT analysis applied to search for possibilities and identify threats in achieving the goals of the meat farming business, optimizing development strategies or certain activities that contribute to achieving these goals (Panayotova et al., 2021) .

Rusdiana (2019) the development of beef cattle cultivation for small farmers needs to consider the support of agricultural land, plantations, fields, vacant land, human resources and the socio-cultural conditions of the community. SWOT analysis of the evaluation of internal and external factors of the beef cattle business in Sukabumi Regency as in Indonesia in general. The strengths are the large number of workers, the land generally owned by breeders, grazing, the number of cattle kept, and institutional support, the Government, farmer groups and livestock markets have quite big opportunities. Weaknesses, low quality of human resources and rearing of beef cattle that does not lead to commercial business. Cattle farming can become a commercial business if along with processing unit so that it can provide optimal profits for farmers.

Research Method

The research location is in Sidomulyo, Sumberwaru Village, Situbondo Regency, East Java Province, which was conducted from 1st June to 18th July 2022. Sidomulyo, Sumberwaru Village, Situbondo Regency, was selected purposively by some criteria: 1) Sidomulyo is one of the cattle farming development centers in the Situbondo Regency. 2) The number of beef cattle in Sidomulyo totals 2,220 heads.

Based on data from Puskeswan Sumberwaru (2021), there were 247 cattle farmers in Sidomulyo, Sumberwaru Village. The sample was determined using Slovin's formula:

$n=N/(1+N\ e^2\ )=247/(1+(247\ (0,1)^2))=71,18\approx72$ respondents

Notes:
n: Number of Samples
N: Number of Population
e: error rate in sampling in the study is 10%

Respondent was determined by purposive sampling with some criteria: (1) Cattle farmers live in Sidomulyo, Sumberwaru Village, (2) they have cows at most minuscule 1 AU (Animal Unit), and (3) have experience in cattle farming for at least five years. The method of research used the descriptive quantitative method. Data collecting technique used SWOT questionnaires to define strengths, weaknesses, opportunities, and threats to the development of cattle farming in Sidomulyo. Data were then analyzed using SWOT analysis by determining internal factors through the IFAS matrix and external factors through the EFAS matrix. Then, an internal-

external matrix (IE matrix) was made. The alternative strategy is formulated by establishing a SWOT matrix.

Result and Discussion

General Description of the Research Location

Sidomulyo is located in Sumberwaru Village with a typology of an agricultural village. Sumberwaru area covers approximately 17,730 ha, with forest area covering 10,050 ha, rice fields, unirrigated fields, and plantations covering 3,690 ha, 1,302 ha, and 206 ha, respectively. The population in Sumberwaru Village is 7,919 people consisting of 3,885 men and 4,034 women, and 3,044 households. The majority of the people in Sumberwaru Village work as farmers.

Respondents Characteristics

The age of the respondents ranges from 27 to 70 years old. The age range is 41-50 years old. The majority of the cattle farmers are of productive age and are ideal for working. Age is critical in determining job choice (Kumar et al., 2018). Age may affect the ability of cattle farmers to perform cattle farming activities.

Table 1. Characteristics of Respondents

No	Characteristics	Number of respondents	Proportion (%)
1	Age of farmer		
	< 30 years	5	6.94
	31 – 40 years	23	32.94
	41 – 50 years	26	36.11
	51 - 60 years	12	16.66
	> 60 years	7	9.72
2	Gender		
	Man	63	87.50
	Woman	9	12.50
3	Education level		
	Not completed Elementary school	7	9.72
	Elementary School	33	45.83
	Junior high school	23	31.94
	Senior high school	8	11.11
	College	1	1.39
4	Farming experience period		
	< 10 years	20	27.78
	11-20 years	25	34.72
	21-30 years	17	23.61
	>30 years	10	13.89

Source: primary data (2022)

Age relates to the respondents' physical and thinking (intellectual) abilities; the older the respondents, their physical and intellectual abilities will decline. Seven respondents are more than 60 years old. These cattle farmers are inactive in the activity of production management. Production management, such as providing feed, is delegated to the next generation. Ntini et al. (2022) add that senior people are presumed to be unproductive, isolated, and ineffective. However, if an opportunity is available, the senior people will become the strength of positive change in their community.

The majority of the cattle farming activities are conducted by male respondents, 63 respondents or 87.50 %, and the rest, nine, are female. Women are involved in cattle farming activities because they do not have husbands or men in the family; their husbands work outside of town or are not physically able to manage cattle farming. Women's roles in cattle farming are crucial, so they need to be trained to maximize cattle farming management in the use of labor efficiently. Carnovale et al. (2022) state that gender and age might affect their attitude toward animal welfare, so women's approach to cattle farming management would be softer than men's.

The respondents' education level reflects the quality of the human resources. Low education level, in which majority of them graduated from Elementary School, 45.83 %. Their reasons for not continuing their study to the next level are: their home is far from school, their inability to pay the school fees, the cattle farmers' social environment, and the cattle farmers, and the personal inability of the cattle farmers to learn. (Kumar et al., 2018) that obstacles to improving education are lack of adequate facilities for effective learning, food scarcity, school absence, and lack of community social support. Formal education of the farmers will affect the technology absorption rate to improve cattle farming efficiency.

The farming experiences of the farmers will affect their knowledge level and skills in managing their business. The most extended period of farming experience ranges from 11-20 years, with 25 respondents or 34.72 %. The experiences of the farmers affect farming management. With more extended farming experience, farmers would have more skills in farming management. However, the reality is not as expected. The respondents who have had farming experiences for decades sometimes find it more difficult to accept new knowledge and innovation than new farmers.

Sidomulyo cattle are privately owned by the farmers, *gaduhan* (a partnership between farmer and investor), or solely belong to investors. *Gaduhan* or traditional cattle partnership has become a hereditary practice carried out by the farmers in Sidomulyo, with the return of the first calves given to the farmer who raises the cattle. The second calves are given to the investor. Mutual agreement is only made orally without any written agreement or legal contract. The trust investors give to the farmers is based on the emotional bond between the farmers and investors. Most investors come from outside the village and have relationships with the farmers, such as relatives and relations. The research used Animal Unit (AU) as a standard of cattle ownership. Based on the data above, the most private livestock ownership of <4 AU are 58 respondents, and the most *gaduhan* cattle on the ownership scale of <4 AU are 36. So, it can be concluded that more beef cattle ownership is not from investors. The distribution of the respondent farmers' population is presented in Table 2.

Table 2. Cattle Ownership

Cattle Ownership	Privately owned+*Gaduhan* (number of the farmer)	Privately Owned (number of the farmer)	Traditional Partnership/*Gaduhan* (number of the farmer)
<4 AU	24	58	36
4-7 AU	18	10	16
>7 AU	30	4	20

Source: primary data (2022)

Assessment Matrix of Internal and External Factors

Internal and external factors assessment is performed to create a measurable weight. The amount of weighting in the matrix must be equal for internal and external analysis. The IFAS matrix shows the internal conditions (strengths and weaknesses) of the beef cattle business owned by farmers in Sidomulyo Hamlet. Based on Table 3, the total IFAS matrix is 2.36, showing that it is difficult for the cattle farmers in Sidomulyo to overcome their weaknesses and use the strength factors in developing beef cattle farming. The strength value is 1.23, and the weakness value is 0.94. The greatest strength lies in natural mating management, which is easier and cheaper for farmers. The greatest weakness of the farmers lies in raising livestock/Cattle farming as a culture, limitations of the livestock market, and the low education level of the farmers, with each having a rating of 1.

Natural mating becomes vital for cattle farmers in Sidomulyo because they raise cattle using extensive systems. If the farmers in Sidomulyo could maximize natural mating, they would get more benefits. Support from the affiliated institution, for example, the Livestock Service of Situbondo Regency and Loka Penelitian Sapi Potong Grati (Grati Cattle Research Center), to maximize natural mating intensification in Sidomulyo is needed. The most important support is a bull donation to prevent inbreeding. Inbreeding may become a weakness to cattle farming development because it harms the offspring. Losdat et al. (2014) reported that the effect of inbreeding might reduce livestock qualities in reproduction and affect their fertility.

Cattle farming as a culture is the weakness of the farmers in Sidomulyo because they tend to be more defensive to any changes and innovations to increase and develop cattle farming in Sidomulyo. The cattle farmers in Sidomulyo affect each other in their farming management and become one of the weaknesses of cattle farming in Sidomulyo Hamlet. Market limitation of livestock distribution can be seen when livestock is traded; the cattle only change hands from one farmer to another in a village. In this case, the middlemen have a vital role in selling livestock outside the village so that the farmers get prices below the market prices.

The subsequent weakness is the low education level of the farmers, whereas the majority only graduated from Elementary School (45,83%). The formal education level of the farmers

will affect the technology absorption level to increase cattle farming efficiency. Such weaknesses highly affect cattle farming development in Sidomulyo, so the right strategy is required to minimize the weakness.

Figure 1. Cattle grazing in Baluran National Park

Table 3. IFAS Matrix

	Internal Factor	Weight	Rating	Score
Strengths	Large livestock population	0.08	3	0.24
	Available labor	0.08	3	0.24
	Natural mating	0.12	4	0.48
	Farmers Mutual Cooperation	0.09	3	0.27
	Sub Total	0.37		1.23
Weaknesses	Cattle farming as a culture	0.11	1	0.11
	Lack of training program	0.07	2	0.14
	Livestock market limitation	0.10	1	0.10
	Low education level of Human Resources	0.11	1	0.11
	Less intensive breeding	0.07	2	0.14
	Limited feed and water supplies	0.09	2	0.18
	Traditional cattle farming management	0.08	2	0.16
	Subtotal	0.63		0.94
	Total	1.00		2.17

Source: primary data (2022)

External Factor Analysis Summary (EFAS) Matrix is an analytical tool that shows the farmers' external conditions to determine the opportunity and threat factors of Sidomulyo cattle farmers. Based on Table 4, the total value of the EFAS matrix is 3.17. The development of beef cattle farming in Sidomulyo has excellent potency to be developed by taking some advantage of external opportunities that offer more benefits to the farmers. It is also to avoid some threats that may disturb the farmers operating their farming businesses. The opportunity value for developing cattle farming in Sidomulyo is 2.02, and the threat value is 1.15. The opportunity factors for the development of cattle farming in Sidomulyo are the high demand for beef, livestock waste treatment, agricultural waste utilization for feeds, and native forage plantation

around the area as a feed source. The highest threat is a conflict with the BNP (Baluran National Park) management, followed by the spread of disease caused by extensive farming, low support for breeding management, and acacia trees issue.

Opportunity for Cattle Farming Development in Sidomulyo

The high demand for beef is the opportunity for cattle farming development in Sidomulyo. Ministry of Agriculture (2020) presumed that in 2022 beef consumption is projected to decline from 0.80% to 2.50 kg/capita/year. The same decline is projected in 2023 and 2024, which are about 0.46% and 0.29%, respectively. However, the limited domestic livestock population still inhibits the structure of fulfilling meat consumption in Indonesia. Celaya et al. (2022) reported that proper and qualified livestock selection may increase production to support the rural economy. This is an opportunity for cattle farming market development in Sidomulyo.

The next opportunity is livestock waste treatment in Sidomulyo, which has not been processed and abandoned without any specific treatment. This waste then pollutes the air and paved roads. Processing manure into fertilizer and biogas can benefit and increase the earnings of the farmers in Sidomulyo. However, farmers seem reluctant to adopt this practice. Sari et al. (2022) report that social acceptance of biogas is affected by factors such as motivation, the number of livestock, the intensity of extension, and information access.

Agricultural wastes (for example, corn husk, straw, corn con, peanut shell, and rice bran) are processed as feeds. In contrast, most people around the village still have rice fields and land. So, cattle farmers and land owners should cooperate to utilize agricultural wastes for feed. The practice will reduce the feed costs of the cattle farming business. Syam et al. (2019) find that some adaptive strategies for the farmers to maintain their cattle farming are: learning about feed technology, making fermented feed (silage), concentrate feed, cattle grazing on rice-field after harvesting, and buying land for planting forage. Feed processing could also increase the nutritional value of feed and keep the feed to prevent feed shortage.

Planting forage in the Utilization Zone of Baluran National Park could be done because farmers are permitted to cultivate in this zone. It offers some solutions for the farmers who still struggle to provide feed for their livestock. Selecting native forage that conforms to land conditions and the livestock population is significant in maximizing yield. Hilmiati et al. (2021) research shows that the awareness and capacity of the farmers must be improved for better feed management in order to solve the problems faced by the farmers. So different skills and knowledge about forage are essential for farmers.

Threats of cattle farming development in Sidomulyo

The greatest threat is a land conflict with the management of the Baluran National Park due to some of the cattle grazed in Baluran National Park coming into the Core Zone. It is aggravated by the dry season that causes native forage around the zone to start to finish off and dry so that the cattle look for native forage and enter into the Core Zone. Grazing prohibition in Baluran National Park had also been conducted by appointing several rangers at the entrance and exit gates of the conservation zone. However, it did not work because the people had

unwritten-basic rules in the culture that they had the right to graze cattle at the Baluran National Park as a "God's Land."

The spread of disease transmitted by wild animals to cattle and vice versa may occur due to their interaction intensity during extensive farming. The disease frequently found is suffering from intestinal worms. Sadarman et al. (2007) the worms in the body will disturb animal health and automatically affect production and reproduction. In Indonesia, the prevalence of suffering from intestinal worm is still relatively high, both among animals and humans, which suffer an economic loss and are harmful to animal health.

One threat for cattle farming businesses is low support for breeding management, including the Artificial Insemination socialization program. Artificial Insemination is undesirable because farmers have to pay for the service. However, they still prefer natural mating, although the number of bulls is limited. Feed availability is also threatened because of the vast spread of acacia in Baluran National Park. Acacia disturbs the growth of native forage and decreases the feed source for livestock and wild animals. Lukmandaru (2018) suggests that acacia in Baluran National Park can be significant disturbance management because the species grow well and spread faster. Today many acacia trees are found in relatively large diameters even though they are relatively young. The growth of natural plantlets, which are uncontrolled, may cause the grasses to die so that the availability of feed for wild animals is disrupted. The spread of acacia in Baluran National Park may disturb the growth of native forage, decreasing the feed source for the livestock and the wild animals. The growth of natural plantlets, which are uncontrolled, may cause the grasses to die, so the availability of feed for animals is disrupted.

Table 4. EFAS Matrix

	External Factor	Weight	Rating	Score
Opportunities	High demand for beef	0.09	4	0.36
	Technological development	0.07	3	0.21
	Government support for Artificial Insemination	0.07	3	0.21
	Livestock waste treatment	0.08	4	0.32
	Utilizing agricultural wastes for feeds	0.08	4	0.32
	Planting native forage around the area as a feed source	0.08	4	0.32
	Sub Total	0.47		2.02
Threats	Conflict with the BNP management	0.09	1	0.09
	The spread of disease caused by extensive farming	0.09	2	0.18
	Issues of Covid-19	0.09	3	0.27
	Low support for breeding management	0.08	2	0.16
	Cattle predator and theft	0.09	3	0.27
	The spread of acacia	0.09	2	0.18
	Subtotal	0.53		1.15
	Total	1.00		3.17

Source: primary data (2022)

Based on the results of IFAS dan EFAS analysis, scores for internal and external factors are presented as follows:

1. Strengths : 1.23
2. Weakness : 0.94
3. Opportunities : 2.02
4. Threats : 1.15

IFAS and EFAS analysis can be arranged in IFAS and EFAS Matrices as presented in the table below.

Table 5. IFAS and EFAS Matrix

IFAS / EFAS	Strengths (S)	Weakness (W)
Opportunities (O)	SO Strategy 1.23 + 2.02 = 3.25	WO Strategy 0.94 + 2.02 = 2.92
Threats (T)	ST Strategy 1.23 + 1.15 = 2.38	WT Strategy 0.94 + 1.15 = 2.09

Source: primary data (2022)

The IFAS and EFAS Matrices in the table show that the SO strategy is 3.25, which means that the primary strategy to develop cattle farming is an aggressive (growth-oriented) strategy. The total WO value is 2.92 and lies in the second quadrant, which means it supports the turnaround strategy. The diagram below is a SWOT analysis as presented in Figure 2

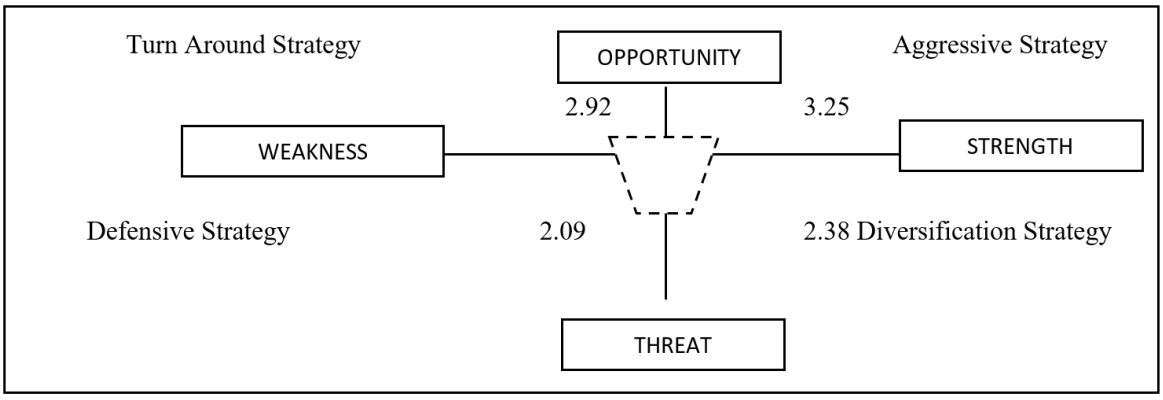

Figure 2. SWOT Analysis Diagram

Development Strategy of Cattle Farming

An alternative strategy can be formulated by combining internal factors (strengths and weaknesses) and external factors (opportunities and threats). The SWOT matrix analysis is presented in the table to formulate an alternative strategy. Based on the SWOT analysis, the recommended alternative strategy to develop beef cattle farming uses the SO strategy that supports aggressive growth. SO strategy is a strategy that utilizes profit from the available opportunities in the external environment. The strategies for the development strategy of cattle farming in Sidomulyo hamlet are presented below:

1. Optimizing and developing the farmer's potencies in utilizing the available resources to increase cattle farming.
2. Cooperate with the government to improve technical aspects.
3. Optimizing land use by planting forage.
4. Utilizing technology for feed processing and livestock waste treatment

Managerial Implication

Based on the analysis results, some managerial implications can be used as a cattle farming development strategy in Sidomulyo. The efficient cattle farming development approaches are as follows.

1. Optimizing and developing the farmers' competencies by utilizing the available natural resources to improve cattle farming. The objective is to improve the farmer's welfare. Activities that support the program are as follows:
   a) Establishing farmers' group. The farmers' group aims to facilitate farmers obtaining information about efficient cattle farming management. Some farmers groups in Sidomulyo have maximum yet increased their members' productivity due to their low quality and small quantity. Farming institutions would significantly improve human resources, the group's self-reliance, and farmers' dignity. The farmer groups in Sidomulyo are not optimal in empowering their members due to their dependency on outsiders to operate their organization. The condition is generally found in Indonesia, where Indonesia's farmer groups depend highly on government funding to perform organizational activities (Irham et al., 2020). The quality of the farmer groups can be seen in how many contributive activities are for its members. Leadership is the main factor in motivating the cattle farmer groups to be more productive. This problem is still not an important issue for most of the programs in Sidomulyo. Teshome et al. (2021) state that societal leadership must be able to operate and manage the people effectively and inspire them to participate in development. Farmers' participation in the farmer group could catalyze the development of farming.
   b) Increasing the number of field extension officers, veterinarians, and inseminators who have competencies. Adding competent workers are intended to develop the farmers' potencies in Sidomulyo. Khan et al. (2018) stated that cattle farming extension could accelerate the implementation of technology innovatively to increase income and the farmers' standard of living. The increase in several competent personnel will affect the efficient use of natural and farmers' human resources.
2. Cooperate with the government to increase technical aspects. The objective is to increase human resources quality and market distribution network. Activities that support the program are as follows:
   a) Establish a regular training/extension program. The activity is intended to increase the technical aspects of cattle farmers. Government and the related parties should play essential roles in cattle farming efficiency development in Sidomulyo. Training could improve the managerial quality aspect of the farmers in managing the available resources. Guo et al. (2021) suggest that training and education are needed to increase the awareness and skills of the farmers. The farmers may innovate if they have the

awareness and skills to improve their productivity. Islam et al. (2013) report that government intervention will support innovation initiated by the farmers to develop a responsive system to increase their business.

b) Livestock market development. This activity is intended to increase livestock product of distribution channels. The cattle farmers need more market access to sell their products to raise price competition and increase the number of bulls in the herd population. Scott & Richardson (2021) suggest that the farmer's network is intended to affect market access, decision-making, and farming success indicators. Farmers in Sidomulyo have limited choices to sell their cattle and only depend on middlemen if they want to sell their livestock outside the village. Yousefian et al. (2021) state that the main obstacle between the consumers and the farmers in marketing is communication and logistics. The middleman/broker controls the communication and beef supply chain in Sidomulyo. The middlemen come from outside the village and have been long trusted by the farmers to sell their cattle. The establishment of the livestock market is intended to reduce the middleman's role. Cattle farmers and buyers can meet for a transaction without passing by the middleman to gain optimal profit.

c) Providing means and infrastructure in the production area. Providing means and infrastructure must be conducted to increase production. Means and production infrastructures must be improved to increase competitiveness among the farmers in Sidomulyo, such as cage construction and drinking installation, feed processing machines, slaughterhouses, and an animal market. Robinson et al. (2021) state that the changes in the farming system, combined with infrastructure development, will bring more economic, social, and environmental benefits to the cattle farming sector and the community. Infrastructure development for livestock production requires the government's role to open access to funding. Egbide et al. (2022) state that budget effectiveness, budget openness, and budget sufficiency have a positive correlation to village development.

Figure 3. Utilization Zone in Baluran National Park

3. Optimizing land use by planting forage. The objective is to provide qualified feed. Activities that support the program are as follows:

a) Land identification and optimal forage use. The total utilization zone in Baluran National Park needs zoning revision. Planting forage in the utilization zone must be permitted and supported by the management of the Baluran National Park. The first thing that must be done is land identification and forages, which are suitable to be planted on the land. Such identification was conducted to reduce the risk of failure from planting native forage. Pratama et al. (2021) report three main preferences of a farmer in selecting forages: the palatability of the cattle, nutrient content, and forage productivity. A feed integration system is applied to maximize production to increase farming efficiency (Alexandre et al., 2021).

4. Socialization about the benefits of planting forage. Socialization is conducted to increase the farmers' participation in programs that will be implemented. The socialization must be well-planned by involving the cattle farmers to increase social participation. Adaptive natural resources management must be performed by planning, implementing, monitoring, and adjusting, which includes personal, ecological, technical, and financial capacities to implement sustainable management (Azizah et al., 2021)
5. Utilizing the technology of feed processing and livestock waste treatment. The program aims to adopt feed and livestock waste processing technology. Activities that support the program are as follows:
   a) Feed processing uses simple feed technology (hay and silage). Feed processing was conducted to improve the quality of the feed. Feed processing uses simple feed technology, such as hay and sillage, which could become the solution. In most cases, farmers do not know how to utilize sillage to increase livestock productivity (Chiambiro et al., 2022). Mello et al. (2021) found that sillage of plant waste could become an alternative to good forages for feed, particularly during forage shortages. The fermented feed can increase crude fiber digestibility with potential beneficial effects on intake and livestock production (Humer & Zebeli, 2017).
   b) Livestock waste management program. Livestock waste in Sidomulyo is just abandoned and disturbs the environment. Average cattle droppings are 20 kg/cow/day. Livestock waste potencies in Sidomulyo are 44 tons/day from 2,220 cows. Processing livestock waste into fertilizer is an alternative sustainable solution because it can be used for agriculture. Livestock waste is not only utilized as organic fertilizer but also for biogas. Biogas is alternative energy than can be used by the people in the villages. Park et al. (2019) suggest that biogas offers energy efficiency and minimizes carbon emissions compared to the available biomass products.

Internal Factor / External Factor	Strengths (S)	Weaknesses (W)
	1. Large livestock population 2. Available Labor 3. Natural mating 4. Farmers Mutual Cooperation	1. Cattle farming as a culture 2. Lack of training program 3. Livestock market limitation 4. Low education level of Human Resources 5. Less intensive breeding 6. Limited feed and water supplies 7. Traditional cattle farming Management
Opportunities (O) 1. High demand for beef 2. Technological development 3. Government support for AI 4. Livestock waste treatment 5. Utilizing agricultural waste for feeds 6. Planting forage around the area as the feed source	**SO Strategy** 1. Optimizing and developing the farmers' potencies by utilizing the available resources to improve cattle farming qualities (S1, S2, S3, S4, O1, O2, O3, O4, O5, O6) 2. Cooperate with the government to improve technical aspects (S1, S2, S4, O1, O3, O4, O5, O6) 3. Optimizing land-use by planting forage (S1, S2, O5, O6) 4. Utilizing technology for feed processing and livestock waste treatment (S1, S2, S3, O2, O4, O5, O6)	**WO Strategy** 1. Provide mentoring and extension programs to improve the ability of the farmers (W1, W2, W4, O2, O3, O4, O5, O6) 2. Introduce feed processing technology by utilizing agricultural waste (W2, W4, W6, W7, O2, O5) 3. Utilize technology of livestock waste processing (W2, W4, W7, O2, O4) 4. Maximize Artificial Insemination to obtain good quality cattle in order to meet the market needs (W1, W3, W5, W7, O1, O2, O3) 5. HR development in mastering technology in production efficiency (W1, W2, W3, W4, W7, O2, O3, O4, O5, O6)
Threats (T) 1. Conflict with the management of the Baluran National Park 2. The spread of disease caused by extensive farming 3. Issues of Covid-19 4. Low Support for Breeding Management 5. Cattle predator and theft 6. The spread of acacia	**ST Strategy** 1. Cooperate with Baluran National Park that relates to land use for planting forage (S1, S2, S3, T1, T3) 2. Start cattle farming intensification to reduce the spread of disease with a wild animal, and inbreeding (S1, S2, S3, T2, T4, T5) 3. Eliminating acacia which disturbs native forage planting by involving the society (S1, S2, T1, T5)	**WT Strategy** 1. Utilize land belonging to Baluran National Park to plant forage (W4, W6, W7, T1, T3) 2. Improve production quality of beef cattle by applying IB technology and feed technology as well as rearing management (W1, W2, W4, W5, W6, W7, T2, T3, T4) 3. Provide means and infrastructures to support cattle farming (W1, W2, W3, W5, T2, T4, T5, T6)

Figure 4. SWOT Matrix

The strategy to increase cattle farming efficiency based on SWOT analysis is an SO strategy that supports aggressive growth. SO strategy utilizes profit from the available opportunities in the external environment. The strategy to increase cattle farming efficiency in Sidomulyo used comparative advantages are: 1) Optimizing land use by planting forage. 2) Optimization in developing the farmers' potencies by utilizing the available resources to improve cattle farming. 3) Cooperate with the government and colleges to increase technical aspects. 4) Utilizing the technology of feed processing and developing livestock manure management programs.

Conclusion

The characteristics of the cattle farmers in Sidomulyo are aged between 41-50 years old, male; the education level is elementary school, have 11-20 years of cattle farming experience, with a private livestock ownership scale under 4 ST. Strategy to increase cattle farming efficiency based on SWOT analysis is SO strategy that supports aggressive growth. SO strategy utilizes profit from the available opportunities in the external environment. The strategy to increase cattle farming efficiency in Sidomulyo used comparative advantages are: 1) Optimizing land use by planting forage. 2) Optimization in developing the farmers' potencies by utilizing the available resources to improve cattle farming. 3) Cooperate with the government and colleges to increase technical aspects. 4) Utilizing the technology of feed processing and developing livestock manure management programs.

Declaration of conflicting interest

The authors declare that there is no conflict of interest in this work.

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