

# Dairy cattle business defense strategy during the fmd outbreak in Mojosongo District, Boyolali regency, Central Java, Indonesia

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**Abstract.** This study aimed to determine the factors that contribute to livestock farmers' defenses against FMD outbreaks and to formulate strategies applied to these businesses in Mojosongo District, Boyolali Regency. The location determination method was purposive sampling. This study involved surveys and interviews with 60 livestock farmers through purposive sampling with at least one lactating dairy cow, having 1 year of livestock farming experience, and being affected by FMD. This study also involved 10 expert resource respondents from government and private institutions and relevant community leaders. Data were obtained through observations, interviews, and questionnaires. The analysis employed the Internal Factor Evaluation (IFE) matrix, the External Factor Evaluation (EFE) matrix, and SWOT analysis. Findings from the quantitative SWOT matrix indicate that the total score for internal factors is 0.83 calculated as the difference between total strengths and total weaknesses, while the score for external factors is 0.29 derived from the difference between total opportunities and total threats. These results position the development strategy for dairy cattle farms in Quadrant II. Accordingly, the recommended strategy emphasizes leveraging long-term opportunities through diversification and innovation, particularly by integrating technological advancements such as vaccination and biosecurity systems, feed processing technologies, reproductive technologies, and waste management technologies.

## 1 Introduction

Livestock plays a key role in providing food for all Indonesians. The livestock subsector also contributes to the provision of renewable energy, increasing employment opportunities, and increasing incomes and community well-being [1]. Dairy cattle are one of the livestock commodities in the agricultural industry, primarily producing cow's milk. Globally, cow's milk is an important source of animal protein and an integral part of people's consumption patterns [2]. In Indonesia, dairy farming makes a significant contribution to the farming economy and the well-being of rural communities. In addition to being a primary source of income for farmers, this business also supports national food security by providing milk, an essential source of nutrition for the population [3]. The growing demand for dairy products

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reflects the significant economic potential of this livestock industry. In this case, dairy cattle breeding is still done traditionally. It has not gotten much attention from basic management technologies, and lacks agribusiness knowledge [4]. In this context, alternative forms of community farm growth must be identified that have economies of scale and can contribute to adequate family income.

In 2022, an outbreak of the infectious disease Foot and Mouth Disease (FMD) in cattle resulted in decreased milk and meat production and even animal mortality [5]. This situation necessitated efforts by dairy farmers to maintain their dairy farming operations. It is recommended that Dairy Cattle production systems be improved in terms of business feasibility and competitiveness by implementing proven applied technology, particularly in feeding systems and good farming practices, through the use of location-specific local feed power sourced from agricultural and agroindustrial waste [6]. One of the areas affected by FMD is Boyolali Regency, as the areas producing dairy cow's milk in Central Java. Boyolali Regency is a major contributor to milk production and supply in and around Central Java Province [7]. Its abundant land area, abundant forage, including grass and agricultural and industrial waste, and suitable temperature and humidity for livestock farming make Boyolali Regency a prime location for developing livestock farming, particularly dairy cattle [8]. According to data from the Central Statistics Agency [9], Boyolali Regency boasts a significant dairy cattle population, estimated at 59,374 head. The dairy cattle population in Boyolali Regency is spread across several sub-districts, one of which is Mojosongo District. Mojosongo District comprises 13 villages with a significant dairy cattle population, estimated at 11,961 head [9].

This study aimed to describe the profile of dairy cattle entrepreneur group members, identify the key factors influencing the development of the dairy cattle industry, and determine applicable strategies for advancing dairy cattle agribusiness in Boyolali Regency. This research required identifying internal and external factors affecting dairy cattle development, analyzing alternative strategies suitable for agribusiness growth, and determining priority strategies that can be effectively implemented within the local context. Based on these considerations, conducting a comprehensive study on the dairy cattle sector is essential to formulate an appropriate development strategy for Boyolali Regency.

## **2 Materials and Methods**

The research on the development strategy for the dairy cattle business in Mojosongo District, Boyolali Regency, Central Java Province was conducted from February to March 2025. The research employed both primary and secondary data. Primary data were collected through several methods, including questionnaires, interviews, and direct observations. Secondary data, defined as information not obtained directly from respondents but sourced through intermediaries or documented records, were gathered from the Boyolali Regency Statistics Agency (BPS). The study involving human participants was reviewed and approved by the Ethics Committee of Dr Muwardi General Hospital (RSUD Moewardi Approval No. 2.450/XI/HREC/2025). Written informed consent to participate in this study was provided by the participants

### **2.1 Sampling methods**

The study location was selected using a purposive sampling approach. Mojosongo District was chosen based on several considerations: the district consists of 13 villages with a substantial dairy cattle population, estimated at 11,961 head; it possesses access to supporting infrastructure; and it has adequate natural and human resources with strong potential for

further development. These factors collectively indicate that Mojosongo District is well-positioned to support the growth of the dairy cattle industry. The study employed a survey method targeting dairy cattle farmers in Mojosongo District, Boyolali Regency. The purposive sampling was used to select the respondents with the background of farmers with a minimum of two years of experience in dairy cattle farming and own at least two dairy cattle. A total of 60 respondents were included in the sample for this study. This study also involved 10 respondents from outside the dairy farming community, including government agencies and the private sector. The sampling method for these 10 respondents was convenience sampling. These respondents were asked to assess and rank the urgency of each internal and external factor affecting smallholder dairy farming in Mojosongo District, Boyolali Regency. The questionnaire was used to assess the current condition of livestock farmers and the level of importance of each condition. The questionnaire was compiled using a Likert scale ranging from 1 to 5 with the following details: Condition assessment score 1 = very poor, 2 = poor, 3 = neutral, 4 = good, 5 = very good. Urgency assessment score 1 = very unimportant, 2 = unimportant, 3 = neutral, 4 = important, and 5 = very important.

## **2.2 Data Analysis**

In this study, descriptive analysis was used to determine the various conditions and characteristics of dairy farmers in Mojosongo District, Boyolali Regency. Data obtained through interviews and questionnaires will be processed and summarized for comparison to identify relationships with external and internal factors affecting smallholder dairy farming in the area. SWOT analysis is the systematic identification of various factors to formulate a suitable strategy for a company. This analysis is on reasoning that minimizes dangers and weaknesses while simultaneously maximizing opportunities and strengths. [10]. Situational analysis is the beginning of strategy formulation, identifying the match between external opportunities and internal strengths, while also addressing external threats and internal weaknesses [11].

The SWOT matrix is a key analytical tool used to formulate four categories of strategic alternatives: SO (Strength–Opportunity), WO (Weakness–Opportunity), ST (Strength–Threat), and WT (Weakness–Threat) strategies [12]. Primary qualitative data were analyzed descriptively and subsequently evaluated using the SWOT matrix. This analysis facilitates the identification of internal and external factors influencing the dairy cattle business, including strengths, weaknesses, opportunities, and threats, and supports the formulation of appropriate development strategies based on the potential of Mojosongo District. The performance of a business can be assessed through the interaction between internal factors (strengths and weaknesses) and external factors, which include opportunities and threats. Both sets of factors must be systematically considered within the SWOT framework to generate comprehensive strategic recommendations [13].

## **3 Results and Discussion**

### **3.1 Characteristics of Respondents**

The characteristics of respondents were analyzed to assess the potential for dairy cattle development in Mojosongo District. These characteristics included age, educational attainment, employment status, experience in dairy cattle farming, number of household members, and the size of the dairy cattle herd owned by each respondent.

**Table 1.** Characteristic of respondents in the Dairy Cattle business.

	<b>Characteristics</b>	<b>Total</b>	<b>Percentage (%)</b>
Age (years)	15-35	7	11.4
	36-45	20	31.4
	46-55	18	32
	56-64	14	24.2
	>65	1	1
Education	No school	3	5
	Elementary school	22	36.7
	Middle School	21	35
	High school	12	20
	College	2	3.3
Main Job	Farmers	42	70
	Civil servants	2	3.3
	Private	9	15
	Entrepreneur	2	3.3
	Trader	5	8.3
Farming experience (years)	1-10	6	10
	11-20	32	53.3
	> 20	22	36.6
Number of family members (person)	1-3	18	30
	4-5	36	60
	> 5	6	10

Source: Processed Primary Data, 2025.

Table 1 illustrates that the age of the respondents is mostly 36-45 years old, 20 people (31.4%), followed by 46-55 years old and the least age is over 65 years old, only 1 person. The age of respondents is defined as the productive age for work, because the majority are between 15 and 64 years old [14]. The level of education of livestock farmers is still low, as evidenced by the fact that many still have elementary school education, 22 people (36.7%), followed by junior high school education, 21 people (35%). The main occupation of most farmers is 42 people (70%), other jobs such as civil servants, private sector, entrepreneurs, and laborers are around 18 people (30%). The most respondents with livestock experience have 11-20 years of experience, 32 people (53.3%), followed by more than 20 years of experience, 22 people (36.6%). The number of family members shows that the majority of the number of members is 4-5 people, 36 respondents (60%), while the number of families 1-3 is 18 respondents (30%).

### 3.2 Identification of internal and external factors

This study was conducted by identifying internal and external factors influencing the success of dairy cattle business development in Boyolali Regency through the use of the Internal Factor Evaluation (IFE) and External Factor Evaluation (EFE) matrices [11]. The identification process was aligned with the actual conditions in the research area. Internal and external factors were obtained from interviews with 60 dairy cattle farmers who served as respondents. Based on this identification, the study further formulated the strengths, weaknesses, opportunities, and threats (SWOT), as presented in Table 2.

**Table 2.** Identification of internal and external analysis.

<p><b>Internal Factors Evaluation (IFE)</b></p>	<p><b>Strength – S</b>                  High labor force                  Productive age of farmers.                  Availability of green fodder throughout the year.                  Availability of transportation facilities.                  Abundant availability of agricultural waste.                  Application of IB technology in society.</p>	<p><b>Weakness – W</b>                  The level of education of livestock farmers is still low.                  Livestock experience is still lacking.                  Raising dairy cattle as a side business.                  Livestock ownership is still low.                  Limited capital.</p>
<p><b>External Factors Evaluation (EFE)</b></p>	<p><b>SO Strategy</b>                  Optimizing the internal capabilities of farmers.                  Utilizing available land for green fodder.                  Collaboration with local governments in developing feed by utilizing agricultural waste.                  Providing knowledge and technology to livestock farmers to develop their businesses.</p>	<p><b>WO Strategy</b>                  Carrying out outreach and mentoring to improve the capabilities of livestock farmers.                  Facilitating banking access to increase capital.                  Providing knowledge about agricultural waste processing in order to utilize existing agricultural waste.                  Development of milk processing technology.</p>
<p><b>Threat – T</b></p> <ol style="list-style-type: none"> <li>1. Fluctuating feed prices.</li> <li>2. There are no third-party partnership efforts yet.</li> <li>3. There is a change in the function of agricultural land.</li> <li>4. The price of milk is influenced by quality.</li> </ol>	<p><b>ST Strategy</b></p> <ol style="list-style-type: none"> <li>1. Developing human resources and business efficiency to increase productivity.</li> <li>2. Establishing partnerships with the government and third parties by utilizing family-like interactions within village communities.</li> </ol>	<p><b>WT Strategy</b></p> <ol style="list-style-type: none"> <li>1. Improving business management and strengthening the role of livestock groups.</li> <li>2. Collaborate with other agencies for business development.</li> <li>3. Evaluation and coaching are needed to improve livestock breeder skills.</li> </ol>

Source: Processed primary data, 2025.

### 3.3 SWOT Analysis

A SWOT analysis was to determine the internal and external influences of the dairy cattle business on the strengths, weaknesses, opportunities, and threats based on the development strategy formulation [10]. Dairy cattle business development consists of identified internal and external factors. The data processing sourced from government agency respondents explained that the weighted value of the current condition assessment and the level of urgency of importance can be calculated. The rating value is obtained from the calculation of the current condition assessment column, namely the sum of the question column values divided by the total number of questions. The weighted value is obtained from the calculation of the rating value to obtain an average and then divided by the total number of averages. Based on the rating value and the weighted value, the final score can be calculated by multiplying the rating value and the weighted value for each question [10].

#### 3.3.1 Internal Factors

Internal factors are factors originating from within the dairy cattle business. Internal factors consist of strengths and weaknesses identified based on conditions at the research location. Internal strategic factors can be seen in Table 3.

**Table 3.** Internal strategic factors of dairy cattle farming business.

No	Internal Strategy Factors	Rating	Weight	Score
<b>Strength</b>				
1	Sufficient livestock farming experience	3.9	0.13	0.51
2	Green fodder available	3.8	0.16	0.61
3	Implementation of IB technology	4.3	0.13	0.56
4	Have young and potential human resources to be developed	3.7	0.14	0.52
5	Access to transportation and infrastructure facilities	4.2	0.16	0.67
6	Interaction between people who are family Friendly	4.1	0.12	0.49
7	The cooperative institution that oversees	3.7	0.16	0.59
8	Availability of agricultural waste	4.1	0.13	0.53
	<b>Amount</b>	<b>27.7</b>	<b>1</b>	<b>3.99</b>
<b>Weakness</b>				
1	The education of livestock farmers is still low	3.3	0.14	0.46
2	Raising cattle as a side business	2.9	0.11	0.32
3	Livestock ownership is still low	3.2	0.13	0.42
4	The maintenance pattern is still simple	3.4	0.16	0.54
5	The livestock group is not running optimally	2.4	0.10	0.24
6	Limited business capital	3.7	0.15	0.56
7	There is no utilization of agricultural waste	2.3	0.11	0.25
8	Business management is still low	2.5	0.12	0.30
	<b>Amount</b>	<b>23.7</b>	<b>1</b>	<b>3.09</b>

Source: Processed primary data, 2025.

*Strength* strategy factor score is 3.99 and the *weakness* strategy factor is 3.09. The result of subtracting the weighted average of strength *and* the weighted average of weakness is 0.90. The result of the weighted average is the coordinate point of the "x" axis which has a

positive value in the SWOT analysis diagram and is in the dairy cattle business development quadrant. The results of the final score indicate that the strength value of the dairy cattle business is included in the fairly good category and the threat value of the dairy cattle business in Mojosongo District is in the moderate category, so an evaluation is needed to overcome these weaknesses [4].

### 3.3.2 External Factors

External factors represent the business environment that creates opportunities and threats faced by farmers in Mojosongo District, Boyolali Regency. External factors consist of economic, socio-cultural, governmental, and technological forces. Based on these external factors, current opportunities and threats can be identified. External strategic factors are shown in Table 4.

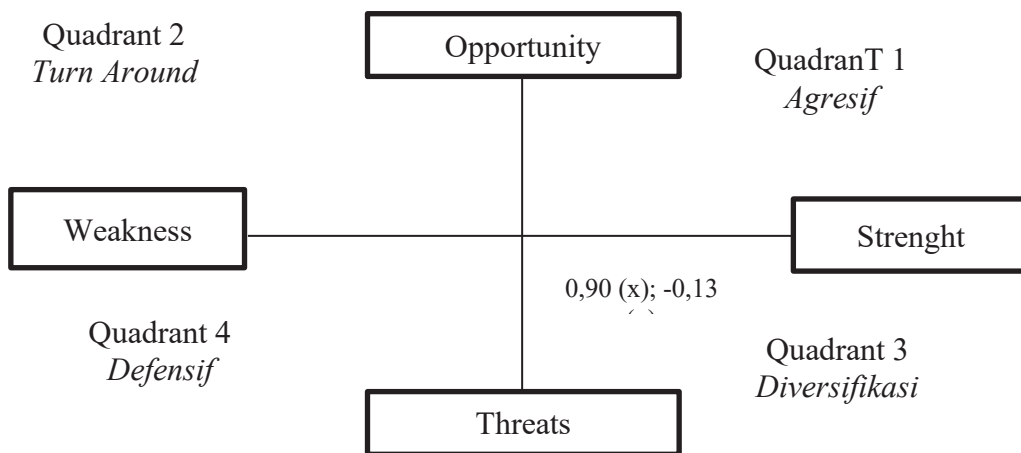
**Table 4.** External strategic factors of dairy cattle farming business.

No	External Strategy Factors	Rating	Weight	Score
<b>Opportunity</b>				
1	Support from local government	3.5	0.14	0.49
2	Increase in demand for dairy products	3.2	0.13	0.41
3	Government policy in developing dairy cattle business	3.4	0.13	0.44
4	Milk processing technology	3.3	0.14	0.46
5	IB technology has spread in society	4.1	0.13	0.53
6	Ease of marketing cow's milk	3.4	0.13	0.44
7	Processing livestock waste into organic fertilizer	3.6	0.10	0.36
8	Suitable climate conditions for dairy cattle	4.4	0.10	0.44
	<b>Amount</b>	<b>30.5</b>	<b>1</b>	<b>3.57</b>
<b>Threats</b>				
1	Fluctuating prices of concentrated feed	3.8	0.15	0.57
2	There is a change in the function of agricultural land into residential and industrial areas	3.4	0.10	0.34
3	The weakness of livestock farming institutions	3.8	0.11	0.42
4	Difficulty getting loans from banks and cooperatives	3.8	0.14	0.53
5	Uncertain milk prices	3.8	0.11	0.42
6	Imported milk policy	3.4	0.14	0.48
7	There are no third-party business partners yet	3.6	0.12	0.43
8	The dominant role of collectors in determining milk prices	3.6	0.14	0.51
	<b>Amount</b>	<b>26.6</b>	<b>1</b>	<b>3.70</b>

Source: Processed primary data, 2025.

Table 4 was the score for the opportunity strategy factor of 3.57 and the threat strategy factor is 3.70. The result of subtracting the weighted average of the opportunity and the weighted average of the threat is -0.13. The result of the *weighted* average is the coordinate point of the "y" axis which has a negative value in the SWOT analysis diagram and is in the dairy cattle business development quadrant. The recommended strategy for dairy cattle development is positioned in Quadrant II (Figure 1). A Quadrant II strategy indicates a condition in which farmers possess considerable internal strengths but simultaneously face

significant external threats [4]. Although challenges are present, several opportunities can still be leveraged. The internal and external factor scores determine the strategic position of dairy cattle development in Mojosonggo District, Boyolali Regency. The total internal factor score is 0.90 calculated as the difference between strengths and weaknesses, while the total external factor score is - 0.13 derived from the difference between opportunities and threats. Based on these values, the most appropriate strategy for dairy cattle development falls within Quadrant II.



**Figure 1.** Diagram of SWOT Analysis.

The strategy implemented in quadrant 2 is one in which the corporation maintains its internal strength in the face of numerous dangers, including FMD diseases [13]. Farmers are threatened, yet there are trustworthy forces. Because of this, farmers might employ alternative approach 2, which is diversification or innovation, by leveraging their ability to seize long-term opportunities in markets or goods. [4]. Strategies to address FMD in dairy cattle include prevention (routine vaccination, strict biosecurity, livestock movement restrictions), control (isolation of sick animals, early detection, disinfection), supportive treatment (antibiotics for secondary infections, anti-inflammatories, vitamins, nutrition), and risk management (farmer education, government coordination, culling of severely infected animals), with a primary focus on vaccination and biosecurity to protect healthy cattle and minimize significant economic impacts such as a decrease in milk production of up to 80%.

## 4 Conclusion

The research results indicate that the recommended alternative strategy for maintaining dairy cattle farming in Mojosonggo District, Boyolali Regency, is a diversification strategy, which falls into quadrant 2 of the SWOT analysis. The first diversification strategy is improving human resource quality, including optimizing and strengthening the internal capacity of farmers, particularly human resource competencies. Second, effectively utilizing available natural resources to expand and modernize dairy farming operations by introducing high-quality feed and superior cattle breeds. Third, strengthening partnerships with government agencies and external stakeholders, as well as strengthening farmer institutions, is crucial to increasing their bargaining power in the market. The fourth defensive strategy for addressing FMD in dairy cattle includes prevention, control, supportive treatment, and risk management, with a primary focus on vaccination and biosecurity to protect healthy cattle.

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