



Research Article

Assessing the Viability of Establishing a Dairy Milk Business in the Village Unit Cooperative of Gandusari District, Blitar Regency: A Feasibility Analysis

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ABSTRACT

Milk is a vital animal-derived food product, along with meat and eggs, for human consumption. In Indonesia, the dairy industry is dominated by small and medium-sized dairies. Dairy cows are a significant source of animal protein, and their primary product is milk. In the North of Blitar Regency lies the sub-district of Gandusari, where dairy cow milk is produced in the villages under the coverage of the Village Unit Cooperative called KUD "Semen." This research was initiated to address a problem. Primary and secondary data were collected using a pulDRosive sampling technique, questionnaires, literature review, and observation. The collected data is quantitative, and investment criteria were utilized for analysis. The results of the NPV analysis showed an amount of IDR 18,672,631,280, IRR of 29%, B/C Ratio of 184.04, and PP for eight years and six days, indicating the feasibility of investing in KUD "Semen." Sensitivity analysis was performed based on three assumptions, including the increase in feed costs, operational costs, and decreased milk production of dairy cows. The analysis revealed that the dairy milk business in KUD is sensitive to increased feed prices and decreased production, among the three assumptions.

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INTRODUCTION

The dairy industry in Indonesia is primarily composed of small and medium-sized entelDRises, as reported by Anindyasari et al. (2015). Dairy cows, which provide animal protein, produce milk as their main product. Milk, along with meat and eggs, is a crucial food ingredient of animal origin that is essential for human life due to its high nutritional value. However, milk is highly susceptible to microbial growth and deterioration, rendering it unsuitable for consumption within a short period, and it is typically rejected for marketing pulDRoses (Zain, 2013). Despite this, milk is highly beneficial, and its consumption in Indonesia has increased significantly. Unfortunately, domestic milk production has failed to keep up with this trend, forcing the government to import milk from other countries. As Poetri's (2016) research indicates, milk is among the most frequently consumed livestock products. However, due to the gap between milk production



and consumption in Indonesia, the country needs to import raw materials from other milk-producing nations. Hence, additional business development is required to satisfy the nation's milk consumption needs.

Table 1 above displays the annual changes in fresh milk production between 2019 and 2021, indicating a tendency for fresh milk consumption to rise annually. Among the most significant milk-producing regions is East Java. Detailed information on the production of fresh milk for each province is presented in the subsequent table:

Table 1. Milk Production by Province

Province	Fresh Milk Production by Province (Tons)		
	2019	2020	2021
West Java	300337.16	281198.94	283361.18
Central Java	102948.90	102707.88	102508.64
Yogyakarta	5925.69	5385.60	5306.04
East Java	521123.43	542860.27	556431.78
Banten	53.74	121.22	121.22

Source: BPS (Fresh Milk Production by Province) 2021

Dairy milk production is a significant agricultural activity in East Java, and the villages of the Gandusari district, situated in the northern region of Blitar Regency, are among the dairy milk-producing areas. The production activities are coordinated by a Village Unit Cooperative (KUD) called KUD "Semen," which provides necessary facilities to farmers. Against this backdrop, this study aims to address several research questions. First, what are the costs and revenues associated with running a dairy milk business for farmers or KUD "Semen" members? Second, what is the feasibility of the dairy milk business run by KUD "Semen"? Finally, how does the sensitivity analysis affect the dairy milk business in KUD "Semen"? Answering these research questions will provide insights into the financial viability of the dairy milk business in the study area and will be beneficial to policymakers, dairy milk farmers, and other stakeholders.

Enhancing the efficiency of dairy farming is a strategic approach towards augmenting the income of farmers at the household and national levels (Asmara et al., 2015). Business feasibility theory is a scientific approach that assesses the viability of a business operation. The role of business feasibility studies is pivotal in providing recommendations to business owners for ensuring continuity of operations. Previous research has established that a cattle farming business is financially feasible if the net present value is greater than zero ($NPV > 0$), although the payback period should be less than the project life of ten years.

Khafsah et al. (2018) conducted a study on the financial and non-financial feasibility of dairy farm production by PT Fructi Agri Sejati. Their findings suggested that the business is viable since the investment criteria were met with $NPV = 0$ and R/C value > 0 . Nevertheless, this research differs from the present study in terms of the analyzed population. Notably, this study did not examine the sensitivity of the dairy farm production business. Previous research conducted by Poetri et al. (2016) investigated the development of Kunak dairy farming in Pamijah village, Bogor Regency, using both investment criteria and sensitivity analysis. The results of the investment criteria analysis indicated that the business is feasible with $NPV > 0$ and $IRR > 0$, while the sensitivity analysis showed that the business is still viable and insensitive to assumed changes. The objective of this study is to provide an overview and information on the feasibility of the dairy milk business, specifically on its financial aspects, by utilizing the existing investment criteria to evaluate the feasibility of the dairy milk business in KUD "Semen".

METHOD

The present study employs both primary and secondary data sources. The former was gathered through interviews and observations conducted with breeders or members of KUD "Semen." To ensure representativeness, a purposive sampling technique was utilized, as described by Arifin (2017). This technique involves selecting participants based on specific criteria established by the researcher. For the purposes of this investigation, a sample of 30 breeders was deemed adequate and expedient for data processing. Data collection involved the administration of questionnaires, which were used to gather information on various aspects of the respondents' identities, including their names, gender, age, livelihoods, educational background, and farming experience. The questionnaire technique is in line with the approach suggested by Sugiyono and Purbarani (2013), who describe it as a set of written questions administered to respondents, which can be considered a form of observation. Only families involved in lactating dairy cow

farming in Gandusari District were selected as respondents, with selection criteria determined in advance by the researcher. Samples were designated from various villages or KUD "Semen" coverage areas. The data gathered from the respondents was quantitative and analyzed using investment criteria specific to dairy milk businesses. These criteria were defined as follows:

Net Present Value (NPV)

$$NPV = \sum_{t=1}^n \frac{Bt - Ct}{(1+i)^t}$$

Where:

Bt = Benefit of year t

Ct = Cost of year t

i = Interest rate

t = Economic lifetime in dairy cows (10 years)

Criteria for decision-making:

1. if $NPV > 0$, the dairy milk business is deemed feasible.
2. if $NPV < 0$, the dairy milk business is deemed unviable.
3. if $NPV = 0$, the dairy milk business is considered to be at the break-even point.

Payback Periode

$$Payback\ period = \frac{Investment\ Value}{Net\ Cash} \times 12\ months$$

Where:

Investment Value = Initial Investment

Net Cash = the benefits earned in each period

Assessment criteria for the payback period (PP):

1. If Payback Period < economic lifetime in dairy cows, the dairy milk business is deemed feasible.
2. If Payback Period > economic lifetime in dairy cows, the dairy milk business is deemed unviable.

Benefit of Cost Ratio (B/C Ratio)

$$\frac{B}{C} \text{ ratio} = \frac{Total\ Benefit}{Total\ Cost}$$

Where:

Bt = Benefit of year t

Ct = Cost of year t

Assessment criteria for Benefit Cost Ratio (B/C):

1. If $B/C > 1$, the dairy milk business is deemed feasible.
2. If $B/C < 1$, the dairy milk business is deemed unviable.
3. If $B/C = 1$, the dairy milk business is considered to be at the break-even point.

Internal Rate of Return (IRR)

$$IRR = i_1 + \frac{NPV_1}{(NPV_1 - NPV_2)} (i_2 - i_1)$$

Where:

NPV₁ = Positive NPV

NPV₂ = Negative NPV

i₁ = Interest rate of NPV₁

i₂ = Interest rate of NPV₂

Assessment criteria for Internal Rate of Return (IRR):

1. If IRR > interest rate, the dairy milk business is deemed feasible.
2. If IRR < interest rate, the dairy milk business is deemed unviable.
3. If IRR = interest rate, the dairy milk business is considered to be at the break-even point.

Sensitivity Analysis

$$\text{Sensitivitas} = \frac{\frac{|X_1 - X_0| \times 100\%}{X}}{\frac{|Y_1 - Y_0| \times 100\%}{Y}}$$

Where:

X = Average change in NPV/IRR/Net B/C ratio

Y₁ = Selling price/production cost/production after changes occur

Y₀ = Selling price/production cost/production volume before the change

Y = Average change in selling price/production cost/production

Criteria for Sensitivity rate:

1. Sensitivity rate > 1, the results of the business or project are sensitive to changes.
2. Sensitivity rate < 1, the results of the business or project are insensitive to changes.

RESULTS AND DISCUSSION

The dairy industry represented by the Village Unit Cooperative (KUD) Semen is located in Slumbung Village, Gandusari District, Blitar Regency, and is managed by cooperative farmers. Originally established in 1972 under the name of the Village Unit Business Agency (BUUD), BUUD was seen as less effective at mobilizing the community as a whole. Consequently, based on government regulations outlined in Presidential Instruction No. 2 of 1978 concerning Village Unit Business Entities/Village Unit Cooperatives, BUUD was combined with KUD. KUD Semen's Business Unit comprises a range of operations, including a Dairy Milk Processing Unit, Dairy Concentrate Feed Processing Unit, KSMart Unit, Home Biogas Unit, Animal Health Service Unit, and Savings and Loan Unit, with the Dairy Milk Unit serving as the main and featured unit. KUD Semen boasts 71 employees, 16 structural administrators, and 650 active farmers as members. The cooperative's vision is to "make KUD Semen a binder of members and the community in improving the quality of life based on cooperative values", while their mission is "to improve the standard of living of members and the community in fulfilling their livelihood based on the cooperative's principles".

The type of dairy cows commonly farmed in the area is Friesian Holstein (FH) dairy cows. The population of dairy cattle is stratified by age, with calves aged approximately 1-3 months comprising the breeding stock of the farmed mother, while cattle aged approximately 1-3 years are the primary source of dairy milk or lactating cows. Farmers undertake several maintenance procedures to ensure optimal milk quality, beginning with regular cleaning of the cattle's living quarters, which is required by the cooperative. The observations indicate that the dairy milk business run by KUD is clean and well-maintained, with cowsheds equipped with automatic feeding and drinking tubs known as water life. The cooperative recommends the use of water life to meet the mineral requirements of dairy cows, as water is a crucial component of milk production, which is composed of 87% water and 13% dry matter (Sudono et al., 2003). The farmers provide fresh and fermented grass as the primary source of forage feed, given twice daily, in the morning and evening. Concentrate feed is also provided to increase the quantity and quality of milk production. Operating costs associated with feeding, as well as other costs incurred by farmers to support the dairy milk business, are classified as operational and fixed costs (Ula, Mahfudlotul, et al., 2017).

Structure of Costs

Fixed Costs

Fixed costs are expenses that remain constant regardless of the level of production within a specific range and are not influenced by fluctuations in business activity. Fixed costs incurred by dairy farmers include various items such as milk cans, buckets, sieves, scrapers, sickles, and brooms. Equipment depreciation refers to the process of allocating the cost of equipment over its useful life, after accounting for its residual value.

Table 2. Fixed costs incurred by each farmer

No	Fixed Costs	Depreciation	Average
1	Milk can	1.098	1.581.667
2	Bucket	931	44.667
3	Sieve/strainer	116	8.333
4	Scraper	861	82.667
5	Broom	620	89.333
6	Sickle	133	6.400
Total		3.759	1.813.067

Source: Primary Data Processed (2022)

According to the findings of this research, the milk can is the most expensive piece of equipment to purchase compared to other farming tools. As the number of cows on a farm increases, the need for more milk cans also increases. However, this conclusion differs from the findings of Khafsah (2018), who reported that the most expensive tool for dairy farmers to purchase is the scale used to measure milk production.

Variabele Costs

Variable costs are expenses that are directly associated with dairy farming activities (Aprillia et al., 2021). In the present study, operational costs incurred by farmers consist of various items, such as fuel oil (BBM), labor, concentrate feed, and medicines.

Table 3. Operational costs incurred by each farmer.

No	Operational Costs	Total	Average
1	Fuel oil	28.733.400	957.780
2	Labor	88.800.000	986.667
3	Concentrate Feed	27.608.400	306.760
4	Drugs	19.745.000	219.389
Total		164.886.800	2.470.596

Source: Primary Data Processed (2022)

The findings of this study are consistent with those of Anindiyasari et al. (2015), who reported that labor costs account for the highest percentage of expenses among dairy farms in Banyumanik, Getasan, and Cepogo, which are the areas covered by this study. However, this perspective contrasts with the findings of Asperinche (2018), who suggested that feed costs are the most significant expense incurred by dairy farmers.

Business Feasibility Analysis

A business feasibility analysis is a comprehensive evaluation from the perspective of the company owner, taking into account all income and expenses based on prevailing domestic prices and interest rates. A financial feasibility analysis provides information on the level of profitability, payback period, and credit interest rate that the business activity can sustain. The findings indicate that both costs incurred, and revenues earned increase each year, with farmers earning a profit annually.

Table 4. Results of Feasibility Analysis of Dairy milk business at KUD "Semen"

No	Investment Criteria	Calculation Result	Description
1	NPV (Net Present Value)	354.769.584	Profitable
2	BCR	4,72	Feasible
3	IRR (Internal of Return)	28%	Feasible
4	PP (pay Back Period)	8 years 9 months 7 days	

Source: Primary Data Processed (2022)

Net Present Value (NPV) of Dairy milk business at the KUD "Semen" in Gandusari District, Blitar Regency

The Net Present Value (NPV) method calculates the net value of a project by discounting all cash inflows and outflows over the project's life to their present value, thereby determining the difference using the same basis as the current market price. In this study, the NPV criterion was used to evaluate the feasibility of a dairy milk business in KUD "Semen" Gandusari District Blitar Regency. The financial analysis of the dairy milk business showed that the NPV obtained with a discount factor of 13.25% was IDR 354,769,584, indicating that the net profit obtained over seven years was around IDR 354,769,584 in present value terms. Thus, the dairy milk business run by farmers is feasible and profitable with an initial capital of IDR 247,956,864. This result is consistent with the findings of Aspirienche's (2018) study, which also concluded that the business can continue because the NPV value exceeds zero.

The financial feasibility of a business is largely dependent on bank interest rates, which can significantly impact the net present value (NPV) of the business. In this study, it was found that an increase in bank interest rates of up to 18.86% per year did not result in a negative NPV for the dairy milk business. Specifically, the calculated gain was IDR264,230,692, indicating that the business remained profitable and feasible for development. This result differs from the findings of Kartikasari (2015), who noted that an increase in interest rates can cause the NPV of a business to fall into the negative, rendering it unfeasible. A detailed summary of the analysis with an interest rate increase of 18.86% is presented in the following table:

Table 5. Net Present Value (NPV)

Investment Criteria	Calculation Result
NPV1	18.672.631.28
NPV2	14.172.315.01
B/CR	184,04
IRR	29%
Df 1	12%
Df 2	16%

Source: Primary Data Processed (2022)

Internal Rate of Return (IRR) of Dairy Milk Business at the KUD "Semen" in Gandusari District, Blitar Regency

The Internal Rate of Return (IRR) is a technique used to determine the interest rate that equates the present value of all cash inflows to cash outflows of an investment. It also represents the discount rate that causes the net present value (NPV) to be equal to the total investment cost of a project. IRR can be useful in assessing a project's ability to repay interest on loans from internal financial institutions that finance the project. The present study computed the IRR for the dairy milk business in the "Semen" cooperative and found it to be approximately 28%. This indicates that the business can still generate a profit and continue to operate if the interest rate increases to 28%. As the IRR value of 28% exceeds both the interest rates of 13.25% and 18.86%, the dairy milk business is worth developing due to its high rate of return. The results of this study are consistent with those of Khafsah (2018), which suggest that the IRR value above the specified discount rate makes the business viable for development.

Net Benefit Cost Ratio (Net B/CR) of Dairy Milk Business at the KUD "Semen" in Gandusari District, Blitar Regency

The Net Benefit Cost Ratio (Net B/C) method is an essential analysis technique that evaluates the previous assessment results with additional methods. This technique is widely used during the initial stages of investment planning evaluations. Table 5 presents the Net B/C data obtained from the dairy milk business in KUD "Semen" farmers in Gandusari District, Blitar Regency. The Net B/C Ratio provides a measurement of the benefits obtained from the costs incurred by the project. In this regard, a project is deemed feasible if the Net B / C Ratio value exceeds one. The analysis results of the dairy milk business's Net B/C Ratio reveal a value of 4.72, which is significantly greater than one. As such, the higher the value of the Net B / C ratio, the greater the profit obtained, and the more feasible it is to develop (Utari, 2015). This study's results corroborate the findings of Dewi and Fatmawati (2011), who contend that the Net B/C Ratio is greater than one, indicating that the business development criterion is feasible to run.

Payback Period (PP) of Dairy Milk Business at the KUD "Semen" in Gandusari District, Blitar Regency

To determine the profitability and feasibility of the dairy milk business in KUD "Semen," it is necessary to perform a Payback Period (PP) analysis. This tool helps to assess the financial viability of an investment by calculating the length of time required to recover the initial investment. Investments with a faster payback period are preferred as investment options. The PP value for the dairy milk business in KUD "Semen" is calculated by dividing the initial capital invested by the net benefits obtained each year. The calculated PP value for the dairy milk business is eight years, nine months, and seven days. These results show that the dairy milk business can return the invested capital in a time period that is not too long and is less than the 10-year economic life of the dairy milk production factors in KUD "Semen." Furthermore, the results of this study align with previous research by Khafsah et al. (2018), which states that a dairy farming project is considered feasible if the point of return on investment is 9.63. The analysis of the dairy milk business's feasibility, based on the NPV, IRR, B/C Ratio, and PP calculations, indicates that the business is worth developing, and the hypothesis is accepted.

Sensitivity Analysis of Dairy Milk Business at the KUD "Semen" in Gandusari District, Blitar Regency

A sensitivity analysis is an essential tool for evaluating the impact of investment parameters under different scenarios that may arise during the investment's lifespan. It helps to determine the extent to which situational factors and conditions can influence the investment's profitability and significantly affect decision-making. This analysis usually involves testing various assumptions to assess how sensitive the investment is to changes in these assumptions. In this study, we evaluate the sensitivity of the dairy milk business in KUD "Semen" to a 20% increase in feed costs. The results of this sensitivity analysis are presented below.

Table 6. Results of sensitivity calculations to feed price increases

No	Investment Criteria	Calculation Result	Description
1	NPV (Net Present Value)	331.410.492	Profitable
2	Net B/C Ratio	1,13	Feasible
3	IRR (Internal of Return)	17%	Feasible
4	PP (pay Back Period)	10 years 0 months 5 days	

Source: Primary Data Processed (2022)

In addition to genetic factors, the success of a dairy business is also influenced by operational costs, such as feed expenses. Insufficient food may lead to a decrease in milk production due to lack of energy in the milk-producing animals. Therefore, high-quality dairy cows producing a large quantity of milk require adequate maintenance, such as vitamin supplements and highly nutritious feed. One of the critical factors that can impact the feasibility analysis of a joint venture is the increase in feed costs. To test the hypothesis, the researcher conducted a sensitivity analysis on the impact of feed price increase on the dairy farm's feasibility. The sensitivity analysis focused on a 20% increase in dairy feed prices.

Based on the assumptions from previous studies, a decision was made to expand the dairy business. To determine the viability of this decision, a sensitivity analysis was conducted to examine the impact of a 20% increase in feed costs on the business. Results indicate that total costs would increase by IDR 251,403,400, but the NPV value of IDR 331,410,492 suggests that expansion is still possible. Furthermore, the Net B/C ratio of 1.13 indicates that investment in this business is feasible. The IRR value in the sensitivity analysis is 17%, and all four investment criteria give positive and profitable results. However, the profits are minimal compared to the earnings before the food price increase. The payback period under a 20% increase in food prices is ten years 0 months five days. The rate of return on capital has exceeded the economic period, indicating that the cow's milk business has limited potential for growth. These findings are consistent with research by Kartikasari (2015), which indicates that dairy cattle farming is becoming increasingly unfeasible. Overall, the sensitivity analysis results show that the milk business KUD "Semen" is not sensitive to price changes.

The present study aims to conduct a sensitivity analysis of variable costs associated with dairy farming in KUD "Semen." Specifically, the study focuses on evaluating the impact of forage silage feed costs during the dry season on the feasibility of dairy farming in KUD "Semen." The study considers the assumption that additional costs will be incurred during the dry season due to the scarcity of forage for dairy cows. This assumption is based on the feedback received from the respondents who reported taking silage measures during the dry season. The results of the sensitivity analysis are presented below.

Table 7. Results of sensitivity calculations to the addition of variable costs

Investment Criteria	Calculation Result
NPV	IDR 442.099.047
B/CR	5,7
IRR	27%
PP	8,08

Source: Primary Data Processed (2022)

The study aimed to determine the feasibility of incorporating dairy cows in KUD "Semen" by conducting a sensitivity analysis of the addition of variable costs, specifically the cost of forage silage feed during the dry season. The research team added this assumption based on feedback from respondents indicating that silage is made during the dry season. The results presented in Table 7 indicate that the dairy milk business remains viable despite the added variable costs. The additional variable costs incurred amounted to IDR 250,836,864, initially IDR 247,956,864. The NPV value of IDR 442,099,047 demonstrates that members who incur additional costs for forage hay during the dry season can still achieve profitability and maintain feasibility. An IRR value of 27% shows that members can still benefit and survive at this interest rate. The Net B/C result of 5.7 indicates that the additional cost of forage silage feed can produce a significant value and is increasingly feasible to develop. The return on capital is eight years, nine months, and seven days, which is nine months longer than the original analysis. These findings contrast with those of Duwi et al. (n.d), who assert that dairy cattle are less sensitive to variable changes.

In this study, a sensitivity analysis was conducted to assess the feasibility of the dairy cattle milk business in KUD by analyzing the impact of a decline in milk production. The objective of the study was to test the hypothesis based on prior research that a decline in milk production of 41.36% would render the dairy cattle milk business unviable. The results of the analysis are presented below.

Table 8. Results of sensitivity calculations to decreased production (41.36%)

Investment Criteria	Calculation Result	Description
NPV	180.313.485	Feasible
Net B/CR	3.0	Feasible
IRR	29%	Feasible
PP	10,195	

Source: Primary Data Processed (2022)

The aim of this study was to evaluate the feasibility of the dairy cattle milk business in KUD by analyzing the sensitivity of a 41.36% decrease in milk production, based on previous research. The results of the analysis indicate that the business remains viable even with a decrease in production. However, a reduction in NPV value was observed, from IDR 354,769,584 to IDR 180,313,485. Net B/C ratio also declined from 4.72 to 3.0. The IRR value remained at 29%, similar to the previous analysis. Return on capital from the dairy milk business in KUD against a decrease in production was found to be ten years one month and nine days, exceeding the economic life of 10 years. The results of this study contrast with those of Duwi et al. (n.d), which state that the dairy cattle business becomes financially unfeasible with a 41.36% decrease in production.

CONCLUSION

Based on the findings of this research, it is concluded that the dairy milk business in KUD "Semen" is feasible to operate with an NPV value of IDR 354,769,584, net B/C value of 4.72, IRR value of 28%, and PP of 8 years, 9 months, and 7 days. Further sensitivity analyses were conducted to examine the impacts of increased feed prices, additional variable costs, and decreased production on the feasibility of the business. The sensitivity analysis results demonstrate that the dairy business is not sensitive to the addition of variable costs as the investment criteria calculation does not align with the decision. However, the increase in prices and decrease in production significantly affect the feasibility of the dairy milk business in KUD "Semen." These results are consistent with previous research, which suggests that a decrease in production by 41.36% makes the dairy cattle business financially unfeasible.

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