Buletin Peternakan 49 (1): 35-42, February 2025

ISSTAP
Indonesian Society for Sustainable Tropical Animal Production

Bulletin of Animal Science

ISSN-0126-4400/E-ISSN-2407-876X Accredited: 36a/E/KPT/2016
http://buletinpeternakan.fapet.ugm.ac.id/

Doi: 10.21059/buletinpeternak.v%vi%i.98169

Qualitative Modeling to Analyze The Performance of Beef Cattle Farms That Receive Government Aid in Banyumas District

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Article history
Submitted: 12 July 2024
Accepted: 12 December 2024

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ABSTRACT

The objectives of this study are to analyze the success of the beef cattle assistance program in Banyumas Regency as seen from the economic performance of the business and to identify the factors related to the performance of beef cattle farms receiving assistance in Banyumas. This study used a field survey method in Purwojati and Jatilawang Subdistricts, Banyumas Regency with in-depth discussions and interviews (focus group discussions). The sample size was determined using purposive sampling. There were 65 informants from 4 groups of beef cattle farmers who received assistance in 2021 and 2022. Data analysis using Cash Flow and Causal Loop Diagram (CLD) qualitative modeling. The results of the cash flow analysis research found that one farmer group was considered efficient, one was inefficient, and the other two groups could not be identified because there was no revenue and expenditure data. Factors related to business performance of beef cattle farmers in Banyumas Regency based on Causal Loop Diagram were found to be livestock suitability, violation, motivation, and feed.

Keywords: *Beef cattle farms, Cash flow, Causal loop diagram, Qualitative modeling*

Introduction

The development of the livestock sector is prioritized to increase meat production and livestock population to achieve self-sufficiency in meat from livestock in order to improve the standard of living of farmers. The existence of various assistance programs from the government is expected that beef cattle farmers in Indonesia can increase the production and quality of beef cattle, increase farmers' income, and strengthen domestic food security. It is important to analyze the success of the productive breeder cattle and animal feed assistance programs that have been implemented from 2021 to 2022 to ensure that the government's objectives in providing livestock assistance have a significant impact on the livestock community in Indonesia. (Harianto *et al*. 2022)

The success of a livestock business is not only affected by technical production factors but also social and economic factors (MacLeod et al., 2011; Snapp and Pound, 2008). Socio-economic characteristics that also contribute to business success are the role of livestock farmer groups in empowering farmers' business activities. Through farmer groups, it is expected that farmers can interact with each other, exchange information, and complement each other, so that they have the impact of mutual need, mutual strengthening, so that they will increase their knowledge and ability to potentially manage agribusiness and agroindustry business systems using cash flow analysis (Mardiyati *et al*., 2024).

The dynamic system approach can be an effective tool to analyze the success of the livestock assistance program in Banyumas Regency. This approach allows us to model the relationship between various factors that influence the success of the program, as well as understand the changes that occur over time. Through a dynamic systems approach, a deeper understanding of the factors that influence the success of the livestock assistance program can also be obtained. Dynamic system modeling can guide scenario analysis to evaluate the impact of various strategies or policy changes on the success of the livestock assistance program in Banyumas Regency. Research Objectives are to analyze the success of the beef cattle assistance program in Banyumas Regency in terms of business economic performance and identify factors associated with the business performance of beef cattle beneficiary farmers in Banyumas Regency.

Materials and Methods

Materials/Research Objectives

The research target is beef cattle farmer groups receiving assistance in Banyumas Regency in 2021 and 2022, totaling 21 beneficiary groups. The stage of determining the sample of farmer groups was carried out using the purposive sampling method, namely sampling with specific criteria. The criteria were sub-district areas that received livestock and livestock and forage assistance, livestock groups from the same sub-district area, and groups willing to be interviewed. Four groups were selected, namely Gapoktan Karya Abadi (Kube Ternak Sapi Werdi Dadi), Marga Makmur, Mugi Lestari, and Ngudi Jaya from 2 sub-districts Purwojati and Jatilawang. The number of informants used a census with a total of 65 farmers. The research period was 2 mon., from October 2023 to November 2023.

Research Methods

The research method used is the field survey method, which involves interviewing farmers using questionnaires and observations related to the group. Primary data collection was carried out with in-depth discussions and interviews (focus group discussions) with farmer group members and group administrators to find out the factors that influence the success of farmer groups receiving assistance in 2021-2022. Secondary data was obtained from the Fisheries and Livestock Service Office of Banyumas Regency. The analysis used is economic analysis using cash flow analysis and qualitative modeling using causal loop diagrams.

Results and Discussion

Economic Analysis

Farmer Group Assets

Group assets are everything that is owned and utilized by a farmer group in carrying out its operations. It includes all goods and resources needed by the farmer group to produce livestock products, maintain livestock health, and conduct business activities. By having sufficient assets, farmer groups can optimize production, improve efficiency, and strengthen business sustainability in the long term. Supit, V., Rantung, V., & Pakasi, C. (2016) Table 1 shows the assets of beef cattle farmer groups at the time of the research.

Table 1 Livestock Group Assets

Group	Asset Type	Total	Asset Price (IDR)	Total Price (IDR)	Total Assets (IDR)
Karya Abadi	Cage	2 (7x12 m^2)	14.000.000	28.000.000	204.000.000
	Mature Female Cow	11	16.000.000	176.000.000	
Mugi Lestari	Cage	1 (7x11 m^2)	10.000.000	10.000.000	34.000.000
	Mature Bulls	1 ekor	24.000.000	24.000.000	
Ngudi Jaya					6.000.000 (sale of 2 cows)
Marga Makmur	Cage	2 (7x12 m^2)	14.000.000	28.000.000	284.000.000
	Mature Female Cow	16	16.000.000	256.000.000	

The initial amount of assistance received in each group is Karya Abadi eleven cows, Marga Makmur twenty cows, Mugi Lestari two cows and HPT (Animal Feed Grass) odot and Indigofera, Ngudi Jaya two cows and HPT (Animal Feed Grass) odot and Indigofera. Current beef cattle ownership in each group is Karya Abadi eleven heads; Makmur Makmur sixteen heads; Mugi Lestari, one, and Ngudi Jaya no longer has livestock. The Marga Makmur group experienced four livestock deaths due to illness. The Mugi Lestari group had one livestock die due to illness, and in the Ngudi Jaya group, two livestock were sick, so they were sold at a price of 6,000,000 for two heads.

Revenue

Revenue is a livestock activity that runs the business, obtaining a flow of income from various activities carried out in running a livestock business. This income can come from several sources, such as livestock sales, crop yields, and sales of livestock products. Ismiyah (2020) 's Revenue of livestock groups can be seen in Table 2.

Table 2 Acceptance

Group	Type of Receipt	Price (IDR)	Total	Total Price
Ngudi Jaya	Livestock Sales	3.000.000	2	6.000.000

Revenue only exists in the Ngudi Jaya group. The Karya Abadi, Mugi Lestari, and Marga Makmur livestock groups do not yet have revenue from beef cattle farming because they are still in the early stages of implementation, with a span of about 1-2 years. Therefore, these groups have not yet developed and have never sold their livestock. By-products, such as fertilizer from cattle feces, are not sold but used by group members themselves. At the time of receiving the livestock assistance, the cattle had not yet reached productive age, so they had to be nurtured until they were ready for breeding. During this time, there has not been sufficient progress to create a measurable impact on group revenue. A careful evaluation of the factors that influence business progress, such as

management, cattle health, and marketing strategies, could provide greater insight into the future revenue potential of this cattle group. According to (Maulidiah and Sunyigono 2023) the benchmark of a successful livestock business can be known through the overall amount of revenue earned by farmers in running their business.

Expenses

Expenses are the costs or expenses required by the farmer group to run its business. This includes payments for various needs, such as the purchase of animal feed, treatment and care of sick livestock, financing costs for artificial insemination (AI), and other operational costs associated with the daily activities of managing the farm. Expenses are an important part of managing farm finances and ensuring the smooth operation and welfare of the livestock under management. Attached in table 3 are the expenditures of the recipient beef cattle groups.

Table 3 Expenses

Group	Expenditure Type	Price (IDR)	Total	Total Price (IDR)
Marga Makmur	IB (Artificial Insemination)	100.000	6	600.000
Ngudi Jaya	Medicine	200.000	1	200.000

Cash Flow Analysis

Cash flow analysis is an evaluation process carried out to understand the inflow and outflow of money.

Cash Flow = Total Inflows - Total Outflows

E = R/C

The results of the data obtained for the total inflow (revenue) are in the Ngudi Jaya group with a total of Rp. 6,000,000, - and for the total outflow (expenditure) of the Ngudi Jaya group of Rp. 200,000, - so that the cash flow results of the Ngudi Jaya group are positive. The Marga Makmur group until now has not had a total cash inflow (revenue) and has had a total outflow (expenditure) of Rp. 600,000, - so that the cash flow results of the Marga Makmur group are negative. The Gapoktan Karya Abadi (Kube Ternak Sapi Werdi Dadi) and Mugi Lestari groups have no inflows (receipts) and outflows (expenses) so they cannot be calculated for cash flow.

The results of business efficiency based on existing calculations obtained by the Ngudi Jaya group have a value> 1 which can be said to be efficient or profitable. The Marga Makmur group has a value of <1 which can be said to be inefficient or loss-making. The Gapoktan Karya Abadi (Kube Ternak Sapi Werdi Dadi) and Mugi Lestari groups cannot be said to be efficient or not because there is no revenue and expenditure.

The relationship between cash flow and business efficiency is very close because healthy cash flow is a key indicator of the operational efficiency of a business. A positive cash flow indicates that the business is able to generate enough money from its operations to cover daily expenses and still have some left over for investment or expansion. By understanding and managing cash flow well, companies can avoid liquidity problems, reduce dependence on borrowing, and improve the ability to capitalize on growth opportunities. Thus, cash flow analysis is key in assessing and improving the operational efficiency and financial sustainability of a business.

Qualitative Modeling Observing the System

Observing the beef cattle enterprise system of government aid recipients using a qualitative modeling approach allows researchers to explore the dynamics that occur in beef cattle farming. Researchers can identify patterns of relationships, dynamics and interactions between variables that are not apparent in qualitative data. The qualitative modeling approach can help in understanding non-financial factors such as management practices, environmental conditions, and social interactions among stakeholders in beef cattle enterprises.

The qualitative modeling approach overcomes the limitations of field data and allows researchers to explore insights from the narratives, opinions and direct experiences of relevant stakeholders. Through in-depth interviews, participatory observation and data analysis, researchers can capture things that are missed in quantitative analysis. This will gain a deeper understanding of the local context, challenges and opportunities faced by beef cattle enterprises receiving government assistance. Thus, the qualitative modeling approach not only complements but also enriches the understanding of beef cattle enterprise systems, which in turn can assist in designing more effective policies that are responsive to the real needs of stakeholders.

Identifying the Problem

Based on the analysis conducted, problems were found that affect the performance of beef cattle breeder groups in Banyumas Regency. The problems identified are the reduction in livestock population due to mortality, farmers' limited capital to manage beef cattle business, inadequate natural resources, lack of water resources, limited land, and lack of achievement motivation from farmers.

Causal Loop Diagram Analysis of Performance of Farmer Groups

Qualitative modelling in the form of a Causal Loop Diagram (CLD) is used to visualize the cause-and-effect relationships between variables in a complex system of beef cattle enterprises receiving government assistance. CLD allows researchers to identify how changes in one variable can affect other variables in the system and researchers can understand the underlying structure of the system and hidden patterns in the

interactions between variables. This makes it possible to identify potential intervention points to improve beef cattle enterprise performance effectively and sustainably.

The business performance of beef cattle farmer groups in Banyumas Regency consists of a complex structure, and the description of the qualitative modeling above is as follows:

R1 = Motivation - Hours worked - Motivation

Loop R1 explains motivation, the high motivation of farmers in running a beef cattle farming business can increase the farmer's working hours in running the business.

R2 = Motivation - Hours worked - Productivity - Business Income - Motivation

Loop R2 explains motivation, high motivation increases the farmer's working hours and thus increases productivity. Higher productivity can have a positive impact on business income.

B1 = Supported Livestock Population - Mortality - Supported Livestock Population

Loop B1 explains livestock suitability, the higher the population of unsuitable assisted livestock, the higher the mortality. High mortality results in a reduction in the assisted livestock population.

B2 = Penalty - Discipline - Penalty

Loop B2 describes violations. The high penalty in beef cattle assistance increases farmer discipline in business management, high discipline can reduce penalties.

B3 = Carrying Capacity of land - Number that can be reared - Forage requirements - Carrying Capacity of land

Loop B3 describes the land. The larger the Carrying Capacity of land, the more livestock that can be kept, but also increases the need for forage.

B4 = Forage Supply Effort - Labor - Forage Supply Effort

Loop B4 describes the land. Forage provisioning efforts require labor, because the greater the effort in providing forage, the greater the labor required to manage, plant or care for the forage.

B5 = Forage Effort - Cost - Forage Effort

Loop B5 is about land. Forage effort also has an impact on costs, with increased effort spent on providing forage increasing the operational costs of the farm.

Causal Loop Diagram Identification

A Causal Loop Diagram (CLD) is a visual representation that depicts the cause-and-effect relationships between events or variables in a system. How to present information about how factors affect each other in the system, using symbols and arrows to show the direction and type of relationship between variables. (Dianat et al. 2021)

Many variables influence behavior in the beef cattle farming system, especially in groups receiving government assistance programs. There is a match between expectations and reality, where there is a mismatch or gap (gep) that can arise for various reasons such as differences in understanding, perception, or unforeseen conditions. It is important to identify and address gaps between expectations and reality as they can have a negative impact on the viability and success of beef cattle farming enterprises. This study aimed to explore variables in 4 dimensions: livestock suitability, offense, motivation, feed.

a. Livestock Suitability

Based on figure 1, 1B is identified. The suitability of livestock provided to beneficiaries has a significant impact on livestock mortality and sale rates, which in turn affects the number or population of assisted livestock. Livestock suitability includes livestock type, physical condition, and adaptability of livestock to the new environment. For example, there were goat groups that received beef cattle assistance, which led to suboptimal husbandry management. The animals were then sold in a sick condition, and the proceeds were used to buy more goats and for the group's savings and loan program. On the other hand, another group received two male dairy cattle. Providing dairy cattle in the lowland areas of Banyumas Regency was considered inappropriate given the high temperature and limited natural resources. As a result, one animal died and the other was sold to be replaced with a female beef cow.

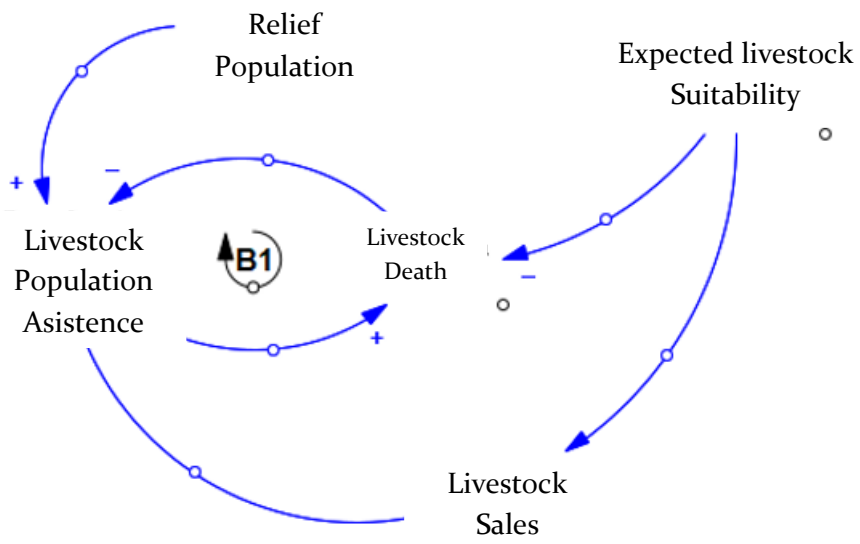

Figure 1 Livestock Suitability

b. Violation

Based on figure 2 identify 1B. Violations in beneficiary beef cattle farming groups occur due to a lack of sanction enforcement, which reduces farmer discipline. Farmer discipline is key to maintaining the continuity and efficiency of farm operations. Without consequences imposed for violations such as not following livestock management rules or not maintaining the health of livestock properly, farmer discipline can decline.

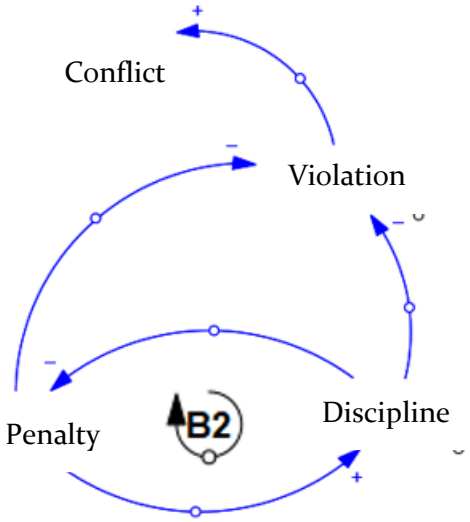

Figure 2 Violations

This decline in discipline has the potential to lead to violations that often adversely affect the livestock business as a whole. Lack of attention in maintaining livestock health can lead to the spread of diseases that are detrimental to the entire livestock group. In addition, violations can disrupt environmental balance or cause economic losses.

In addition to reducing discipline, the absence of penalties can also lead to conflicts between farmer groups. Dissatisfaction with the inappropriate behavior of some farmers can cause tension among group members. This can disrupt cooperation and collaboration among farmers, and hinder joint efforts to improve overall farm conditions.

c. Motivation

Based on Figure 3, 2R were identified. The motivation of beef cattle farmer group members has a significant impact on the level of productivity of members' working hours. When group members feel motivated, they are more likely to work with passion and dedication in livestock activities. This motivation can arise from a variety of factors, including the desire to improve family

welfare, pride in their work, or the hope of achieving certain livestock business goals.

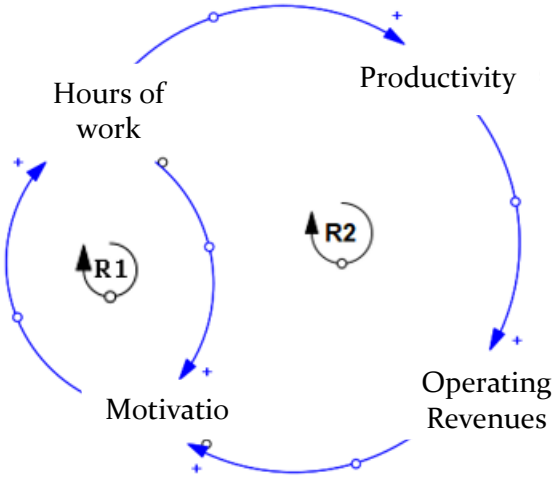

Figure 3 Motivation

High work hours mean that group members work longer or more intensively, potentially increasing group productivity. With greater effort and higher focus on work, group members can produce more or improve efficiency in livestock activities. The impact could be an increase in production yield, product quality, or operational efficiency of the farmer group.

Increased productivity of group members can result in an increase in their income. By working more productively and efficiently, group members have a greater chance of producing high-quality livestock, which in turn can increase their income. Therefore, the motivation of beef cattle farmer group members plays an important role in improving group productivity and income. For this reason, farmer groups need to encourage and support the motivation of their members through appropriate rewards, recognition and support, in order to create a productive and sustainable working environment.

d. Feed

Based on figure 4, 3B is identified. Water availability has a significant impact on land quality, which in turn affects the carrying capacity of the land for the number of livestock that can be kept in the area. This carrying capacity determines how many livestock can be fed and maintained sustainably in that environment. Good land quality can increase carrying capacity by providing sufficient feed resources for livestock. However, poor or limited water availability can reduce land quality, thereby reducing carrying capacity and limiting the number of livestock that can be kept.

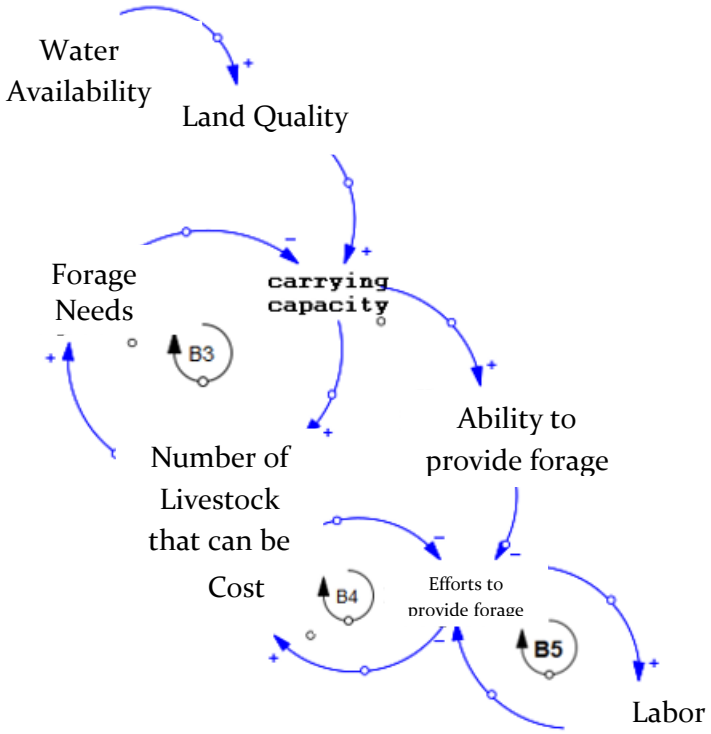

Figure 4 Feed

Carrying capacity, which is influenced by land quality and water availability, also impacts livestock forage requirements. The greater the carrying capacity, the more livestock can be kept, which also means an increased need for forage as animal feed. Farmers' ability to provide forage for their livestock is key to meeting these needs. Farmers' efforts to provide forage are influenced by various factors, including the availability of resources, the technology used, and the level of expertise in livestock management.

Farmers' ability to provide forage for their livestock influences how they source forage, which in turn influences other aspects of animal husbandry. Providing forage can require significant labor, especially in terms of feed procurement. It also costs money, such as operational costs.

Most farmer groups do not have land to grow forage for livestock feed, so they have to forage daily to feed their animals. During the dry season, they are forced to look for forage as far as districts outside Banyumas because these areas are rainfed areas that do not have their own water sources.

Conclusion

Based on the research conducted, it can be concluded that the business kinera of beef cattle breeder groups in Banyumas Regency based on cah flow analysis found that one breeder was considered efficient, one was inefficient, and two other groups could not be identified because there was no revenue and expenditure data. Beside that, factors related to business performance of beef cattle farmers in Banyumas Regency based on Causal Loop Diagram were found to be livestock suitability, violation, motivation and feed.

Conflict of interest

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

Funding statement

This research has received no specific grants from any funding agency in the public, commercial, or non-profit sectors.

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