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Income analysis of beef cattle farm business in Minahasa Regency, North Sulawesi

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Abstract- This study aims to describe and analyze the income of the beef cattle farm business in Minahasa Regency, North Sulawesi. It used a survey method using primary and secondary data. The study used a purposive sampling method focusing on localities of the highest cattle population in Minahasa, Kawangkoan district and west Langowan district, respectively. Respondents were also selected as many as 35 people from the farmers who have sold beef cattle and had at least 5 cows. Data analysis was done descriptively and used a Revenue/benefit ratio. Results showed that the farmer's income was IDR. 551,180,857 yr^{-1} with a mean income of IDR. 15,748,024 yr^{-1}. The RC ratio was 1.1 meaning that the beef cattle farm business in Minahasa Regency is feasible to be developed.

Index Terms- **Keywords**: beef cattle, cost, farm business, income, RC ratio.

I. INTRODUCTION

Animal husbandry subsector is one of the major food supplying sectors to support the industrial development. It has very important roles in maintaining the food security because animal-derived food is a protein source that becomes major needs in people's nutritive needs. One of the animal food product comes from beef cattle. The objective of beef cattle farming is to produce good quality beef and highly productive calf, create job opportunity, and increase income.

Minahasa Regency[1] is one of North Sulawesi regions possessing the highest beef cattle population with 26,915 cows compared with other regencies. It increases with time, 25,976 individuals in 2020, 26,761 ind. in 2021, and 26,915 ind. in 2022. Kawangkoan District has the highest number of cows in Minahasa Regency, with 3,925 ind., then west Langowan, 3.581 ind., and Tompaso District, 3,528 ind. Kawangkoan and west Langowan districts located in Minahasa Regency, North Sulawesi, are potential for beef cattle farm development. However, it still has many problems since its farming system is done traditionally so it has not given an optimal production. This study is expected to be able to motivate and improve the farming system of beef cattle. It is aimed at describing the beef farm business in Kawangkoan and West Langowan Districts, North Sulawesi, and analyzing the farm business revenue.

II. GENERAL DESCRIPTION OF BEEF CATTLE FARMING SYSTEM IN MINAHASA REGENCY, NORTH SULAWESI

Beef cattle farming in Kawangkoan and West Langowan Districts in general, is traditionally done. A survey of 35 respondents shows that 28 respondents rear the cattle by tying them in the field every day, whereas the rest are left in the field from Monday morning to Saturday afternoon because the respondents have a cattle shed behind their house so the cows can be taken home in Saturday afternoon and returned to the field on Monday morning for grassing. It can also be done in the rainy season, in which cows are taken to the shed.

Moreover, beef cattle rearing just relies on the grass around the locality where they are tied. The farmers also feed the corn straw when the grass in the field is not available enough or when the cattle are taken to the shed. The corn straw was obtained from purchasing or their garden. Water was given twice a day, the daytime and afternoon.

The farmers in Minahasa Regency also give medication to the infected cattle and vitamins to newborn calves and recovered cows. Handling sick cattle is taken care of by the farmers themselves based on their experiences and when the cattle has a serious health problem, the farmer contacts the animal orderlies. The drugs and vitamins often used are anthelmintic and B-complex vitamins.

The beef cattle are sold in the meat market in Kawangkoan Regency, part of a traditional market. The market is a meeting place between the cattle farmer, realtor, and consumer to do the transaction. The sale can be done in the meat market or through a realtor. Most farmers do the sale through a realtor to save transportation costs due to transportation constraints to bring the cows to the market. The farmers generally sell the cow when they need money for their family's needs, such as kid education, weddings, etc.

III.   METHOD

Research site and time
This study was conducted in Kawangkoan and West Langowan Districts, Minahasa Regency, North Sulawesi, in August, 2023.

Type and source of data
The study used a survey method on the beef cattle farmers. Data collection was carried out through interviews using questioners. The secondary data were obtained from the Agricultural Department Office of Minahasa Regency, Kawangkoan District, and West Langowan District

Site and sample selection
Study site selection used purposive sampling method under a criterion of the highest population of beef cattle ownership in Minahasa Regency, North Sulawesi. The selected districts were Kawangkoan and West Langowan. Total number of the beef cattle farmers were 342 people. The respondent sample was also determined with purposive sampling method under the following criteria, namely the farmers who have sold beef cattle and have at least 5 cows. Under these categories, the total respondent samples were 35 people.

Variable definition and its measurements
1.   Beef cattle farm is a beef cattle farming business run by the farmers in Kawangkoan and West Langowan Districts, Minahasa Regency, North Sulawesi.
2.   Production costs are the total fixed cost and variable cost spent by the farmers in the cattle farm business expressed in IDR yr^{-1}.
     - Fixed cost is an unchanged cost as a result of a change in revenue obtained by the farmers in Kawangkoan and West Langowan Districts, consisting of depreciation costs of shed, equipment, and vehicle.
     - Variable cost is the changeable expenditures as a result of a change in production gained, such as calf, feed, vaccine, drugs, etc. expressed in IDR yr^{-1}.
3.   Total cost is the entire costs spent by the beef cattle farmers in Kawangkoan and West Langowan District, Minahasa Regency, expressed in IDR yr^{-1}.
4.   Revenues are cattle sold by beef cattle breeders and those that have not been sold in Kawangkoan District and West Langowan District, Minahasa Regency, North Sulawesi Province, expressed in IDR yr^{-1}.
5.   Beef cattle farmer's income is the difference between total revenue and total costs spent in the cattle farm business in Kawangkoan and West Langowan, Minahasa Regency, North Sulawesi, expressed in IDR yr^{-1}.
6.   Revenue Cost Ratio (RC Ratio) is the ratio between total revenue and total cost.

IV.   DATA ANALYSIS

A descriptive analysis was used to describe the beef cattle farm business in Kawangkoan and West Langowan Districts. It aimed to describe the condition of the variables studied. Data were presented in tables and figures using Microsoft Excel [2].

To evaluate the feasibility of the beef cattle farm business in Minahasa Regency, several financial analyses were applied [3] as follows:

Cost analysis
$$TC = FC + VC$$
Where TC is *total cost,* FC is fixed cost, VC is variable cost.

Revenue analysis
Revenue analysis is estimated multiplying the number of production (Y) and sale value (Py) as follows:
$$TR = Py.Y$$
Where TR is total revenue, Py is product price, and Y is number of production.

Income gain
Income is the difference between total gain or total revenue (TR) and total cost (TC). The income gain estimation followed the formula below [4] :
$$Pd = TR - TC$$
Where Pd is income, TR is total revenue, and TC is total cost

***Revenue-Cost Ratio*)**
R-C ratio was estimated as the ratio between gain and total cost [3] as follows:
$$RC = TR / TC$$
Where TR is the total revenue and TC is the total cost.
If RC > 1 the farming business is profitable, RC = 1 indicates the business in break-even point, and RC < 1 means the business is not feasible.

V.   RESULTS AND DISCUSSION

Beef cattle farmer's respondent characteristics in Minahasa Regency.
Table 1 demonstrates the respondent's characteristics based on age, education, farming experience, and cattle ownership.

Table 1. Respondent's characteristics with age, education, farming experience, and cattle ownership.

No.	Remark	No. people	Percent (%)
1.	Age (yr)		
	• 25 – 55	29	71.9
	• 56 – 75	6	28.1
	Total	35	100
2.	Education		
	• SD	9	25.5
	• SMP	9	25.5
	• SMA	17	49
	Total	35	100
3.	Farming experience (yr)		
	• 5 – 10	12	34.29
	• 11 – 20	16	45.71
	• 21 – 40	7	20
	Total	35	100
4.	Number of Livestock Ownership (Head)		
	• 5 – 7	25	71.42
	• 8 – 12	5	14.29
	• 13 – 18	5	14.29
	Total	35	100

Age-based respondent's characteristics

Age is one of the factors influencing someone's productivity. A productive age is indicated by the capability to do daily activities effectively and efficiently. Someone's productive age ranges from 15 to 64 years old which has higher productivity than those beyond this age range. [5].

Table 1 shows that most respondent farmers are in the productive age range. The farmer's age will affect the physical ability to work and think. It is in line with the previous finding [6] that someone's age is related to psychological maturity and physiological ability. The older the person the higher the motivation and the physiological ability until a certain point where the physiological ability will fall with age.

Education-based respondent's characteristics.

The educational level of the respondent farmers is mostly high school graduates (49%). Education is crucial in research, since education is considered as a determinant of human resources quality [7]. Good human resources can appear from knowledge level and problem-solving in their cattle farm business and ability to absorb science and technology.

Someone who has a high educational level will affect the mindset in decision-making concerning business financing. This condition gives an image that one of the references to the decision making is educational level in which the higher the education the better the decision is taken.

Farming experience-based respondent's characteristics.

Farming experience is an important factor for a farmer to decide all policies that will be implemented in the business including the decision to use the capital source [8]. The respondent's farming experience is believed to be able to influence the knowledge level and the farmer's skill. Farming experience is related to the time length the farmer runs the farming business. The longer the farming experience the more the experience could be obtained.

Table 1 shows that the farming experience is mostly in the range of 11-20 years (45.71%), followed by 5-10 years (34.29%), and 21-40 years (20%). The farmers with sufficiently long experience generally have more knowledge than those who just started the beef cattle farm business. The previous finding [9] found that the most farming experiences were 6 to 10 years indicating that the farming experience of the farmer respondents could be categorized as enough in which the farmers have gradually understood the technological development in beef cattle business management.

Livestock ownership-based respondent characteristics.

Table 1 demonstrates the highest ownership of beef cattle is 5-7 individuals in 25 farmers (71.42%). Cattle ownership is one of the factors influencing the income level. The higher the number of cattle, the higher the farmer's opportunity to obtain better income.

The potential of beef cattle farm development in Minahasa Regency that becomes one of the determining factors is the number of cattle. An increase in the number of beef cattle must be followed by knowledge development of the farmer concerning a good rearing system and supported by human resources, natural resources, technology, and business capital.

Production cost of beef cattle farm business in Minahasa Regency, North Sulawesi.

Production costs are one of the factors that need to be considered for each business or economic executor, including beef cattle farmers. These can be grouped into fixed costs and variable costs. The former covers shed and vehicle appreciation costs; the total fixed cost spent by the farmer was IDR. 13,458,976. Variable costs consist of calf, feed, vaccine, drug, labor, and marketing costs. The total variable cost spent was IDR. 4,493,346,000. The total production cost spent by the farmers was IDR. 4,499,819,143 yr^{-1} with an average of IDR. 128,566,258 farmer^{-1} yr^{-1}. Total cost is the entire cost used by the beef cattle farmer for one year of rearing. This cost is the total of fixed costs and variable costs per year. The total production cost will rise with the business scale.

Revenue of beef cattle farm business in Minahasa Regency, North Sulawesi.

The beef cattle farm business revenue is the total amount of money received by the farmer from beef cattle production for one year. It could be seen from the sale value of the beef cattle, the rent value of the cattle used as labor cattle, and the rent value of the cattle as breeding cattle. The sale value of the beef cattle was determined by the farmer based on the costs spent during the rearing process. The cattle value varied depending upon the cattle age, variety, and quality.

The revenue received from the cattle sale for one year was IDR. 2,166,000,000 with an average of IDR. 61,885,714 farmer^{-1} yr^{-1}. The cattle gain as an investment (the reared cattle, the rented cows as labor, and the cows used for breeding) was IDR. 2,885,000,000 yr^{-1} with an average of IDR. 82,428,571.4 farmer^{-1} yr^{-1}. The total revenue of the beef cattle was IDR. 5,051,000,000 yr^{-1} with an average of IDR. 144,314,286 farmer^{-1}

yr[-1]. The total investment was calculated based on the cattle value at the end of 2022.

Income of beef cattle farm business in Minahasa Regency, North Sulawesi.

Net income is the difference between the money gained and the spent costs [10]. The income is obtained after the total revenue has been cut by the total costs spent for one year. The farmer's income could be influenced by the total gain and the cost amount spent.

The income obtained by the farmer is the total gain subtracted by total costs. The total gain of all farmers was IDR. 551,180,857 yr^{-1} with an average of IDR. 15,748,024 farmer[-1] yr^{-1}. Each farmer has a different income due to different beef cattle business scales. The bigger the farmer's business scale the higher the income gained.

The income is obtained from the entire gain of the beef cattle business subtracted by the production costs. Therefore, the income could be different among the business scales so each farmer could also have a different income. It is in agreement with the previous study [11] that different incomes obtained by the farmer could result from different numbers of cattle population owned. In economic activities, income is the gain as a remuneration of the production factors received by the household, such as money, salary, wages, and rental [12].

RC ratio
The R-C ratio analysis gave the ratio of 1.1 indicating that the beef cattle farm business in Kawangkoan and West Langowan Districts, Minahasa, North Sulawesi, was profitable and feasible to be developed.

VI. CONCLUSION

This study found that mean farmer's income was IDR. 15,748,024 yr^{-1}, with R/C ratio of 1.1 meaning that the farm business in Kawangkoan and West Langowan Districts, Minahasa Regency, North Sulawesi, is feasible to be developed.

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