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Financial feasibility analysis study of beef cattle business in Minahasa regency

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Abstract. The aim of this research was to study the financial feasibility of beef cattle business in Minahasa Regency. Primary and secondary were used as data sources. The former was obtained directly from interviews using questionnaires, and the latter was collected from related agencies and other relevant references. Sampling was done using purposive sampling based on the largest beef cattle population and at simple random sampling with a total of 120 respondents selected in research locations. Data were descriptively analyzed based on investment criteria. Overall results showed that the beef cattle business in Minahasa Regency is feasibly sustainable because all of the measured parameters have met investment criteria, with the break-even point at 25 ind yr^{-1} and income gain of IDR 334,069,889, IRR is 33.14% > bank interest rate, B/C Ratio > 1, and Payback Period is 1 year 9 months shorter than the project period of 3 years.

1. Introduction

Livestock business in Indonesia is highly potential to develop since land and food materials are available in the rural area. One of the potential livestock businesses is beef cattle business. Beef cattle gives benefits as animal protein source and income source for agricultural workers. In general, beef cattle are traditionally reared as side business of the farmer.

Based on 2018-statistic data of North Sulawesi, the highest population of beef cattle was in Minahasa Regency at 20,671 individuals. The beef cattle business is in general, small-scaled with number of cattle of 2–6 individuals [1]. Knowledge limitation of the farmers in the cattle management business influences the farming success. One of the determining factors of the business success is production cost optimization. If the production cost of the cattle business is not well managed, the impact on business profit will not be maximal.

Previous studies found that Minahasa Regency is potential for beef cattle development on the basis of the availability of natural resources, human resources, agricultural, and plantation areas [2]. With this potential, beef cattle business is expected to be able to give benefits for human prosperity development, but, in fact, this kind of business in Minahasa Regency is still a side-business for household's saving. Business scale will highly affect the profit and the business sustainability, if it is well managed. Therefore, technical, technological, and financial aspects need to be considered that a beef cattle business can give good profits and can be developed. This study describes the production cost in relation with the profit gain and other financial aspects in beef cattle business.

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2. Research methods

2.1. Research period and locality
This study was carried out in January to February 2021 in Minahasa Regency. This area is one of the beef cattle development center in North Sulawesi Province.

2.2. Sample determination
Sampling site determination used purposive sampling technique. Site selection was deliberately done in 3 districts on condition that the districts had high population of beef cattle, the farmers had on average >10 years of farming experience, and close by the market. The selected sites are west Kawangkoan, Tompaso, and west Tompaso districts. The selected villages are Kanonang 1, Kanonang 2, Kanonang 3, Kanonang 4, Kanonang 5, Tempok, and Tonsewer [3]. Respondents were randomly selected from the selected villages as many as 120 persons or 40 respondents per village.

2.3. Data source
This study utilized primary and secondary data. The former was collected through direct observations and interviews. The latter was collected from Statistic Office of Minahasa Regency and relevant previous studies.

2.4. Data analysis
Data were descriptively analyzed to describe the respondent's characteristics and the beef cattle farming system. To know the financial visibility of the beef cattle business, several financial analyses were done following Handayanta *et al.* [4], Mayulu *et al.* [5], and Haloho and Saragih [6], i.e. BEP (Break Event Point), NPV (Net Present Value), IRR (Internal Rate of Return), Net B/C Ratio and Payback Period (PP) as follows:

2.4.1. BEP (Break Event Point).
BEP analysis was used to know the minimum sales that the business reaches the point of cost-benefit balance. This analysis followed Lestari *et al.* [7].

$$BEP\ (IDR) = \frac{Fixed\ costs}{1 - \frac{Variable\ costs}{Sales}}$$

$$BEP\ Unit = \frac{Fixed\ costs}{selling\ price/unit - variable\ costs/unit}$$

2.4.2. NPV (Net Present Value).
NPV was used to measure the business capability to run the investment at the project period [7].

$$NPV = \sum_{t=0}^{n} \frac{Bt - Ct}{[1 + i]^t}$$

where: Bt = gross profit in time t, Ct = expenditures in time t, and I = discount factor. If NPV > 0, the beef cattle business was feasible to run; if NPV < 0, the business was not feasible to run or not profitable; if NPV = 0, the business will yield the same gain as the expenditure.

2.4.3. IRR (Internal Rate of Return).
IRR is used to calculate the return rate of business investment [6] as follows:

$$IRR = Df\ positive + \left[\frac{NPV\ positive}{NPV\ positive - NPV\ negative}\right] \times Df\ distance$$

If IRR < bank loan interest rate, the business cannot be continued because the profit is lower than the loan interest; if IRR > bank loan interest rate, the business is feasible to run because the profit is higher than the loan interest.

2.4.4. Net B/C Ratio. Net B/C Ratio analysis was used to estimate the net benefit gain relative to the cost spent by the company for during the project. The calculation followed Suastina and Kayana [8].

$$Net\ B/C = \frac{\sum_{t=1}^{t=n} \frac{Bt}{(1+i)t}}{\sum_{t=1}^{t=n} \frac{Ct}{(1+i)t}}$$

If B/C > 1, the business can be sustained; if B/C < 1, the business cannot be sustained; and if B/C = 0, the business reaches the Break event point.

2.4.5. Payback Period (PP). Payback period was used to estimate the period of investment return [7]. Where I = number of investment costs needed and Ab = net benefit gain per year.

$$Payback\ period = \frac{I}{Ab}$$

3. Results and discussion

3.1. Respondent's characteristics

Respondent's characteristics included age, education, main occupation, farming experience, and rearing system. The present study found that 78.3% of the beef cattle business farmers were in the age range of 30-60 years, meaning that the farmers in Minahasa Regency belong to productive age (Table 1). It is in agreement with Haloho et al. [6] that the cattle farmers are below 60 years old; and this fact is good as an opportunity to increase production and farmer's income [9].

Education is one of the factors contributing to the farming success. Table 1 demonstrates that the farmers were mostly high school-educated at 69.2%. This finding is in line with previous reports in cattle farming business [9–11]. Education level is also influential in farmer's information absorption [6].

Most beef cattle farmers (85.83%) in Minahasa Regency have focused on the farming work, and the rests have main occupation as business executor, civil servant, retirement, and religious leaders.

Table 1. Beef cattle business characteristics in Minahasa regency

No	Description	Number (pers.)	(%)
1.	Age:		
	<30 years old	17	14.2
	30-60 years old	94	78.3
	>60 years old	9	7.5
2.	Education:		
	Basic School	9	7.5
	Elementary School	18	15
	High School	83	69.2
	S1	10	8.3
3.	Main occupation:		
	Farmer	103	85.83
	Side farmer	17	14.17
4.	Farming experiences:		
	<10 years	32	26.7
	10-30 years	85	72.8
	>30 years	3	2.5
5.	Rearing system:		
	Semi Intensive	98	81.67
	Intensive	22	18.33

According to Indrayani and Andri [12], experiences in cattle business can affect the capability of managing the business. The longer the cattle farming experience, the better the farmers comprehend how to run the farming. The present study found that the cattle farmers, 70%, have had working experiences of 10-30 years, and it makes them be more skillful in farming development. According to Hastang and Asnawi [9], longer farming experience can ease the farmers to make decision in relation

with farming business implementation technique, because farming experience could be used for adaptation guide to future problem solution.

Beef cattle farming management in Minahasa Regency is generally directed to fattening. Most farmers, 81.67%, utilized semi-intensive rearing system (Table 1). They herd the cattle to feed during the day.

3.2. Production costs and beef cattle business gain

Production costs are a supporting component of the business. These consisted of fixed costs and variable costs (Table 2). The former is the unchanged cost with business volume, whereas the latter can change with business volume. The fixed costs include depreciation in cage, equipment, and vehicle, whereas the variable costs are spent for cattle, feed, drugs, electricity, water, and labors.

Revenue was obtained from cattle selling, number of cattle multiplied by the present cattle price. Cattle sales are based on the selling price at each life stage per individual. According to Mayulu et al. [5], revenue is all production gained multiplied by selling price. Selling price is determined based on the product market price, and it is often affected by demand for the product and number of demands.

The present study showed that average production cost was IDR 3,042,361,922 yr^{-1} in 3-year period. The fixed cost was IDR 46,710,000 yr^{-1} comprising depreciation in cage, equipment, and operational vehicle. The variable cost was IDR 2,995,651,922 yr^{-1} consisting of cattle, feed, labors, vaccine and drugs, electricity, and water.

Table 2. Production cost and beef cattle business revenue

No.	Year	Fixed costs (IDR. Yr^{-1})	Variable costs (IDR. Yr^{-1})	Total costs (IDR. Yr^{-1})	Gain IDR
1	2018	46,710,000	2,786,905,840	2,833,615,840	3,355,000,000
2	2019	46,710,000	2,915,528,725	2,962,238,725	3,608,000,000
3	2020	46,710,000	3,284,521,200	3,331,231,200	4,082,000,000
Mean (IDR) :		46,710,000	2,995,651,922	3,042,361,922	3,681,666,667

Table 3. Investment criteria

No.	Criteria	Criteria value	Remarks
1	BEP :		
	BEP (Unit)	25	BEP
	BEP (Rupiah)	IDR 250,680,691	BEP
2	NPV	IDR 334,069,889	Feasible
3	IRR	33.14%	Feasible
4	Net B/C Ratio	1.33	Feasible
5	Payback Period	1 year and 9 months	Feasible

3.3. Beef cattle business feasibility

Financial business feasibility in this study was conducted to know how good the financial feasibility of the cattle business in 3-year period, from 2018-2020. The investment comes from total costs of cattle, cage, equipment, and transportation. Bank loan interest was calculated based on the present interest rate, 12%.

Table 3 shows that the BEP has the equal balance point at 25 units or 25 cattle.yr^{-1} production with a revenue of IDR 250,680,691 yr^{-1}. It means that the beef cattle business in Minahasa Regency has reached the BEP if the farmer could rear 25 individuals yr^{-1}. Similar finding is also reported by Arbi et al. [13] for the beef cattle farm in Tompaso Barat district.

NPV in the present study was IDR 334,069,889, meaning that the beef cattle business has given benefit for 3 years so that it is feasible to run. It is in line with Handayanta et al. [4], Mayulu et al. [5], and Haloho and Saragih [6] who found NPV > 0, indicating the beef cattle business could be continued.

Moreover, IRR indicates the ability of a project to give investment return or achievable profits [4]. The present study found the IRR of 33.14%. This value is higher than that of the present bank loan interest so that the beef cattle business is feasible to be continued [7,6,14].

Benefit-cost ratio (B/C) is the evaluation technique that compares the present value of the cattle business with the present value of all cattle business costs [5]. In this study, B/C ratio was 1.33, so that the business is feasible to continue and could give profit for 3 years. This B/C ratio is bigger than 1, meaning that each addition of IDR 1 will add IDR 3.300. This finding is in agreement with Handayanta *et al.* [4], Anis *et al.* [14], and Utama [15].

Payback period is used to determine whether the investment project proposal is feasible or not by comparing the payback period with the project economic period [16]. The present study found the payback period of 1.87 meaning that the investment could be returned in one-year and 9 months, so that the investment could be continued because the payback period is shorter than the project plan, 3 years.

4. Conclusions

The present study found that the beef cattle business in Minahasa Regency could be sustained because it has met the investment criteria requirements. The business has reached Break Even Point at number of cattle of 25 ind.yr^{-1} ekor with a gain of IDR 250,680,691 per year, NPV of > 0 as much as IDR. 334,069,889, IRR of 33.14% > bank interest, B/C Ratio > 1,1.33, and Payback Period of one year and 9 months, shorter than a project period of 3 years.

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