



# Comparative Study Of Livestock Appearance And Beef Cattle Breeder Income In Aek Kuo District Of North Labuhanbatu Regency

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**Abstract.** Beef cattle farming in Aek Kuo District, North Labuhanbatu Regency, North Sumatra Province is traditionally managed in an intensive and semi-intensive system. This study aimed to determine differences in the appearance of cattle and the income of beef cattle breeders using intensive and semi-intensive maintenance systems. The number of respondents used in this study were 30 breeders with livestock ownership of at least two heads of beef cattle and had been running a livestock business for at least two years. The methods used are site surveys and interviews based on questionnaires. The analysis used in this study was followed by a significant partial test (T-test) assisted by the SPSS version 25 program. The results showed an increase in the intensive population rate of 42.37% and semi-intensive 24.60%, intensive calf crop of 73% and semi-intensive 40%, calving interval intensive 17.52 months and semi-intensive 20.03 months, intensive mortality 0.4 % and semi-intensive 4%. In contrast, the income of beef cattle is IDR 11,816,617.00/year/breeder, and semi-intensive IDR 4,891,733.00/year/breeder with a comparison of the R/C Ratio of an intensive system of 1.8 and a semi-intensive system of 1.5. The partial significance test (T-test) results showed that the performance and income of farmers who used intensive rearing systems had higher values and were significantly different compared to farmers who used semi-intensive rearing systems.

**Keyword:** Appearance Of Beef Cattle, Farmer's Income, Maintenance System

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## 1 Introduction

The beef cattle farming business has an excellent opportunity to help increase income, even though it is only used as a side job and is managed traditionally. One of the efforts to increase the supply of beef in Aek Kuo District is the intensive and semi-intensive raising of cattle, which is traditional without recording and implementing video management. Intensive maintenance systems are those in which livestock are kept stably continuously, while semi-intensive systems combine intensive maintenance systems (cages) and extensive maintenance systems (grazing).

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The intensive maintenance system is the condition of livestock kept in stables continuously. All livestock activities are carried out in the cage, from eating, drinking, and sleeping [1].

In contrast, in the semi-intensive maintenance system, they are carried out regularly and controlled by giving supplementary feed [2]. Evaluation of livestock performance can only be done if there is a record. The absence of reproduction records for beef cattle in intensive and semi-intensive rearing systems is a significant problem in evaluating and implementing reproductive management. Records relating to the reproductive performance of cattle, including population increase, calf crop, calving interval, and mortality, are essential aspects of cattle reproductive management. The reproductive performance of cattle represents the quality of the maintenance management that has been carried out. The reproductive appearance of cattle also determines each livestock business's sustainability, profit, and productivity [3]. Besides that, evaluation of the income of beef cattle breeders is also critical because, in business, beef cattle farming has been done for a long time with traditional maintenance patterns. However, no record of the costs incurred has ever been made, so the amount of income obtained for the business cannot be known with certainty by the breeder. Revenue is income minus production costs, so the results are expressed in profits or losses [4]. With information from this research, breeders in Aek Kuo District are expected to change their views about raising better beef cattle, so they can run businesses and analyze on their own how to separate acceptance components from the costs they incur. That way, they can easily calculate their total income in one year of raising beef cattle.

Based on this description, the authors wanted to conduct a comparative study of beef cattle farmers' livestock appearance and income with intensive and semi-intensive rearing systems in Aek Kuo District, North Labuhanbatu Regency.

## **2 Research Methods**

### **2.1 Place and time of research**

This research was conducted in October-December 2022. This research was conducted in Aek Kuo District in October-December 2022. Selected as a place of research because it is a center for beef cattle in North Labuhanbatu Regency.

### **2.2 Population and Sampling**

Community breeders as respondents who raise beef cattle with intensive and semi-intensive rearing systems with a total of 30 respondents each, selected as respondents were taken by random sampling method.

### **2.3 Data analysis**

The data were analyzed using a partial significance test (T-test) assisted by the SPSS version 25 program. The formula was used to see whether there were significant differences in the

performance of cattle and the income of the beef cattle business in breeders using intensive and semi-intensive rearing systems.

The livestock performance formula consists of Population Increase; the increasing population is inseparable from the opinion of beef cattle breeders. The more livestock owned, the higher the income generated [5], Calf Crop; the calf crop value is influenced by several factors, including the number of offspring born, the percentage of mothers who give birth in the total brood population, the percentage of deaths when the children are not weaned, and the spacing of children [6], Calving Interval; the calving interval is the time interval between one birth and the subsequent birth, CI is strongly influenced by the length of gestation and the length of time the cattle are empty [7], Mortality; mortality is the number of animals that died in each period divided by the number of animals that were alive at the beginning of the period [8], and farmer income is as follows:

$$\text{Population Increase (year)} = \frac{\text{final population} - \text{initial population}}{\text{initial population}} \times 100\%$$

$$\text{Calf crop (year)} = \frac{\text{number of calves born}}{\text{the number of broods in the group}} \times 100\%$$

$$\text{Calving Interval (month)} = \text{birth number } i - \text{birth number } (i-1)$$

$$\text{Mortalitas (year)} = \frac{\text{total death}}{\text{population size}} \times 100\%$$

The income formula for raising beef cattle is as follows:

$$\text{Revenue analysis} = \text{TR} - \text{TC}$$

Where :

P = beef cattle raising income (IDR/year)

TR = Total revenue (IDR/year)

TC = Total Cost (IDR/year)

Furthermore, livestock business is said to be profitable or unprofitable can be analyzed using the formula :

$$R/C = \text{TR}/\text{TC}$$

Where :

TR = Total revenue (IDR/year)

TC = Total Cost (IDR/year)

Test Criteria:

- $R/C > 1$  Livestock business is feasible
- $R/C = 1$  Livestock business is at the breakeven point
- $R/C < 1$  Livestock business is not feasible

**Partial significant test (T-test)**

The T-test is intended to determine the level of statistical significance partially. The significance value ( $\alpha$ ) used in the social sciences is 0.05 [9].

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2} - 2r \left(\frac{S_1}{\sqrt{n_1}}\right) \left(\frac{S_2}{\sqrt{n_2}}\right)}}$$

Where :

- $\bar{X}_1$  = Sample average 1
- $\bar{X}_2$  = Sample average 2
- $S_1$  = Standard deviation 1
- $S_2$  = Standard deviation 2
- $S_1^2$  = Sample variance 1
- $S_2^2$  = Sample variance 2
- r = Correlation between two samples

Test Criteria:

If t count  $\leq$  t table or if the significance value  $> \alpha$ : maka H0 accepted H1 rejected

If t count  $>$  t table or if the significance value  $\leq \alpha$ : maka H1 accepted H0 rejected

**3 Result and Discussion**

**3.1 Livestock Appearance**

Cattle kept are predominantly Ongole breed of cattle (PO) 80% and a few crossed with other superior cattle (Limousin, Brahman, Bali, and Simental) through Artificial Insemination. The mating system is dominant through natural mating (60%) and less through artificial insemination (40%).

**Table 1.** Performance of Beef Cattle in Aek Kuo District, North Labuhanbatu Regency

| Criteria                         | Intensive | Semi-Intensive | P-Value |
|----------------------------------|-----------|----------------|---------|
| Population Increase (%)*         | 42,37     | 24,60          | 0,000   |
| <i>Calf Crop</i> (%)*            | 73,70     | 39,97          | 0,003   |
| <i>Calving Interval</i> (month)* | 17,53     | 20,03          | 0,032   |
| Mortality (%)*                   | 0,40      | 3,47           | 0,000   |

Description : \*significant differences on t-test (P<0.05)

In Table 1, it can be seen that the analysis of population increase in 2020-2022 provides a significant value for both maintenance systems, namely the intensive maintenance system obtained a figure of 42.37% and the semi-intensive system of 24.60%. The data processing results

show a significance value of the sample  $0.000 < 0.05$ . Based on the t-test decision-making, if the significance value is less than 0.05, there is a significant difference between the two samples.

The results of the calf crop analysis showed a significant value in both maintenance systems; namely, in the intensive maintenance system, the score was higher, 73.70%, and in the semi-intensive system, 39.97%. We have seen from the data processing results showing a significance value of the sample  $0.003 < 0.05$ . Based on the t-test decision-making, if the significance value is less than 0.05, there is a significant difference between the two samples. The calf crop value is affected by the number of litters born, the proportion of mothers who give birth in the total broodstock population, the proportion of deaths when the young are not weaned, and the spacing of calving [10].

Cattle calving intervals in the tropics range from 365-536 days [11]. The results of the calving interval analysis showed a significant value in both maintenance systems; namely, in the intensive maintenance system, the number was lower, 17.53 months, and in the semi-intensive system, 20.03 months. This can be seen from the data processing results showing a significance value of the sample  $0.032 < 0.05$ . Based on the T-test decision-making, if the significance value is less than 0.05, there is a significant difference between the two samples. The results of other studies also showed values that were not much different, namely the average calving distance of beef cattle in Ujungjaya District, Sumedang Regency, West Java, with an average of 16.98 months [12].

Factors causing livestock death can be caused by maintenance management, feed quality, climate, and livestock disease indications [13]. The results of the mortality analysis showed a significant value in both maintenance systems; namely, in the intensive maintenance system, the percentage was 0.4%, and in the semi-intensive system was 3.47%. The results of the mortality analysis showed a significant value in both maintenance systems; namely, in the intensive maintenance system, the percentage was 0.4%, and in the semi-intensive system was 3.47%. The results of this study are also not much different from several other studies, namely the mortality rate for beef cattle in Ujungjaya District, Sumedang Regency, West Java, was 5% [12].

### **3.2 Income Analysis**

Revenue is revenue minus production costs; the result is profit/loss. The farmer's income depends on the live weight and shrewdness of the breeder in the sales process.

Based on the data in Table 2, the income of intensive beef cattle breeders can be obtained in the amount of Rp. 11,816,617/year. While the income of semi-intensive beef cattle breeders is Rp. 4,891,733/year. The results of other studies also show a value that is not much different. The average revenue for the beef cattle development business in Teluk Bintuni Regency is around Rp. 9,704,643 – Rp. 14,069,978 per year/breeder. The greater the income farmers or breeders receive, the greater the success rate of the livestock business [14]. The selling price of livestock at the research location will be high just before the Qurban holiday. This aligns with research by [15]

that revenue in the beef cattle business comes from selling cattle at the right time to generate large profits.

**Table 2.** Revenue and expenditure of Business (IDR/breeders/year)

| Description                | Intensive         | Semi-Intensive    |
|----------------------------|-------------------|-------------------|
| Reception                  |                   |                   |
| - Sale of livestock        | 25.071.666        | 13.011.666        |
| - Sale of compost          | 547.333           | 98.333            |
| <b>Total</b>               | <b>25.619.000</b> | <b>13.110.000</b> |
| Expenditure                |                   |                   |
| - Land                     | 651.833           | 658.450           |
| - Pen                      | 1.692.550         | 1.472.183         |
| - Equipment                | 128.033           | 99.400            |
| - Seeds                    | 2.384.733         | 2.240.066         |
| - Feed                     | 6.605.900         | 1.286.666         |
| - Drugs                    | 182.666           | 581.500           |
| - Labor                    | 2.003.333         | 1.806.666         |
| - Artificial insemination  | 68.333            | 29.333            |
| - Electricity              | 85.000            | 44.000            |
| <b>Total</b>               | <b>13.802.383</b> | <b>8.218.266</b>  |
| Income* (IDR/breeder/year) | 11.816.617        | 4.891.733         |
| Income (IDR/unit/year)     | 1.473.942         | 547.539           |
| R/C Ratio                  | 1.8               | 1.5               |

Source: Primary data processed, 2022.

In addition, the selling price is also strongly influenced by the livestock breed, body weight, and the health of the livestock itself. At the research location, beef cattle's selling value in 2022 has decreased due to contracting PMK and LSD, especially in livestock whose rearing system is semi-intensive.

R/C Ratio analysis in the beef cattle business is if  $R/C > 1$  indicates that the use of costs is efficient [16]. An intensive maintenance system is 1.8, which means that for every farmer spending IDR. 1,000,000.00, they will receive IDR. 1,800,000.00 Meanwhile, the beef cattle business with a semi-intensive maintenance system has a different value of 1.5, which means that for every farmer spending IDR. 1,000,000.00, they will receive IDR. 1,500,000.00.

#### 4 Conclusion

Livestock performance in beef cattle consisted of an increase in the intensive population of 42.37% and semi-intensive 24.60%, intensive calf crop of 73% and semi-intensive 40%, intensive calving interval of 17.52 months and semi-intensive 20.03 months, intensive mortality of 0.4% and semi-intensive 4%. The income of beef cattle breeders in Aek Kuo District, North Labuhanbatu Regency, with an intensive system of Rp. 11,816,617/year/breeder and semi-

intensive Rp. 4,891,733/year/breeder. A comparison of the R/C Ratio of an intensive system of 1.8 and a semi-intensive system of 1.5.

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