

Research Article



Smallholder Beef Cattle Rearing System and Entreprises in West Sumatra, Indonesia

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Abstract | Information on livestock rearing by smallholder farmers is needed to see how successful the livestock business is and how much the livestock business contributes to the livestock farmer's livelihood. We aimed to examine the husbandry system and income of beef cattle enterprises located in Luak Sub-district, Lima Puluh Kota District, West Sumatra Province, Indonesia. We used a total of ninetyseven farmers who agreed to participate in the study. We used survey methodology. Data were collected using questionnaires and interviews. respondents in this study were 97 breeders. The cattle kept were generally Peranakan simental (F1-F4), Pesisir cattle, Bali cattle, and Peranakan Ongole cattle. The feed provided was forage and concentrate with a rate of 10% of the cow's body weight. Cattle were intensively reared in a semi-permanent housing system. Disease prevention has been done well, especially to handled worm diseases. The average income of farmers from livestock early was only IDR 4,677,545 or IDR 389,795/month. This income does not cover the daily needs of the farmer's family, and as a result farmers turn to other sources of income. This can reduce the motivation to raise livestock, leading to a decline in the number of farmers and livestock population. The role of the government is needed to overcome the problems by distributing knowledge about good husbandry systems, providing capital to increase the scale of breeders' businesses, providing good facilities and infrastructure for breeding in the Luak Sub-district. Farmers must focus more on their livestock business and increasing livestock productivity.

Keywords | Beef Cattle, Entreprises, Income, Rearing, System

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INTRODUCTION

Beef has always received more attention from the Indonesian government for the increasing difficulty in fulfilling and maintaining food stability. As a result, the demand for beef is difficult to resolve, resulting in increased prices of meat yearly. This problem arises due to many reasons, such as low livestock productivity, limited availability of superior local cattle seeds, fewer human resources, low knowledge level, unsustainable availability of feed especially in the dry season, non-optimal livestock business system, and inefficient marketing results. The

maintenance system is very important to consider for its direct relation to livestock. Therefore, a farmer must have knowledge and experience in running his business. Large livestock production will positively affect business income. Income is one of the standard measures of livestock welfare. The livestock business run by farmers must provide interest to farmer households.

West Sumatra is a center and one of the Indonesian provinces that has considerable potential for beef cattle development. As a center for beef cattle development, West Sumatra should have a sufficient population to

supply consumer demand. Based on data from the *Statistical Year Book Of Sumatera Barat (2022)*, the total beef cattle population in West Sumatra is 415,851 heads with a slaughter rate of 91,822 heads. One of the centers of beef cattle development in West Sumatra is Lima Pulu Kota Regency. The beef cattle population in Lima Pulu Kota Regency in 2021 was 45,909 heads, with a slaughter rate of 5,243 heads in 2021. Luak sub-district as one of the sub-districts in District 50 Kota contributed 8,697 head of beef cattle in 2019, increasing to 8,847 head in 2020 (*Statistical Year Book Of Indonesia, 2020*). Despite the increasing number, the cattle births do not meet the criteria. In addition, as a center for beef cattle development, this region should have a large-scale livestock business. So, it contributes according to the scale of its business.

The success of beef cattle development is related to the rearing system. The system includes breeding, feed management, housing, disease management, and rearing techniques (Sarker et al., 2006). This maintenance system must be implemented properly and follow the research that has been done in the field of animal husbandry, especially beef cattle. In addition to having a positive impact on the development of beef cattle, the maintenance system impacted increasing farmers' income from their livestock business. However, the reality is that many farmers have switched to business in other fields rather than farming, whereas farming should be a business that brings prosperity to the community because the demand for livestock products is always increasing.

We aimed to provide information about the beef cattle rearing system and analyze the income from livestock businesses run by farmers in Luak District, 50 Kota Regency, West Sumatra. It is hoped that this study can offer a comprehensive representation to the government and livestock sector stakeholders regarding farmer maintenance and earnings contribution in District 50 Kota.

MATERIALS AND METHODS

RESEARCH AREA

As shown in Figure 1, Luak sub-district is one of 13 sub-districts in Lima Pulu Kota Regency with an area of 61.68 Km². It is located at 00°13'-00°25' S latitude and 100°37' - 100°56' E longitude. The topography is undulating and hilly with good rainfall with 70% humidity, which makes the Luak sub-district very suitable for the development of beef cattle farming based on the area and climate in Luak Sub-district, Limapuluh Kota District.

SAMPLING SIZE AND METHOD

We used a survey method with data collection techniques using questionnaires and interviews. The number of

samples in this study was determined using the Yamane Formula (1967) with a population of 3669 breeders in the Luak district:

$$n = \frac{N}{Nd^2 + 1}$$

Where; n = sample size, N = total population, and d = set precision (10%).

$$\begin{aligned} n &= \frac{3669}{3669 \times 0,1^2 + 1} \\ n &= \frac{3669}{3669 \times 0,01 + 1} \\ n &= \frac{3669}{36,69 + 1} \\ n &= \frac{3669}{37,69} \end{aligned}$$

n = 97,34 dibulatkan menjadi 97.

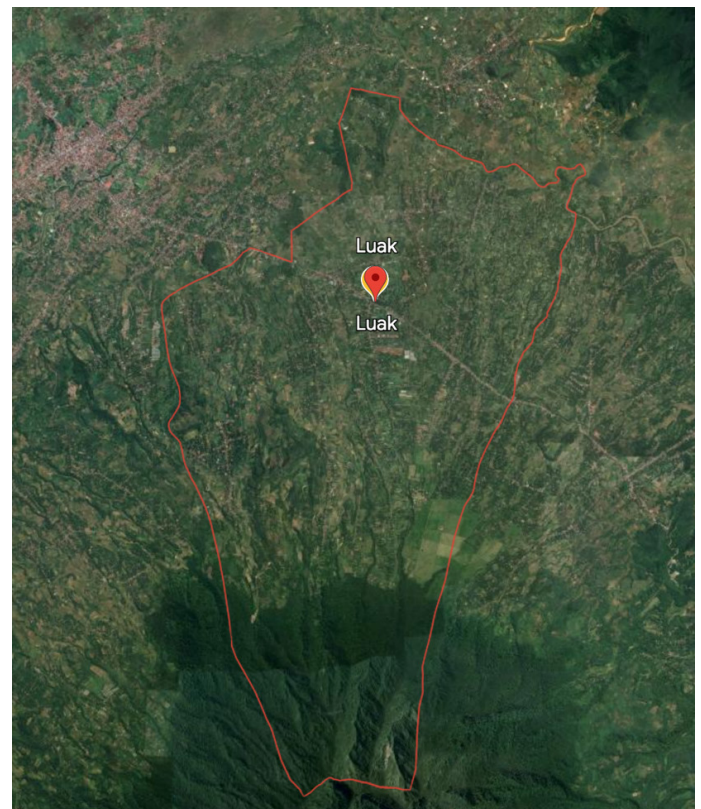


Figure 1: Luak District, West Sumatra.

The number of respondents in the study was 97 people (Table 1); 42 were from Nagari Mungo, 9 from Nagari Andaleh, 25 were from Nagari Sungai Kamuyang, and 21 were from Nagari Tanjung Aro Sikabu Kabu. The difference in the sample number per Nagari was proportional to data collection.

DATA ANALYSIS

The primary and secondary data sources were used in

this study. Baseline data was obtained from household heads through a questionnaire that had mixed question types. Secondary data was taken from the agriculture and rural affairs office and the public health and veterinary office of Luak District. In each study area, a structured questionnaire was administered which had a mixed type of questions with open and closed types. The focus areas of the questionnaire were production performance, socio-economic background of respondents. The principal investigator closely monitored the data collection process. Data collected from the survey were entered, examined, and organized using Microsoft Excel spreadsheets for analysis. Descriptive method with a quantitative approach.

Table 1: Number of beef cattle farmers in Luak Subdistrict, Lima Puluh Kota District.

Tidak	Nagari	Peternak	Respondent	%
1		1595	42	43,29
2	Mungo	335	9	9,27
3	Andaleh	934	25	25,77
4	Sungai Kamuyang	805	21	21,64
Jumlah	Tj. Aro Sikabu Kabu	3669	97	100

RESULTS AND DISCUSSION

CHARACTERISTICS OF RESPONDENTS

The characteristics of respondents in this study are presented in Table 2.

The data in Table 2 shows the classification of farmers based on age, education, main occupation, farming experience, and number of livestock owners. Farmers who became respondents were aged between fifteen until sixty years (84.53%) which is a productive age for someone to work. At this age, a person has the energy and is also more calm in facing the risks of work. Farmers who are in this age range will tend to do all livestock maintenance activities more quickly and efficiently than those who are relatively younger or vice versa.

The education level of farmers in Kecamatan luak was dominated by farmers who only go to elementary school compared to those who have graduated from college which was only 2.06%. The level of education greatly affected the success of farmers in running their businesses. Farmers who have higher education will tend to easily adopt innovations and technologies. The mindset possessed by farmers who have higher education will be much different from those who are not educated.

The main occupation of farmers in the Luak sub-district is a farmer who owns rice fields. Farmers raise livestock only as savings. So, that farmers are not too focused on

building the livestock business. 61% of farmers whose main job is farming, followed by civil servants, and traders, and only 30% of respondents use livestock as their main income. Those farmers tend to advance their business for more welfare and prosperity of their families. Thus, farmers will also strive to implement a good livestock husbandry system to advance their business.

Table 2: Characteristics of beef cattle farmers in Luak district.

Characteristic	Respondent	Percentage %
Aged (Years)		
< 15	0	0
15 – 64	82	84,53
> 64	15	15,46
Level of Education		
Uneducated	3	3,09
Elementary Schol	43	44,32
Junior High School	27	28
Senior High School	22	22,68
University	2	2,06
Main occupation		
Farmer	59	61
Breeder	29	30
Civil Servant	4	4,12
Traders	5	5,15
Farm experience		
1 – 5 years	62	64
6 – 10 years	27	28
> 10 years	8	8,24
Total livestock ownership		
1 – 5 heads	95	89,69
6 – 10 heads	2	10,30
> 10 heads	0	0

Farmers in this sub-district are relatively new as they only have one until five years of experience (64%). Experience plays a role in one's actions when facing risks. Highly experienced farmers are much more resilient and quick to deal with risks. The experience of farmers has a basis for making decisions (Anwarudin et al., 2020)

Livestock ownership in the Luak Sub-district as much as 95% only ranges from one to five heads, this number of livestock indicates that farmers in the Luak Sub-district are small-scale farmers resembling in Ethiopia (Boere et al., 2016). The number of livestock ownership affects the size of income. However, in the Luak sub-district, many of the farmers are new to the livestock business. In line with their experience, it appeared that many are new to farming so the number of livestock owners is not large.

PRODUCTION MANAGEMENT

Table 3 presents data on the types of livestock breeds in the Luak sub-district. Simental cattle dominate the cattle population in this subdistrict. Simental, Persisir, Bali, and

Ongol males and females account for 14.50 and 47.45%, 8.62% and 10.19%, 6.77% and 4.31% and 10 and 11, respectively. It can be seen that many farmers keep females for breeding rather than males that were sold causing lower males available for the sustainability of production. This is higher than the 70% of farmers in Central Vietnam (Dung et al., 2019). Although mating is done through Artificial Insemination (AI), it is necessary to pay attention to the selection process of the right breed and good AI techniques so that the S/C (service per conception) of cattle in the Luak sub-district is not high, which is 3.71 times until successful pregnancy resulting in fairly long birth intervals. It is important to enhance farmer's education to increase production and livestock welfare.

Table 3: The types of livestock breeds in Luak sub-district.

No	Item	Frequencies	Percentage
Cattle Breed			
1	Simental		
	Male	37	14,50
	Female	121	47,45
2	Pesisir		
	Male	22	8,62
	Female	26	10,19
3	Bali		
	Male	17	6,77
	Female	11	4,31
4	Peranakan Ongole		
	Male	10	3,92
	Female	11	4,31
	Total	255	100

FEEDING

As shown in Table 4, the study found that livestock in Luak sub-district were generally fed elephant grass as fodder, with 75.25% of farmers providing this type of grass compared to 24.74% who provided field grass. In addition, 17.52% of the grass provided was in poor condition. For semi-intensive livestock rearing in farmer households, the feed provided consists of cut grass and concentrates (Ruhul et al., 2020). Generally, farmers in Luak district provide animal feed in the form of concentrates such as cassava peels, tofu pulp, and bran. Ideal animal feed must contain protein, carbohydrates, fat, water, vitamins and minerals.

HOUSING SYSTEM

Management in the livestock business in the Luak district mainly involves the maintenance of semi-intensive cages. Cages are used to facilitate control and feeding and minimize the spread of diseases. The use of cages is due to the limited capital owned by farmers. Cages are close to farmer settlements, this aims to make it easier for farmers

to control their livestock, in line with Amrawati's et al. (2020). Farmers should provide more appropriate cages for the welfare of livestock as a factor to increase productivity. An example of one of the cages in the Luak Subdistrict can be seen in Figure 2.

Table 4: Feed utilization in Kecamatan Luak.

Parameter	Percentage	Kg/heads/days
Feeding system		
Communal grazing	0	
Private grazing	0	
Feeding station	100	
Feed source		
Grass	75,52	8-9
Crops and crop residues	24,74	5-9
Industrial by-products	0	
Increase forage	0	
Local sources	100	2-5



Figure 2: Cattle Housing in Luak Sub-district.

MAINTENANCE SYSTEM AND DISEASE PREVENTION

The maintenance system carried out by farmers in the Luak Subdistrict is traditional, with small livestock owners of 1 to 5 heads in line with research (Ruhul et al., 2020) and 70.80% of small-scale farmers in Bangladesh (Mugumaarhahama et al., 2021). This is different in Southern Vietnam where the average number of cattle owners was 3.5 to 9.39 heads in each farmer household (Parsons et al., 2013). Farmers do not organize technical feeding or other maintenance as they should, so livestock development is far from expected. High service per conception (s/c) can affect farmers' income by delaying birth intervals. In this case, government intervention is a must to improve the farmer's husbandry system. The government should always conduct monitoring, considering that the Luak sub-district is in Limapuluh Kota Regency, which is the center of beef cattle farming in west Sumatra province. If this continues, there will be a massive decline in the beef cattle population. In addition, yearly, the Ied Adha tradition is held as part of a religious event for the majority of the community.

Table 5: Farmer income in Luak district.

Item	IDR	Percentage
Income	996.000.000	
Cash	364.000.000	36,55
Non-Cash	632.000.000	63,45
Production Expenses	542.278.080	
Fixed Cost	48.485.000	8,94
Variable Cost	493.792.080	91,06
Revenue	453.721.920	
Income/farmer/year	4.677.545	
Income/farmer/month	389.795	
Income/farmer/head/month	1.528	

FARMERS’ INCOME COMES FROM LIVESTOCK BUSINESS

The results in Table 5 showed that the income of beef cattle farmers in the Luak District was IDR 453,721,920/year, or IDR 4,677,545/farmer/year or IDR 389,795/farmer/month or IDR 1,528 /farmer/tail/month. Income is obtained from the calculation of the difference between total revenue and total business production costs. Little income is due to expenditure on variable costs which is quite large, namely 91.06% of the total cost. However, the income derived from livestock business per month is only IDR 389,795/month. Such income cannot sustain the life of the farmer’s family. Many of the farmers are pursuing both agricultural and non-agricultural businesses (Priyo et al., 2019). In addition to the rearing system, income is influenced by the habits of farmers, the number of livestock holdings, government support, and others (Wahyuningsih et al., 2021; Mutyasira, 2020). Therefore, it is necessary to have governmental aid to increase the knowledge of breeders in the Luak District to enhance the maintenance system. The current maintenance system has not been able to significantly increase livestock productivity. This affects the size of the income of farmers in the Luak sub-district. In addition, the low level of welfare will affect the interest of farmers to continue building their livestock business (Azarov et al., 2019), and also capital to increase the scale of the business, so that the goals of all parties can be achieved.

CONCLUSIONS AND RECOMMENDATIONS

Many of the farmers attended primary school, illustrating the relatively low ability of farmers to absorb technology and knowledge in this study location causing the business to decline. Livestock business income cannot support the needs of the farmer’s family in one month. It makes the view of breeders and businesses in the livestock sector unprofitable. It is feared that very few people will want a livestock business in the future. In addition to the low income from raising cattle, the capital required is relatively high. There are need for improvement in the

livestock business run by the people of this area to increase the population and provide welfare to the farmers. The government and all stakeholders have different roles in helping farmers to better run their livestock businesses. The government is needed to make policies that can encourage the professionalization of farmers, transfer knowledge, and provide capital assistance, as well as other stakeholders. Farmers must have the motivation to advance their livestock business and bring profits.

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NOVELTY STATEMENT

There has been no similar research on the location of Luak District, 50Kota Regency, West Sumatra Indonesia.

AUTHOR’S CONTRIBUTION

All authors contributed to designing, collecting, and analyzing the data, as well as writing and editing the manuscript. The manuscript adheres to conventional academic structure and formatting. Objective language was utilized, technical terms were defined, and causal relationships were established between statements. Additionally, precision in word choice and grammatical correctness were prioritized throughout.

CONFLICT OF INTEREST

The authors have declared no conflict of interest.

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