

Analysis on the Impact of Cattle Fattening Technology on Farmer Households in Atabae Timor-Leste

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Abstract

Agriculture is one of the priority sectors in Timor-Leste. Introducing new agriculture technology is crucial to enhance agricultural production. Practicing cattle fattening can increase beef cattle body weight and generate income to the beef cattle farmers. As farmers face problems including agricultural production decline, lack of forages and information and weather unfavourable. The study's purpose was to examine the impact of adoption of cattle fattening technology on farmer households in Atabae administrative post, Bobonaro municipality in Timor-Leste. There were 200 beef cattle farmers households where randomly selected in four villages in Atabae. It consisted of 65 farmers practicing cattle fattening and 135 farmers non-practicing cattle fattening. Face to face interviews used structured questionnaire. Statistical analysis such as t-test and descriptive analysis were used to examine impact adoption of cattle fattening technology by farmers and factor constraints of cattle production and the solutions of it. The results indicated the average value of cattle and profit were significant different from zero and it is associated with practicing of cattle fattening. The average of labour used on cattle activities, the average of cattle sold, and total cost spent on cattle were not significant different from zero. The percentage of farmers said that factors constraints cattle production were shortage of water and forage (53%) and spend time on culture ceremony and lack of capital (33%). The number of farmers said that they collected water from river, feed cattle with sago and forage (55.3%) and cultivated forage (23.4%). This finding contributes information to the farmers, traders, and Timorese government to continue implementing cattle fattening activities as it enhances farmers' income and developing cattle production.

Keywords

Cattle Production, Adoption of Cattle Fattening Technology and Cattle Farmer Households

1. Introduction

Agriculture is one of the priority sectors in Timor-Leste need to be promoted to decrease poverty, secure food over the population and develop economic growth in rural areas across the country [1].

Aside from the importance of agriculture, the areas cultivation has not yet fully developed as about 174,000 ha for cultivation and 124,000 ha area of bush garden. The total area which is utilised for agriculture purposes is approximately 600,000 ha [2] [3]. The different agriculture activities including cultivating food crops and livestock production utilised these areas.

Farmers have not yet developed enough their agricultural skills and knowledge as well as lack of capital is the constraints to rapidly develop more agriculture into productive and sustainable. This is because farmers still use existing method to cultivate crops and raising their livestock. Hence, introducing new agriculture innovation on how to enhance crops and livestock production as well as providing capital to the farmers are important to increase agriculture production and income generation to the farmers.

The main staple foods in Timor-Leste are rice and maize. The two crops production has been fluctuated during the last two years. This was reported by Ministry of Agriculture Forestry and Fisheries that rice production was declined to 49,983 tonnes in 2020 and increased in the following two years, reaching 72,081 tonnes in 2021 and 85,805 tonnes in 2022. Maize production was also encounter similar issues during the last two years. In 2020, maize output was 119,167 tonnes and declined in 2020, to 77,606 tonnes. However, it has changed in increasing mode over the following years. As in 2021 and 2022, the maize output was increased at 85,627 tonnes and 86,037 tonnes, respectively [4].

A part form the crop production, livestock is likewise important aspect in agriculture sector which generated income to the farmers in Timor-Leste. Cattle production was around 221.787 heads in 2015 [5]. Farmers rear cattle in various ways in both intensive and extensive care which effect on the cattle production.

These challenges need to be addressed for enhancing cattle production in Timor-Leste. The intervention of enhancing cattle values collaboration between ACIAR, MAFF and Universidade Nacional Timor Lorosa'e have introduced *Rede Kamodi (Karau ba moris diak)* to the farmers in selected area such as Atabae, Bobonaro municipality [6]. However, what is the impact of Redi kamodi program to the cattle farmers?

The study aims to look at the impact of cattle fattening technology on farmer households in selected area in Atabae administrative post, Bobonaro municipal-

ity in Timor-Leste. People in this area raise cattle for the generating the income.

2. Objectives

The general objective of the study was to examine the impact adoption of cattle fattening technology on farmer households in Atabae.

The specific:

- 1) Estimate costs and returns of cattle fattening and farmers workload;
- 2) Determine constraints production and marketing of cattle; and
- 3) Suggest possible actions to address these constraints.

3. Literature Review

Farmers are facing various obstacles which anchor their farming activities to move forwards. These problems include erratic weather conditions, lack of knowledge of new technologies, high cost of inputs. Additionally, social, economic, cultural, and traditional factors are also contributed to hamper agricultural production. The implementation of new agricultural innovation is crucial as a pathway to overcome some of these challenges.

The intervention of programme such as improved agriculture practices and farm management techniques are potentially generate benefit to farmers. According to [7] the aim of intervention programme is to bring about changing per unit production by using limited resources includes land, labour, capital, and entrepreneurship which can minimise production cost and marketing of the product output. This can turn to enhance food security, consumption, and income [7].

It depends on the individuals' attitude whether receive or reject towards applying innovation. For instance, [8] highlighted the implementation of agriculture technology such conservation agriculture is significantly influence by intention and perceive behavioural control followed by subjective norm (perform or not to perform). The implementation of agriculture technology is more likely to use efficiently to minimize production cost of a combination factor of production including land, labour, and capital to produce agriculture products. For instance, [9] found that the production cost such as fertiliser, irrigation and machinery was positive and significant affect per unit area of wheat production.

There is one of the main of agriculture technology is improvement in crop production and productivity. For example, a study conducted in Mexico on adoption of improving maize varieties showed that farmers group who participated in the project of new improved maize varieties increased their maize production and income. Their per capita expenditure was also higher when compared with non-participant groups [10] [11]. A similar result from an intervention project happened in Nepal when the intended group targeted for the improvement of maize varieties enhanced their maize yield and net revenue as well as contributed to maize availability in the market when compared with the unintended group.

There was also an intervention of the program of cattle fattening in Atabae administrative post Timor-Leste. The program of cattle fattening called *Redi Kamodi* (*Karau bá moris diak*) to enhance cattle production. The implementation of the technique through farmers groups with assessment of their own situation, defining their needs, and then seeking, testing, and implementing better beef cattle business practices. The transition of farmers is from the existing method of raising cattle to more profitable cattle systems. The production system is particularly leucaena, in high-input cattle fattening systems. Redi Kamodi program has enhanced farmers' skills and knowledge on how utilized best practised of cattle fattening through training on technical and business skills [12].

Thus, this study was to examine the impact of adoption on cattle fattening technology included farmers' income and workload.

4. Method of Analysis

4.1. Study Site

Atabae administrative post, Bobonaro municipality is located in 180.11°E and 080.55°S with area of 273.1 km and border with administrative post of Cailaco and Maliana in the east and Maubara and Hatolia in the north. To the west is Ombai Sea and south is border with the administrative post of Balibo [13]. Farmers cultivate crops and raise animals. For crop production is such as maize, rice, cassava, sweet potatoes, taro, beans and pumpkins. Tree crops are included coconut, candlenuts and areca nuts. Livestock is composed of cattle, buffaloes, pigs and poultry [14].

4.2. Sampling

Study was conducted in Atabae administrative post, Bobonaro municipality. Random sampling was used to select the sample. Cattle farmers were forming their group prior to receive technique of how to implement cattle fattening activity. This was to easily control farmers and their members. The reason was to identify farmers' willingness to apply cattle fattening method.

Quantitative and qualitative method was carried out in June 2021. There were 465 samples where randomly selected. This sample was classified by two groups at which 65 were practicing cattle fattening and 135 were non-practicing cattle fattening. Data collection was used a structured questionnaire incorporated open-ended question. The technique was through face-to-face interview to obtain the data of cost, income and factor constrains cattle production and solutions of the problem.

4.3. Statistical Analysis

Descriptive statistics were applied to identify the demographic background of farmers. Thematic content analysis used to determine factor constrains cattle production and solutions of the problem. Also, t-test was applied to determine the impact of farmers practicing cattle fattening methods and non-practicing in

terms of cost and returns as well as farmers workload. Data was analysed by using SPSS version 24.

5. Result and Discussions

Demographic Background of Farmers

There is gender distribution of farmers in the study sites. In **Figure 1** illustrates that the number of male farmers was 187 (93.5%) and the number of female farmers was 13 (6.5%) respectively.

Male farmers are involved more in raising cattle compared with female farmers. This is to confirm that respondents participated in this interview are mainly responsible directly for their raising cattle activity. This is not surprisingly that male farmers are getting involved more than their female counterpart.

The average age of farmers practicing cattle fattening was 51.09 years old while non-practicing farmers was 51.65. The experience of farmers practicing cattle fattening were 12.16 on average and non-practicing cattle fattening farmers was 15.45 years on average (**Table 1**). On the other hand, the average education attainment of farmers practicing cattle fattening was 5.75 years of schooling while non-cattle fattening farmers was 3.87 years of schooling on average. The average of number of members in the households of farmers practicing cattle fattening were 7 same with non-practicing cattle fattening farmers. Area size was slightly higher of farmers practicing cattle fattening on average than non-practicing cattle fattening farmers on average as indicated in **Table 1**

This indicates that the year of schooling of farmers practicing cattle fattening are more compared to non-cattle fattening farmers. However, both farmers groups in the study area do not conclude compulsory basic education.

The average amount of labour spent on cattle activities by farmers practicing cattle fattening was about 2.24 hr/day as shown in **Table 2**. While labour spent on cattle activities by non-practicing cattle fattening farmers was around 2.34 hr/day on average. The difference in time spent on cattle activities was not statistically significant at the 95% level of confidence.

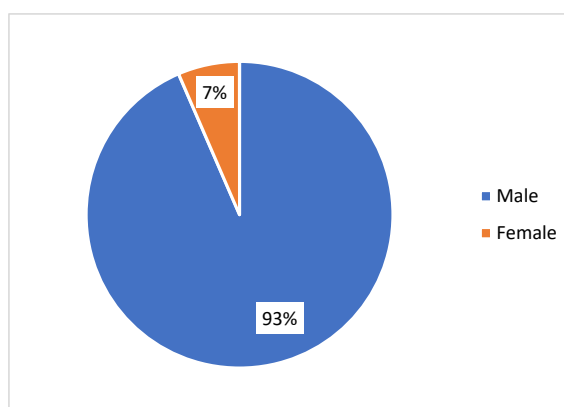


Figure 1. Number of farmers by gender.

Table 1. Households demographic information.

Characteristics	Farmers practicing cattle fattening			Non-practicing cattle fattening farmers		
	No. of farmers	Range	Average	No. of farmers	Range	Average
Age (years)	65	29 - 70	51.09	135	24 - 70	51.65
Experience (years)	65	1 - 56	12.16	135	1 - 45	15.47
Education attainment (years)	65	0 - 16	5.75	135	0 - 16	3.87
Number of members in the household	65	2 - 16	7.00	135	2 - 18	7.00
Area size (ha)	65	0.25 - 5	1.08	135	0.50 - 2	0.88

Table 2. Labour utilisation in cattle production activities by cattle fattening farmers and non-cattle fattening farmers.

Labour	Number of farmers	Labour use (hrs/day)
Farmers practicing cattle fattening	65	2.24
Non-practicing cattle fattening farmers	135	2.34

$t = -0.587$; not significant at 95% level of confidence.

In **Table 3** indicated that the average amount of total cost spent by farmers practicing cattle fattening was \$46.05 per head. While total cost spent by non-practicing cattle fattening farmers was \$32.19 per head on average.

The difference in total cost of cattle was not statistically significant at the 95% level of confidence.

The average amount of value of cattle received by farmers practicing cattle fattening was \$837.72 per head as illustrated in **Table 4**. While non-practicing cattle fattening farmers received value of cattle were \$543.02 per head on average. The difference in value of cattle was statistically significant at the 95% level of confidence.

The average amount of profit obtained by farmers practicing cattle fattening was 792.45 \$/head. While profit gained by non-practicing cattle fattening farmers was 513.99 \$/head on average. The difference in profit was statistically significant at the 95% level of confidence as indicated in **Table 5**.

There are several factors hamper cattle production overcome by cattle farmers in the study areas. These challenges need to be addressed in appropriate manner to enhance cattle production. The percentage of farmers was at 27 (52.9%) mentioned that water and forage shortage were constraints them to undertake cattle production. Following by 17 (33.3%) of farmers reported that they spent time on culture ceremonies and lack of capital. Cattle die and wild were the issue that concerned by the small percentage of farmers accounted for 3 (5.9%) as well as at 3 (5.9%) of farmers said that lack of labour respectively. Meanwhile, lack of

buyer was reported by 1 (2.0%) of the percentage of farmers (**Figure 2**).

The percentage of farmers were at 26 (55.3%) said that collected water from river, feed cattle with sago and forage. Following by 11 (23.4%) mentioned that cultivate forage and at 5 (10.6%) of farmers stated that they were managed the time for doing the activities related to the cattle production. A small percentage of farmers were 3 (6.4%) declared that they have done vaccination to the cattle and at 2 (4.3%) of farmers revealed that they were sold their cattle as indicated in **Table 6**

Table 3. Total cost of farmers practicing cattle fattening and non-practicing cattle fattening farmers.

Cost of cattle	Number of farmers	Total cost (\$/head)
Farmers practicing cattle fattening	65	46.05
Non-practicing cattle fattening farmers	135	32.19

$t = 1.367$; not significant at 95% level of confidence.

Table 4. Value of cattle by farmers practicing cattle fattening and non-practicing cattle fattening farmers.

Value of cattle	Number of farmers	Value of cattle (\$/head)
Farmers practicing cattle fattening	65	837.72
Non-practicing cattle fattening farmers	135	543.02

$t = 4.869$; significant at 95% level of confidence.

Table 5. T-test for differences in profit between farmers practicing cattle fattening and non-practicing cattle fattening farmers.

Profit	Number of farmers	Profit (\$/head)
Farmers practicing cattle fattening	65	792.45
Non-practicing cattle fattening farmers	135	513.99

$t = 4.682$; significant at 95% level of confidence.

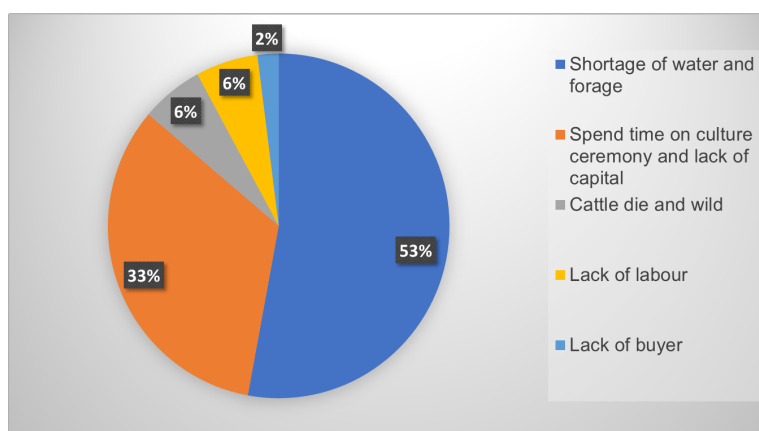


Figure 2. Factors constraining cattle production.

Table 6. Problem solutions to cattle production.

	Number of farmers	Percentage of affirmative responses
Collect water from river, feed cattle with sago and forage	26	55.3
Cultivate forage	11	23.4
Time management	5	10.6
Vaccine cattle	3	6.4
Sell cattle	2	4.3
Total	47	100

6. Conclusion and Implication

6.1. Conclusion

Farmers practicing cattle fattening have slightly lower time spend on cattle activities compared to non-practicing cattle fattening farmers. There are both farmers practicing cattle fattening, and non-practicing cattle fattening sell 3 of their cattle on average. Total cost spent by farmers practicing cattle fattening is slightly lower than that of non-practicing cattle fattening farmers. Value of cattle is higher for farmers practicing cattle fattening than non-practicing cattle fattening farmers. Profit is higher for farmers practicing cattle fattening than non-practicing cattle fattening. Farmers have mostly faced problems with shortage of water and forages. The solutions to overcome the challenges are through collect water from river and feed cattle with sago and existing forages.

6.2. Implication

Cattle fattening program is benefit to the farmers in selected areas such as Atabae administrative post, Bobonaro municipality as it enhances cattle farmers' income. It is important to explore and expand similar study to other sites in regards with the impact of intervention of cattle fattening program implementing by cattle farmers to evaluate the benefit of the program. Timorese government particularly the Ministry of Agriculture Forestry and Fisheries is strongly advised to continue cattle fattening program as it sounds economically benefits to the cattle farmers in Timor-Leste.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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