THE CONTRIBUTION OF THE BEEF CATTLE FARMING SECTOR TO HOUSEHOLD INCOME IN THE TEAK FOREST AREA (CASE STUDY IN THE KEDUNGADEM SUB-DISTRICT, BOJONEGORO REGENCY)

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Abstract
Limited employment opportunities in rural areas make it more challenging for people to live a prosperous life. The social and economic conditions of rural communities tend to depend on the agrarian sector, such as the livestock sector. The livestock sector as an agricultural sub-sector is a very strategic and reliable way to create economic growth, reduce unemployment and create additional sources of income for the community. Most of the population of the Kedungadem sub-district in the Bojonegoro Regency work in the agricultural sector, for example in livestock farming. This study reveals the total income of cattle farmers’ households and the contribution of income derived from beef cattle farming activities to the total household income of farmers who live in the teak forest area. One hundred beef cattle farmers were randomly selected and grouped into one of three beef cattle farming scales, based on the number of cattle owned. This study shows that the average total income in scales I, II, and III was IDR. 19,211,392.15/year, IDR. 34,583,874.51/year, and IDR. 42,945,805.17/year, respectively. The average cattle farmer’s income from beef cattle farming in scales I, II, and III was IDR. 4,002,674.71/year; IDR. 9,482,032.71/year; and IDR. 19,716,588.39/year, respectively. The average contribution of beef cattle farming activity to the total income of farmers’ households in scales I, II, and III was 20.94%, 27.42%, and 47.00%, respectively. This study suggests that the farmers need to improve their economic management in order to survive or increase the income they derive from cattle farming. Farmers should also cooperate with Perhutani, a state forest company, as there are a number of ways in which the teak forest can support the sustainability of their cattle farming.

Keywords: economic analysis, livestock-forest integration, rural community

INTRODUCTION

Activity in the Bojonegoro Regency is one of the most significant contributors to the population of beef cattle in East Java. According to the Livestock Service of East Java (2018), the Regency had a population of 218,131 beef cattle in 2017, which is an increase of 8.2% compared to its population in 2016 (201,954 beef cattle), also which increased by 8% between 2015 (186,861 beef cattle) and 2016. The Bojonegoro Regency is also home to state forest areas managed by Perhutani, a state forest company, under the authority of the Ministry of Forestry. According to the Bojonegoro Regency Profile...
(Regional Development and Planning of Bojonegoro Regency, 2012), the total area of state forest is 56,279.50 Ha, which means that 40.15% of the 230,706 Ha of the Bojonegoro Regency area is covered by state forest. The existence of this much forage reduces the production costs associated with beef cattle farming activities by providing animal feed, and this affects farmers’ expenditure and their profit-making potential.

Most of the livestock farming activities in the region are beef cattle farming. The total number of beef cattle is estimated to have reached 15,390 in 2016 (Central Bureau of Statistic, 2017). Beef cattle farming is supported by the suitable environmental conditions in the area, such as the abundant feed resources that come from agricultural land and the teak forest. The local government also works to promote the growth of beef cattle farming. One measure the government has taken is to form the Central of Animal Husbandry, which was pioneered in three sub-districts in 2014: the Kasiman sub-district, the Temayang sub-district, and Kedungadem sub-district, with the aim of improving the quality of farming and beef cattle resources.

In livestock farming, the integration of production management with financial management is essential, where production management relates to the use of inputs and outputs in the production process. Financial management plays a role in regulating the velocity of funds between capital, operating costs, and profits derived from livestock farming processes. The more effective and efficient the farmer is in managing these concerns, the higher their income and the stronger their ability to compete in the market (Suresti and Wati 2012).

Research conducted for this paper indicates that farmers in the Kedungadem sub-district can improve the way they approach beef cattle farming, and this will have a knock-on effect of improving social stratification and prosperity. Moreover, farmers should learn how to separate revenue and costs, to make it easier to calculate how much income they generate in one year from beef cattle farming and its contribution to their total household income.

RESEARCH METHODS

Study site

The research was carried out in the Kedungadem sub-district, Bojonegoro Regency, East Java province. The Kedungadem sub-district was chosen as the location of the research for the following reasons: 1) The Kedungadem sub-district ranked in second place after Tambakrejo sub-district in 2016 in the largest number of beef cattle (with 15,473 beef cattle) (BPS 2017), 2) the Kedungadem sub-district has teak forest areas managed by Perhutani, at a distance of less than 10 kilometers from residential areas, and 3) the Kedungadem sub-district has a Central of Animal Husbandry from three sub-districts that chosen as locations in 2014 as an effort from the Livestock and Fishery Office of the Bojonegoro Regency to develop the growth of local beef cattle farming by improving farmers’ skills and access to beef cattle resources.

Study design

A quantitative approach was used in this research to determine the extent to which beef cattle farming activities contribute to household income. Interviews and questionnaires were used to collect the data.

Population and research sampling

The study population comprised individuals who carried out beef cattle farming activities in the Kedungadem sub-district, and was made up of a total of 8,569 people (BPS 2017). The sampling method used in this research was a multistage random sampling method. The steps of the sampling process in this study are as follows:

1. Twenty-three villages in the Kedungadem sub-district were divided into two categories: low density cattle villages and high cattle density villages. The classification of these villages can be seen in Table 1.

Table 1. The classification of villages based on cattle density

<table>
<thead>
<tr>
<th>No.</th>
<th>Village</th>
<th>Amount of cattle</th>
<th>Cattle density category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Kesongo</td>
<td>1209</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Tondomulo</td>
<td>1095</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Panjang</td>
<td>1043</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Babad</td>
<td>887</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Drokilo</td>
<td>865</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Jamberejo</td>
<td>791</td>
<td>High</td>
</tr>
<tr>
<td>7</td>
<td>Megale</td>
<td>779</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Pejok</td>
<td>758</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Kepokhidul</td>
<td>754</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Dayukidal</td>
<td>752</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Kendung</td>
<td>651</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Mlideg</td>
<td>611</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Sidorejo</td>
<td>601</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Kedungrejo</td>
<td>581</td>
<td>Low</td>
</tr>
<tr>
<td>15</td>
<td>Sidomulyo</td>
<td>578</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Tumbrasanom</td>
<td>536</td>
<td></td>
</tr>
</tbody>
</table>
2. The number of villages chosen for the research was 15; seven villages were categorized in the low cattle density category and eight villages were categorized in the high cattle density category. Then those villages were selected randomly. The chosen villages represent areas based on geographical locations (north, west, south, east, and central).

3. The total number of respondents was 100, and the determination was made using the Slovin’s formula as follows (Hoddi, et al 2011):

\[
n = \frac{N}{1 + N(e)^2} \times \frac{1}{8,569} = 99 \approx 100
\]

Explanation:
- \(n\) = The number of respondents
- \(N\) = Population of people who carried out beef cattle farming activity
- \(e\) = The margin for error that was tolerated \((e = 0.1)\)

4. The sample was heterogeneous due to the varied number of cattle owned by the respondents. Cattle ownership was stratified into three scales. According to Sudjana (1992), the class intervals are formulated by determining the range interval based on the largest number of cattle owned, minus the lowest number of cattle owned then divided by the number of scales.

\[
Interval of class = \frac{Range interval}{Amount of strata}
\]

The results of this research showed that:
- a. The smallest number of cattle owned was 0.25 AU.
- b. The highest number of cattle owned was 6.5 AU.
- c. The number of cattle farming scales was three.

Interval of class = \(\frac{6.5 \text{ AU} - 0.25 \text{ AU}}{3} = 2.1 \text{ AU}\)

Based on the calculation above, the determination of a cattle farming scale based on the number of cattle owned was as follows:
- a. Scale I consisted of 80 respondents who owned between 0.25–2.35 AU cattle.
- b. Scale II consisted of 17 respondents who owned between 2.35–4.46 AU cattle.
- c. Scale III consisted of three respondents who owned between 4.46–6.5 AU cattle.

Data collection method

Primary and secondary qualitative and quantitative data was collected. Data collection was carried out through interviews that used a structured questionnaire as a tool. In addition to the questionnaire, other questions were also asked, so that the interview process was not stilted and saturated to minimize the occurrence of bias.

Data analysis

Data analysis is an activity that transforms research data into new information that can be used to draw conclusions. The process of data analysis began by checking all available data from various research sources, such as interviews, observations, and documents. The data analysis steps that were carried out are as follows:

Descriptive analysis

Descriptive analysis was used to describe the research objects. This analysis included a description of the beef cattle farming conditions in the Kedungadem sub-district, Bojonegoro Regency, in the form of description of farmer’s characteristics and the management of respondents’ beef cattle farming activity.

Beef cattle farming income analysis

The income from beef cattle farming is what is left after production costs are subtracted from the total revenue over a certain period. The formula used to determine the total income is as follows (Nugroho, 2010):

\[
P = TR - TC
\]

Explanation:
- \(P\) = Income from beef cattle farming activities per year
- \(TR\) = Revenue derived from beef cattle in one year
  (value derived from existing cattle + value of cattle that have been sold – initial cost of the cattle)
- \(TC\) = Costs derived from the sum of fixed costs
  (depreciation cost + land tax + cattle shed)
household income analysis

To calculate a farmer’s household income, the income from on-farm livestock farming activities (beef cattle and other livestock) was added to the income from on-farm crop farming activities, the income from off-farm activities, and the income from the forest. The calculation used the following formula:

\[ I = \sum P + \sum NP + \sum OP + \sum SP \]

Explanation:
- \( I \) = A farmer’s household income (IDR/farmer/year)
- \( P \) = A farmer’s on-farm income from beef cattle farming activities (IDR/farmer/year)
- \( NP \) = A farmer’s on-farm income from non-beef cattle farming activities (IDR/farmer/year)
- \( OP \) = A farmer’s off-farm income (IDR/farmer/year)
- \( SP \) = A farmer’s forest income (IDR/farmer/year)

The following steps were taken to calculate the farmers’ income from sources other than beef cattle farming activities:
1. The on-farm income from non-beef cattle farming activities was obtained by subtracting the total farming costs from the total farming revenue.
2. The forest income was obtained by combining the value of all the forest products produced by the farmer.
3. The off-farm income was taken from income earned from activities or employment that occurred in the agricultural sector (such as farm working) but outside of the respondent’s own land.
4. The non-farm income was obtained by combining income from sources other than farming activities. This included income derived from working as a trader, entrepreneur, government employee, income from a pension, or from renting out land or property, among other activities.

RESULTS AND DISCUSSION

General condition of the research site

Geographically, the Kedungadem sub-district is located 37 km southeast of the center of the Bojonegoro Regency and borders Sunberrejo, Balen and the Kepohbaru sub-district in the north, the Sukorame sub-district (Lamongan Regency) in the east, the Ngluuyu sub-district (Nganjuk Regency) in the south, and Sugihwaras and the Sukosewu sub-district in the west. The Kedungadem sub-district is in the lowlands and has an average air temperature of 27.1°C. According to Central Bureau of Statistic (2017), 59.5% of land in the Kedungadem sub-district is used for agricultural activities, such as crop farming and livestock farming. Furthermore, 24.8% of land in the Kedungadem sub-district is used for forestry and 15.7% of land is used for building and other purposes.

The forest in the Kedungadem sub-district provides employment opportunities for the surrounding community and other ways to earn additional income. According to Kurniadi et al. (2017), forests that are near residential areas can be used to gather feed supplies for cattle, and allow communities to own more cattle and produce more fertilizer. In addition, forests serve as a ready supply of wood for use as fuel. Farmers can use areas of forest for cattle grazing, which solves the problem of a lack of community-owned land.

- • provides grass as cattle feed
- • provides cattle grazing areas

Figure 1. The relationship between the teak forest and beef cattle farming

As shown in Figure 1, teak forests provide feed in the form of grass for beef cattle. In addition, the teak forests also provide cattle grazing areas. This creates a positive feedback loop, as grazing cattle provide a number of benefits to the teak forests. For example, the beef cattle eat the grass which would otherwise be considered a weed, and cattle dung acts as fertilizer for the teak trees.

Characteristics of respondents

The respondents’ characteristics collected in this research were age, education level, cattle farming experience, number of family members and main occupation. There were 100 people who carried out beef cattle farming activities in the Kedungadem sub-district. Data showed that 36 respondents were aged 15–49 years (very productive age sub-category), 46 respondents were aged 50–64 years (productive age sub-category), and 18...
respondents were over 64 years old (unproductive age sub-category). Forty-seven respondents had attended primary school, 31 respondents had never attended school, 12 respondents had attended junior high school, and 10 respondents had attended senior high school.

In terms of cattle farming experience, 36 respondents had 1–10 years’ cattle farming experience, 31 respondents had 11–20 years’ cattle farming experience, 14 respondents had 21–30 years’ cattle farming experience, and 19 respondents had more than 30 years’ cattle farming experience. In terms of the number of family members, 10 respondents had 1–2 family members, 43 respondents had 3–4 family members, 24 respondents had 5–6 family members, and three respondents had 7–8 family members. In terms of main occupation, 89 respondents worked as farmers, 2 respondents worked as farm workers, 8 respondents worked as cattle farmers, and only 1 respondent worked as a construction worker.

In terms of the type of beef cattle farming activity undertaken, 69 respondents specialized in breeding, 20 respondents specialized in fattening, and 11 respondents did a mixed type of beef cattle farming, involving both breeding and fattening. In terms of the agricultural land size, 42 respondents owned 0–0.37 Ha of agricultural land, 46 respondents owned 0.38–0.75 Ha of agricultural land, eight respondents owned 0.76–1.12 Ha of agricultural land, and four respondents owned 1.13–1.50 Ha of agricultural land. The data also showed that on average, beef cattle farmers in cattle farming scale I owned 2.01 beef cattle or 1.22 in Animal Unit, beef cattle farmers in cattle farming scale II owned 4.11 beef cattle or 2.83 in Animal Unit, and beef cattle farmers in cattle farming scale III owned 7.66 beef cattle or 5.58 in Animal Unit.

General description of beef cattle farming conditions

Beef cattle farming activities were a side business for most of the community in the Kedungadem sub-district. Respondents who mostly worked as crops farmers for their main employment also did some beef cattle farming to increase their overall household income. No respondents kept beef cattle solely for meat for personal consumption. Respondents could sell their beef cattle at any time, for example when funds were required by the family to meet unforeseen expenses for education, health, low or failed crop yields, debt, or other reasons. Beef cattle farming in the Kedungadem sub-district included in household-scale farming, due to the relatively low level of beef cattle ownership. Based on the results of this research, the average number of beef cattle owned by respondents was two to three beef cattle, and the highest number of beef cattle owned was ten cattle.

Farmers usually fed their animals twice, once in the morning and once in the evening. In general, feed consisted of forage sourced from forest and agricultural land. Farmers gave agricultural waste to their cattle, without any attempts to improve the nutritional profile of the feed. Agricultural waste was given due to the large availability of agricultural waste. Few respondents added concentrates to their beef cattle feed. In general, the most commonly used feeding system was the intensive system, where cattle are placed in sheds and fed using a cut-and-carry forage feeding practice. However, some farmers used the semi-intensive system, where cattle are placed in sheds but graze in the teak forest during feeding times. Cattle sheds were usually integrated with the farmers’ houses and located at the back of the property; this was done for security reasons and to enable easier monitoring of the animals. Furthermore, the material for cattle shed adapts to the materials used in the farmer's house.

Analysis of beef cattle farming activities

Beef cattle farming activities carried out by the community are undertaken as a means to provide primary or supplementary sources of income. When conducting cattle farming activities, recording the costs and maintaining a cash flow is important so that profits and losses can be calculated. According to Jones (2000), these records can show whether the business is improving, which items are selling, and what changes need to be made. Business analysis is needed in any business to determine the level of efficiency, feasibility of a business, and business successes. In practice, we found that farmers did not keep detailed records of their cost and revenue from their beef cattle farming activities. They also did not do any calculation to their business. Beef cattle farming activities were analyzed by calculating the costs of the production process, revenue, income, and the return per cost ratio (Table 2).
This research found that the average production cost (Table 2) in each cattle farming scale respectively were IDR. 28,535,448.96/year (scale I), IDR. 32,558,123.67/year (scale II), and IDR. 40,020,320.06/year (scale III). This represented the most significant contributing factor to overall production costs, comprising 82.08%, 77.83%, and 74.47% of costs.

### Production cost

The production cost is divided into two parts: the fixed costs and the variable costs. Referring to Nugroho’s (2010) statement about fixed costs and variable costs associated with cattle farming activities, fixed costs in this research consisted of cattle shed depreciation costs, equipment depreciation costs, land rent costs and building tax per year, which was calculated based on the area of land used for beef cattle farming activities. Production factors included in the variable costs were feed (foraged feed and feed additives/concentrates), labor, livestock health costs (i.e., vitamins, medicines, and veterinary fees), artificial insemination, electricity, and the cost of purchasing cattle. The cost of purchasing cattle was included in the variable costs because at the time that the research was carried out, cattle generally had a higher selling value compared to the time they was purchased, or their value at the beginning of the farming period (i.e. at the beginning of the year). Therefore, the value of the cattle at the time of the research was considered as revenue of beef cattle farming activity.

This research found that the average production cost (Table 2) in each cattle farming scale respectively were IDR. 28,535,448.96/year (scale I), IDR. 32,558,123.67/year (scale II), and IDR. 40,020,320.06/year (scale III). This represented the most significant contributing factor to overall production costs, comprising 82.08%, 77.83%, and 74.47% of costs.

### Revenue

The results of the research showed the average revenue (Table 2) in each cattle farming scale was IDR. 32,558,123.67/year in cattle farming scale I, IDR. 60,901,915.07/year in cattle farming scale II, and IDR. 105,658,689.58/year in cattle farming scale III. The increase of revenue from the lowest scale to the highest scale was due to the differing numbers of cattle owned. Inline, the higher the number of cattle owned, the higher the revenue earned from farming activities. Revenue was calculated by combining the actual price of cattle sales for one year with an estimation of the value of existing cattle at the time the research was conducted, along with sales of cattle dung or any income arising from its use as compost.
cattle farming scale I, IDR. 9,482,032.71 in cattle farming scale II, and IDR. 19,716,588.39 in cattle farming scale III. According to the results of the calculation in Table 2, the average total income per AU of beef cattle farmers in each scale respectively were IDR. 3,297,274.36/year/AU (scale I), IDR. 3,350,541.59/year/AU (scale II), and IDR. 3,533,438.78/year/AU (scale III).

The results show an increase in the average income from the lowest cattle farming scale to the highest cattle farming scale. It can be interpreted that cattle farming on a larger scale will have a positive impact on the average income from beef cattle farming activities. However, farmers usually assumed that they had made a significant profit based on a thought that if the selling price of their cattle is higher than the purchasing price or the initial price by the beginning of farming period.

**R/C ratio**

Economic efficiency is required for cattle farm management. In order to determine the average economic efficiency of the beef cattle farming activities carried out by respondents in the various cattle farming scales, the R/C ratio was calculated. Metasari et al (2013) explained that the R/C ratio is a comparison between revenues and costs incurred during the production process. Based on the R/C calculation (Table 2), it was found that the average level of economic efficiency in each scale was 1.14 in cattle farming scale I, 1.18 in cattle farming scale II, and 1.23 in cattle farming scale III. According to Soepranianondo et al. (2013) and Metasari et al (2013), if R/C > 1, this means that the cattle farming activity is profitable. The higher the value of R/C, the greater the amount of income earned by the cattle farming activity.

The results of the R/C ratio calculation (Table 4) show that the highest economic efficiency level was in cattle farming scale III, which had a value of 1.23. This value means that for every IDR. 1 of costs incurred in beef cattle farming activities in one year, IDR. 1.23 of revenue is generated. Economic efficiency in cattle farming scale III occurred because of input optimization in the production process. According to Mandaka and Hutagaol (2005), maximum income is achieved if all the factors involved in the production process have been allocated optimally and efficiently, both technically, price and economically. Farmers must use optimal production inputs in order to achieve high productivity and cost efficiency.

**Non-cattle income**

The household income of beef cattle farmers was generated from the employment and activities undertaken by all family members. Income generated from employment and activities besides beef cattle farming activities was classified as non-cattle income. Sources of income which were classified as non-cattle income included on-farm crop income (generated from crop farming activity), on-farm livestock income (generated from non-cattle livestock farming activities such as farming chickens, goats, ducks, and sheep), off-farm income (calculated by combining all income from various jobs inside the farm), non-farm income (calculated by combining all income from various non-agricultural activities/employment), and forest income (generated from forest products). Income classified as non-cattle income was the net income calculated for one year.

**Table 3. Non-cattle income (IDR/year/cattle farming scale)**

<table>
<thead>
<tr>
<th>Items</th>
<th>IDR/year</th>
<th>Scale I*</th>
<th>Scale II*</th>
<th>Scale III*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. On-farm crop income</td>
<td>12,939,161.</td>
<td>22,381,114.</td>
<td>20,499,877.</td>
<td></td>
</tr>
<tr>
<td>2. On-farm other livestock income</td>
<td>14</td>
<td>78</td>
<td>38</td>
<td></td>
</tr>
<tr>
<td>3. Off-farm income</td>
<td>105,709.30</td>
<td>403,016.17</td>
<td>494,096.97</td>
<td></td>
</tr>
<tr>
<td>4. Non-farm income</td>
<td>426,315.23</td>
<td>98,097.24</td>
<td>741,145.45</td>
<td></td>
</tr>
<tr>
<td>5. Forest income</td>
<td>1.683,960.5</td>
<td>2,066,581.9</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td><strong>Total non-cattle income</strong></td>
<td>15,188,717.</td>
<td>25,101,841.</td>
<td>22,229,216.</td>
<td></td>
</tr>
</tbody>
</table>

*on average
Source: Primary data processed, 2018

According to the non-cattle income calculation (Table 3), farmers in cattle farming scale II had the highest average non-cattle income, which was higher than that of respondents in cattle farming scale III. This was because the number of cattle owned affected the amount of working time allocated to beef cattle farming, meaning that higher numbers of cattle owned by respondents meant that more working time was allocated to cattle farming (Isyanto 2015). This was also because the respondents’ main employment in cattle farming scale III was cattle farming.
On the other hand, the average non-cattle income earned by respondents in cattle farming scale I was lower than the average non-cattle income of respondents in cattle farming scale II. This is because the percentage of average agricultural land size ownership over 0.75 hectares was higher in cattle farming scale II, which meant that respondents in cattle farming scale I owned a smaller-than-average on-farm crop income, compared to those in cattle farming scale II. The higher percentage of average agricultural land size ownership below 0.75 hectares in cattle farming scale I also meant that respondents in this scale earned a greater off-farm income than respondents in scale II.

**Total household income of beef cattle farmers**

The total household income of beef cattle farmers in the Kedungadem sub-district was derived from the sum of all income obtained from activities or employment undertaken by all family members. The most significant contributor to the overall household income was by the head of the family. However, the income contributed by family members besides the head of the family also had a significant impact on the total household income. According to Supriyati (2005), the more family members who generate income, the higher the total income earned by the farming household, meaning that the needs of family life are easier to fulfill.

![Table 4](image_url)

<table>
<thead>
<tr>
<th>Items</th>
<th>IDR/year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Scale I*</td>
</tr>
<tr>
<td>1. Beef cattle farming income</td>
<td>4,022,674.71</td>
</tr>
<tr>
<td>2. Non-cattle income</td>
<td>15,188,717.43</td>
</tr>
<tr>
<td><strong>Total household income</strong></td>
<td><strong>19,211,392.15</strong></td>
</tr>
</tbody>
</table>

*on average  
Source: Primary data processed, 2018

Based on the total household income calculation in Table 4, the average total household income per year for beef cattle farmers increased from the lowest scale to the highest scale. Data in Table 4 also shows that the highest amount of income in each scale came from non-cattle income. The high levels of non-cattle income was due to the fact that the community generally undertook beef cattle farming activities as a side business only. In addition, the main occupation of the respondents was generally seasonal crop farming. Therefore, when looking at the calculation of non-cattle income (Table 3), the income from seasonal crop farming provided the largest income out of all non-cattle sources of income. This condition is following Gapri and Marhawati’s (2011) statement, where the high non-cattle income caused by the community living in villages tend to depend on the agricultural sector, especially in seasonal crops farming as a result of the availability of extensive land and the abundance of natural resources.

**Contribution of beef cattle farming income to total household income**

The contribution of beef cattle farming to total household income was calculated by dividing the total household income by the income from beef cattle farming activities. Gapri and Marhawati (2011) state that the contribution is subvention or is interpreted as the share of income from an agricultural activity of the total household income. Contributions from an agricultural activity can be large if the activity is the main source of income. The size of the contribution in the agricultural sector to household income is determined by the quality and quantity of the human resources and the natural resources used.

![Table 5](image_url)

<table>
<thead>
<tr>
<th>Beef cattle farming scales</th>
<th>Contribution to household income (%)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scale I</td>
<td>20.94</td>
</tr>
<tr>
<td>Scale II</td>
<td>27.42</td>
</tr>
<tr>
<td>Scale III</td>
<td>47.00</td>
</tr>
</tbody>
</table>

*on average  
Source: Primary data processed, 2018

The percentage of contribution of the average beef cattle farming income to the total household income per year increased from the lowest scale to the highest scale (Table 5). The increase in the percentage of the contribution of the average beef cattle farming income occurred...
in line with the increase in the average number of cattle owned. In other words, the higher the number of cattle, the higher the contribution of beef cattle farming activities to the total household income. Based on Ginting’s (2006) research, beef cattle farming in scale I and scale II are included in the side business (subsistence) category, because the percentage of the average contribution was less than 30% of the total household income. Beef cattle farming in scale III is included in the mixed farming category, because the percentage of the average contribution was between 30–70% of the total household income. The categorization by Ginting (2006) is in accordance with the conditions in the research location that the most common main occupation of respondents in scale I and scale II was crop farming, while the most common main occupation of respondents in scale III was beef cattle farming.

The main occupation of respondents in this research was determined by the amount of income earned. The employment that generated the largest income was considered the main occupation. Although the most common main occupation of respondents in scale III was cattle farming, the contribution of income generated from cattle farming activities was below 50% of the total household income. This was because the respondents in scale III also carried out crop farming activities, other livestock farming activities, and paid agricultural jobs, as well as earning income from forest products (Table 3). The sum of the average income from the activities categorized as non-cattle income was bigger than the total income derived from cattle farming activities (Table 4), which caused the average contribution of income generated by cattle farming activities to be below 50% of the total household income (Table 5).

The average contribution of income derived from beef cattle farming in each scale was lower than the contribution of income derived from non-cattle farming activities. One reason for this is that farmers have a limited amount of capital with which to invest in additional cattle. According to Nugroho et al (2013), although the income generated is considered low, beef cattle play an important role in supporting the household income at the micro level. The income generated from beef cattle farming can be increased by raising a larger number of cattle. However, farmers who cannot increase the number of cattle owned due to limited capital can increase their meat output by making improvements to cattle feed management. The increase of meat output will increase their cattle selling value, generating larger income which can then be used as capital.

CONCLUSION

The average total household income of beef cattle farmers who live in the teak forest area in the Kedungadem sub-district in the Bojonegoro Regency is around IDR. 19,211,392.15/year in cattle farming scale I, IDR. 34,583,874.51/year in cattle farming scale II, and IDR. 41,945,805.17/year in cattle farming scale III. While, the contribution of the average income generated by beef cattle farming to the total household income of beef cattle farmers per year in the Kedungadem sub-district in the Bojonegoro Regency is IDR. 4,022,674.71/year (20.94%) in cattle farming scale I, IDR. 9,482,032.71/year (27.42%) in cattle farming scale II, and IDR. 19,716,588.39/year (47.00%) in cattle farming scale III.

REFERENCES


