Optimization of Farmers Working Hours through Increasing the Farm Size of Beef Cattle Production in Rural Area

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Abstract. This study aims were (1) identify the working hours of farmers in beef cattle farming (2) formulate the number of beef cattle that can be maintained by subsistence farmers as a side business. The study was done in rural area of Tegal Regency using survey method. 100 beef cattle farmers were selected as respondents using multistage sampling. Data was analyzed by descriptive statistics to describe the average working hours of farmers per Animal Unit (AU) and the potential time remaining by the farmers. The farmers in Tegal Regency had an average farm size of cattle of 2.40 AU. Various maintenance activities for cattle production were grazing, cleaning cattle housing, feeding and drinking, bathing the cattle. It was done by farmers for 1.75-5.10 hours/day, with an average of 3.89 hours/day. Farmers devoted the most of their time (56.04%) to take forage and grazing. Beef cattle farmers in Tegal Regency had a maximum capacity of maintaining 4.22 AU beef cattle or equivalent to 4 heads of cow.

1. Introduction

Rural areas are geographical spaces that are often identified far from the dynamics of modernization but possess strategic natural potential. Agricultural activities are the economic driver of community life in rural areas. Tegal Regency is an agriculture-based area that occupies varied geographical space ranging from highlands to lowlands. In addition to rice farming, rural communities in Tegal Regency have a beef cattle farming as a side business. The number of beef cattle farmers in Tegal Regency were 3,937 farmers with a population of 10,649 beef cattle [1]. Beef cattle farming that is maintained by rural communities in Tegal Regency tends to be done as a side business with a business scale of 1-3 heads. Beef cattle farmers have major businesses in food crop, plantations, carpentry, and industrial sector.

Beef cattle farmers in rural areas of Tegal Regency do not depend on one permanent business, but the farmer are more likely to develop and carry out several economic business activities to their meet family needs. The farmers have diversity economic activities to optimize the time available by carrying out productive activities to improve family welfare. The Efforts to improve the family welfare face challenges with the limited scale of beef cattle farming and the lack of availability of capital. There are many small-scale farmers face economic challenges, especially access to credit, availability of labor, government regulations that make it difficult to expand their farm scale [2].

The ownership of 1-3 beef cattle in rural communities is one of the characteristics of side businesses. Beef cattle farming in rural areas is carried out in conjunction with paddy rice farm with a limited number
of cows kept and fed with a cut and carry system [3]. However, the farm scale cannot be used as a reference to be able to increase their family income. Although small-scale beef cattle farming is a side business, beef cattle farmers tend to increase farm scale in order to increase their family income [4].

The desire to develop small scale beef cattle farming in rural areas can be realized from two approaches, namely the farm efficiency and optimizing the potential time of farmers. Based on an economic approach, the larger the farm scale the better the welfare of farmers [5]. In the approach of potential time of farmer, the addition of farm scale must not exceed the ability of beef cattle farmers to carry out all economic activities they have. Farmers will increase the farm scale up to the limits of the ability of farmers to manage their time together with other productive economic activities. Adding farm scale beyond the farmer's management capacity will ultimately not be effective and tend to be neglected. Availability of time in livestock management must be an important consideration for identifying the ability of farmers to increase farm scale in addition to considering farming efficiency. In this regard, this study aims were to (1) identify the time allocation of cattle farmers in the beef cattle farming and (2) identify the maximum number of beef cattle that can be kept by farmers as a side business.

2. Materials and Methods

This study was conducted using a survey method through interviews with a questionnaire on beef cattle farmers in Tegal Regency. One hundred (100) beef cattle farmers were selected as respondents using multistage sampling methods. First, the area sample was selected by stratified random sampling based on agroecological zone (high, medium and low land). In each stratum of 20 percent of the sub-district was chosen as a sample region. Second, respondents (farmers) were selected by the Quota Sampling method of 20 farmers in each selected sub-district area.

The variables observed in this study were allocation of working hours and the number of livestock ownership. Data were analyzed with descriptive statistics to describe the average time allocation of cattle farmers for beef cattle management and the average potential time of beef cattle farmers.

3. Results and Discussion

3.1. Respondent Characteristics

Beef cattle farmers in Tegal Regency had an average age of 48.1 years with an age range of 26 - 70 years and an average experience on beef cattle farming was 15.42 years. The average farmers’ education was 7.23 years. Most of beef cattle farmers had been completed elementary education. The average number of family members were 4 persons. Farmers maintained the beef cattle farming for the purpose of producing calves with an average livestock ownership of 2.40 Animal Units (AU). Livestock ownership was the number of beef cattle kept by farmers and stated in the Animal Unit (AU). Cattle weighing was above 325 kg and It is stated as 1 AU, while, heifer = 0.5 AU and calves (under 1 year old) = 0.25 AU. The number of cattle owned by farmers was limited by the profile of beef cattle farming as a side business [6]. The maintenance of beef cattle was profitable for farmers to at least maintain 4 Animal Unit [7].

| No | Variables                      | Mean  | Standard of deviation |
|----|--------------------------------|-------|-----------------------|
| 1  | Age of farmers (year)          | 48.14 | 8.92                  |
| 2  | Farmers’ education (year)      | 7.23  | 2.26                  |
| 3  | Family members (year)          | 3.84  | 1.01                  |
| 4  | Farming experience (year)      | 15.42 | 5.36                  |
| 5  | Farm scale (Animal Unit)       | 2.40  | 4.44                  |
3.2. Time Allocation for beef cattle farming

The work time allocation is the proportion of working time devoted to certain activities in the agricultural sector and outside the agricultural sector to the total work time [8]. The hours devoted to work by cattle farmers vary and depend on the number of cattle, numbers of activities, and age of farmers. There were types of activities that require a large and continuous flow of time, but conversely there were also types of activities that require a limited flow of work time.

| No | Activities                     | Mean (hours) | Standard of Deviation |
|----|--------------------------------|--------------|-----------------------|
| 1  | Foraging (cut and carry)       | 2.18         | 0.83                  |
| 2  | Feeding                        | 0.66         | 0.27                  |
| 3  | Cleaning up the cow shed       | 0.57         | 0.21                  |
| 4  | Bathing a cow                  | 0.48         | 0.22                  |
| 5  | Total time for work            | 3.89         | 1.53                  |

Table 2. Time allocation of 2.4 AU beef cattle farming in Tegal Regency

Beef cattle farming in Tegal Regency was carried out on an average farm scale of 2.40 Animal Units (AU) with the use of simple technology and labor supplied by the farmers themselves. Beef cattle farming system in Tegal Regency covered various maintenance activities such as grazing, cleaning up cow shed, feeding, and bathing a cow, which are all done by the farmers themselves. These activities were carried out with different lengths of time by beef cattle farmers. Based on Table 2, it can be seen that the time allocated by farmers for beef cattle farming ranges from 1.75 to 5.10 hours/day, with an average of 3.89 hours/day. Farmers allocated most of their time (56.04%) to find fodder forage resources with a cut and carry system. This is due to the distance of the location from the beef cattle farm to the location of the forage resources depending on the availability of grass. The location of forage resources is moving forcibly causing the time required for these activities as inefficient. The farmers manage their farming traditionally and extensively. They allocated their time less than 3 hours per day [9]. As a side business, the time allocation for beef cattle farming was very limited and farmers spend more time for other economic activities, such as food crops, village staffs, teachers, and employees. Farmers manage other business activities because of their motives for controlling business risks and utilizing available resources [10]. The availability of unused resources causes farmers to be motivated to develop wider and a greater number of businesses. Small-scale farmers tend not to deal with risk and through diversification of household businesses, they try to control the risks and limited household income [11].

3.3. What is the maximum number of beef cattle for subsistence farmers?

Beef cattle farmers in Tegal Regency majority were subsistence farmers who raise livestock to meet family needs, and they sell their cattle whenever needed and are not driven by strong motivation to develop the farm profits. The existence of subsistence farmers must be encouraged to go to farmers who are efficient and able to deal with external changes. Subsistence farmers are a group of farmers that are not commercially oriented so that their existence must be given conditions to make agriculture as the main activity by increasing the scale of operations of their farms to be more efficient [12].

Currently, livestock that are kept are also very limited with an average of 2.40 AU with simple technology, simple cow shed near farmer’s house, and farmers looking for forage using the cut and carry system. Efforts to increase the farm scale of beef cattle farming in rural area must pay attention to the current number of livestock owned by farmers and the time availability of the farmers. The addition of the number of beef cattle per farmers is a clear roadmap to increase family income and the business climate of rural communities. However, efforts to increase farm scale must pay attention to the available time of farmers for manage their farming. Farmers in conducting beef cattle farming activities allocate working hours of 3.89 hours per day. This illustrates that while maintaining beef cattle farming with 2.40 AU, they
farmer will allocated working hours of 3.89 hours per day. Related to this, the maintenance of 1 AU of beef cattle requires an average time of 1.62 hours per day.

Beef cattle farming carried out by farmers in Tegal Regency is mostly used as a side business with their main works as vegetable farmers, rice farmers, drivers, employees. Sugiarto and Syarifudhi et al (2014) stated that the role of beef cattle as a side business with a 2 AU farm scale only contributes 25 percent of family income [4]. Beef cattle farmers in Tegal Regency allocated average working hours for non-beef cattle farming was 4.69 hours / day. It is illustrated that farmers in one day had a total working hour of 7.78 hours which includes beef cattle and non-beef cattle related activities. Beef cattle farmers in Tegal Regency were generally start working at 6 am and end work at 5 pm so that the total working hours are 11 hours per day. The length of working hours of farmers was higher / longer than the working hours of employees according to Law No. 13 of 2003 concerning Manpower which states the working hours per day is 7 hours.

Based on the length of working hours usually done by farmers in Tegal Regency (11 hours), the beef cattle farmers with various main livelihoods had remaining 3.22 working hours per day. In the previous discussion it was found that the management of 1 AU of beef cattle requires 1.62 hours per day, so that the potential working time of 3.22 hours per day can be used to increase the farm scale of 2 AU. Efforts to increase the number of beef cattle are believed to be able to increase the income of farmers and the role of beef cattle farming to improve farmers' welfare. The farm scale had a positive effect on livestock income in rural areas. Related to allocation of working hours and the potential time, beef cattle farmers in Tegal Regency haved a maximum number of beef cattle that can be kept as many as 4.22 AU. Krisna (2014) stated that by raising three or four beef cattle a year, the farmers can live properly [5].

4. Conclusion

Small-scale beef cattle farmers in Tegal Regency were subsistence farmers who also have several other productive businesses. Even though farmers had more than one economic activity, they remain had 3.22 hours which can be optimized for beef cattle farming development. Availability of time owned by farmers is a potential resource that must be optimized to make beef cattle farmers commercially oriented. Beef cattle farmers allocated their time for beef cattle business as much as 3.89 hours / day with the most allocation for finding feed resources. Regarding this time availability, beef cattle farmers in Tegal Regency haved the potential to increase the scale of beef cattle farming to as many as 4.22 AU.

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