Management characteristics of small-scale beef cattle production in Konawe district of Southeast Sulawesi

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This study aimed to describe the management characteristics of small-scale beef cattle production. The study was conducted in Konawe District of Southeast Sulawesi. Respondents consisted of 30 cattle farmers selected from three sub-districts. Data and information were collected using observation and questionnaire-based interview methods. Data were analyzed qualitatively using descriptive statistics. Research results showed that the objectives of cattle rearing were to have cash income, savings, and social security assurance. The types of cattle breed being raised were mostly Bali cattle. Each farmer kept eight heads of cattle on average. The primary source of cattle was breeding through natural mating and Artificial Insemination. Each farmer employed two family labors in average to take care of beef cattle production. Cattle management system applied consisted of tethering, intensive, and mini-ranch system. The intensive system involved the giving of supplemental feed to the animals so that the cost was higher than that of tethering and mini-ranch system. Small-sale cattle production system does not disrupt the crop farming system and provides supplementary income to the farmers, but has some characteristics that should be addressed in the efforts to have more specialized, medium-scale production or fattening system.

Keywords: beef cattle, management characteristics, production, small-scale, Sulawesi.

INTRODUCTION

Cattle serve significant roles in Indonesian society. Beef is an important source of animal protein and is used as a key ingredient in some local dishes such as *bakso* and *rendang*, which are very popular in Indonesia (Waldron et al., 2015). Beef cattle are slaughtered and consumed during the festival and traditional ceremonies in most communities. For smallholder farmers, cattle serve as a source of saving, social security insurance, draft power, and transport device (Ainsworth, 2017). Their manure is used as organic fertilizer, and the skin in leather works.

Given the importance of beef cattle in the promotion of food security (Saediman et al., 2019a) and poverty alleviation, the government has attempted to achieve beef self-sufficiency. Some measures under the beef self-sufficiency program included breeding measures, cattle distribution schemes, credit schemes, and import restriction. However, those measures seemed failed to increase cattle production substantially. Domestic production still cannot meet the growing domestic consumption, so Indonesia has to rely on the import of beef and live cattle, mostly from Australia.

The 2013 census indicated that domestic beef production in Indonesia is driven primarily by smallholder farmers with an average herd size of approximately two heads per farmers (Ainsworth, 2017). This is shown by the high percentage of cattle controlled by smallholder farmers compared to that controlled by larger-scale corporate cattle investors. In Indonesia, 90 percent of the cattle business is a small business with traditional rearing patterns (Prasetyo et al., 2015). Smallholders have different views of their cattle enterprise in which they put less importance on the role of beef cattle enterprise as a beef production system. Cattle production systems in Indonesia vary according to the location, with extensive systems are found more in Eastern Indonesia and more commercialized plantation systems in Sumatra and Kalimantan (Waldron et al., 2015). The current production system practiced by smallholder producers faces difficulty in expanding the number of breeding cattle, which in turn hampers the development of a smallholder beef industry in Indonesia.

In Southeast Sulawesi, beef cattle are the fourth most strategic commodity and the first strategic commodity in the livestock sector (Saediman, 2015). Farmers have high interest in raising beef cattle, which are regarded as part of farming. The local government supports the promotion of cattle as one of the sources for household income. The beef cattle population in the province in 2014 is 265,370 heads which increased to 395.684 heads in 2018 (Kementerian Pertanian, 2018). However, farmers still practiced traditional beef cattle production with small cattle ownership, low quality of breeder cattle, and low quality feeds. As a result, the productivity of cattle is low (Diwyanto and Priyanti, 2007).

Given the importance of beef cattle management system in the efforts to improve productivity and quality, this study is designed to ascertain the beef cattle management system of small-scale beef cattle production in Konawe District of Southeast Sulawesi. Information on the existing management system will be useful in the efforts to develop larger-scale and more specialized breeding to expand the number of breeding cattle in Indonesia.

MATERIALS AND METHODS

This research was carried out from August to October 2016 in Anggaberi, Tongauna, and Puriala sub-districts, Konawe District. Konawe is situated between the latitude 2°45' and 4°15' South, and the longitude 121°15' and 123°30' East. The district has a size of 5,799 km² and

consists of 29 subdistricts. The study locations were purposively selected because they were the significant cattle production centers in the district. Respondents consisted of 30 cattle farmers who were selected randomly. Data were collected using the interview method based on the questionnaires. The main data collected were the characteristics of respondents such as age, education level, and farming experience, and the management characteristics of beef cattle production. In this regard, the management characteristics consisted of objectives of cattle rearing, the types of cattle breeds, age and sex of cattle, source of cattle, the number of labors, keeping and feeding practices, reproduction method, and major costs incurred. Data were analyzed using descriptive statistics.

RESULTS AND DISCUSSION

Socio-economic characteristics of respondents

Farmers interviewed were in the age range of 34-59 years old, with an average of 46.5 years old. This finding implies that most cattle farmers were in the productive age. Respondents' household size was 4-5 persons, which is similar to the result in East Java reported by Hanifah et al., (2010). This household size is the same as the average household size for Southeast Sulawesi province (4 persons) (BPS, 2018). Length of involvement in cattle rearing ranged from 5 to 25 years, with an average of 15.0 years. This result agrees to finding by Hasiruddin et al., (2015) that the majority of cattle farmers in Konda sub-district of Konawe District has more than 10 years of cattle rearing experience, but is still less than the cattle rearing experience of 20 years for farmers in East Java as reported by Hanifah et al., (2010). Concerning the education level, the majority (63.3 percent) of respondents had completed senior high school and the remaining 36.7 percent were only until elementary school and junior high school levels, with a mean of 10 years of schooling. This mean year of schooling is higher than that for Southeast Sulawesi Province of 8.9 years (BPS, 2018). This result implies that respondents have a sufficient level of education, which might support their adoption of improved farming practices and technologies.

Objectives of cattle rearing

The primary reasons for farmers to rear cattle were to have cash income, savings, and social security assurance. Farmers consider their cattle as productive assets or savings that can be sold

quickly when they need cash. The cows can have calves meaning that their savings gets higher and has some interest. By selling cattle, farmers will get cash income that can be used to pay for regular expenses and for major outlays such as religious festivities, wedding ceremonies, house renovation, and educational cost of the children. Raising cattle also provides respondents with a financial benefit to cover emergency expenses (e.g., medical costs).

The objectives of raising cattle as a source of cash income and as a kind of saving and social security assurance are in line with the characteristics of rural villagers who mostly do not want to borrow money from banks. They tend to borrow money from informal sources than banks, but usually with high interest rate or with the compensation of their yields to be sold with low price to the moneylenders (Saediman et al., 2019b). In this regard, most farmers prefer to sell their calves to get cash in order not to borrow money from any of those institutions.

Based on the amount of time and labor allocated, cattle raising constitutes only one of the units of farming activities. This is because farmers are also actively involved in low-land rice farming and upland farming. The use of cattle for transport was not common in the study area. Likewise, the use of cattle for draught power was not seen anymore in the study area, as all farmers have used tractors for land preparation of their lowland rice field. This condition is different from that in East Java, where one of the objectives to keep cattle is to provide animal draught power (Priyanti et al., 2012; Nugroho et al., 2013).

Types of cattle breeds

There are six types of major cattle breeds being raised in Indonesia, namely Limousine, Brahman, Simmental, Ongole, Madura, and Bali. In the study area, farmers predominantly raised Bali cattle breeds. This result agrees to a finding of Azwanda et al., (2017) that Bali cattle are the breeds that the farmers commonly rear in Southeast Sulawesi. Bali cattle are native breeds that were originally domesticated from wild bantengs (*Bosjavanicus*) in Java and Bali for hundred years (Sutarno and Setyawan, 2016). Bali cattle are now the most populous cattle with the broadest distribution in Indonesia due to their ability to adapt to the local environment, including the climate, natural fodder, water availability, and resistance to disease (Sutarno and Setyawan, 2016).

Only a few farmers have raised other cattle breeds, such as Simmental and Ongole crossbred, but with low quantity, These cattle were raised for breeding purposes to improve the quality of offspring of native cattle.

Age and sex of cattle

Table1 shows that farmers generally raised bull, cow, and young male and female cattle. The number of cows raised was three heads on average, which is the highest. The average number of young female cattle raised was two heads, whereas bull and young male cattle each with one head. Cows are greater in number because cows are raised to produce calves, whereas the bull can be used as breeder cattle, and can be sold when needed or when there is a buyer.

Table 1: The number of cattle raised according to age and sex

No.	Cattle	Average number (head)	%
1	Bull	1	12.5
2	Cow	3	37.5
3	Male cattle (young)	1	12.5
4	Female cattle (young)	2	25.0
	Total	8	100,0

Source of cattle

Cattle that the farmers have raised generally were obtained from three sources, namely, own cows, purchased from other farmers, and profit sharing arrangement. As can be seen in Table 2, out of an average of eight cattle that farmers have reared, six were obtained from farmers' cows through breeding. The remaining two heads (25 percent) were obtained through purchasing from other farmers and through profit sharing arrangement a few years before.

Respondent farmers are involved mostly in breeding and not fattening. Farmers consider fattening as expensive because they have to spent additional costs especially on feed. Farmers hold breeding cattle mainly to produce calves, which are reared as they looked after the cows. Farmers may sell the calves after they reach certain live weight, or when farmers are in urgent need of cash. They may also sell the calves to fatteners, who are usually the middlemen. Other farmers might also rear the calves under the profit-sharing arrangement.

The profit-sharing arrangement is made without a written sharing contract, but it has been applied smoothly in the study area. Under sharing arrangement, the tenant is responsible for feed

and any other expenses that may arise during the cattle rearing, and will get the first off-spring. The cattle's owner will get the second off-spring. The cattle for sharing is usually obtained from the better-off farmers in the village.

Table 2: The average number of cattle according to their sources

No.	Sources	Quantity (head)	%
1 2 3	Own cows Purchased from other farmers Profit sharing arrangement	6 1 1	75.0 12.5 12.5
	Total	8	100.0

Number of labors

Labors used in beef cattle production system were all from family labors as they are available from each household. Therefore, there was no cost needed to pay for hired labor. All respondents used two family labors to take care of the cattle every day. Hasiruddin et al. (2015) also reported the use of two family labors in the beef cattle production in Konda sub-district, South Konawe District, Southeast Sulawesi. One labor cut-and-carry fodders and fed the cattle. Another one takes care of the cattle and cleans the cattle and the shed. This division of tasks was flexible, in which one can exchange the tasks depending on the agreement and their activities.

Cattle farmers in the study area entirely rely on family labors to carry out cattle production activities. While input utilization is very low, labor is the only significant input provided by farmers in the beef cattle production. In general, family labors are involved in all activities in beef cattle production, covering fodder collection, feeding and watering cattle, herding, and cattle health and shelter maintenance (Kapa et al., 2018). However, the amount of labor utilization depends on the management system applied. For example, in the intensive management system, significant labor allocation should be provided for collecting feed or fodder. In the tethering management system, significant labor allocation is provided to herding and fodder collection. In the mini-ranch system, labor allocation is less than the other two management systems.

Family labor allocation in the cattle rearing is high, especially during the dry season. Farmers have to collect fodders from river banks, forests or other fallow land areas which are relatively far from their homestead or from where their cattle are tethered.

Keeping and feeding practices

Cattle production system in the study area can be classified into three categories, namely tethering, intensive, and mini-ranch systems. As shown in Table 3, the majority (40.0 percent) of respondents practiced intensive system, 26.7 percent used tethering system, while 33.3 percent practiced the mini-ranch system. The tethering system requires the cattle to be taken out in the morning and tethered to stakes where they can graze on pastures until afternoon. These cattle are brought back to their simple sheds near the homestead, where they are also tethered for security. Anyanwu et al., (2002) reported that the majority (96.25 percent) of muturu cattle farmers in Ezza, Izzi, and Ohaukwu Local Government Areas in Ebony State, Nigeria, practiced the tethering system. The majority (69.35 percent) of the muturu farmers in AkwaIbom State were also reported to practice this tethering system (Umoh et al., 1998).

Mini ranch system is practiced by ten farmers or 33.3 percent of respondents. In this management system, the animals are confined to private fenced grazing land, where they almost get their entire feed intake from pastures. Farmers who practice ranch system were those who owned a sufficiently large area of land. The average owned grazing land was 2-5 ha which enabled cattle to graze. In this ranch system, the farmers put their cattle on the fenced pasture area and came only once a day to provide drinking water and supplemental feed, to check if any of the herd get pregnant, and to count the number of cows to ensure no cows have been lost. Inside the ranch cattle are not given any extra feed. Thus, this system requires large size of land.

In the intensive management system, the cattle are put in the pen and are fed on fodder cut from the roadside, fallow land, riverbanks, and communal areas where grasses and green vegetation are abundant. Twelve respondents or 40.0 percent practiced the intensive production system.

Table 3: Number of respondents according to cattle keeping strategies

No.	Keeping strategies	Cattle farmers	%
1 2 3	Intensive system Tethering system Mini ranch system	12 8 10	40.0 26.7 33.3
	Total	30	100.0

The types of feed provided usually consist of grasses, forages, rice straw, and crop residue. In this regard, cattle are fed and provided with drinking water twice a day regularly, with the food

quantity is based on the cattle weight. Besides, the pen should be regularly cleaned in order for cattle waste and forage waste not to become a source of diseases for the cattle.

Reproduction method

Concerning the breeding method, respondents used natural mating (43.3 percent) as well as combination of natural mating and Artificial Insemination or AI (56.7 percent). Natural mating is done with the bull that the farmers have kept in their pens or mini-ranch. It may also occur when the animals are grazing in the pasture. Natural mating is free and easier to access. Therefore, many farmers still do natural mating despite the availability of AI. In recent years AI is increasingly accessible to farmers as the government promotes its application through UPSUS SIWAB (*Upaya Khusus Sapi Indukan Wajib Bunting* or Special Efforts of Mandatory Cattle Pregnancy) program. The program uses AI as the primary method to increase the cattle population with the main aim to realize beef self-sufficiency in 2026.

The use of natural mating with the bulls as the mode of cattle breeding is practical from the farmers' viewpoints with some reasons specified above. However, some problems associated with natural breeding include, among others, a limited number of superior male breeder cattle, lack of farmers' ability to deal with cattle breeding, and traditional maintenance system (Atmakusuma et al., 2014). Therefore, the government has attempted to encourage the use of Artificial Insemination (AI) to increase the local cattle population (Sutarno and Setyawan, 2016). However, the application of artificial insemination is often constrained by the lack of access to information and technology, affordability of the cost, bureaucracy procedures (Prasetyo et al., 2015), and lack of farmers' interests and understanding.

Major costs incurred in cattle rearing

Cattle rearing requires some costs, consisting of fixed cost and variable cost. However, costs in cattle rearing can be kept to the minimum amount because farmers use family labors and take the fodder themselves from the roadside, fallow land, riverbanks, or crop farming. Labor cost was not included in the cost calculation since farmers use their family members to carry out rearing activities. Fodder was also not included in the production cost because respondents did not pay at all to obtain it. Besides, respondents seldom used the supplement and bought concentrates because it was considered expensive.

Table 4 shows that the intensive management system requires the highest amount of cost, namely, Rp220,625 per head per year. The cost of the tethering system is Rp93,750 per head per year. The mini ranch system uses the lowest cost, which is only Rp80,000 per head per year.

Table 4: Major cost components in cattle rearing, 2016

No.	Cost per head per year	Average amount (Rp)	%
1	Intensive system: Supplemental feed - Veterinary - medicines - Depreciation	30,000 50,000 <u>140,625</u> 220,625	13.6 22.7 <u>63.7</u> 100.0
2	Tethering system: Veterinary medicines - Depreciation	18,750 <u>75,000</u> 93,750	20.0 <u>80.0</u> 100.0
3	Mini ranch system: - Veterinary medicines - Depreciation	21,250 <u>58,750</u> 80,000	26.6 73.4 100.0

The high cost in the intensive management system is due to two major cost components, namely, veterinary medicines and depreciation of pen. In the tethering system, the item with a high cost is shed depreciation. In the mini ranch, the item with a high cost is depreciation of the fence. Fence from wood or wire to enclose the ranch can reach some hundred meters long, depending on the size of the ranch.

Some studies provide a calculation of the income that farmers received from cattle production. The average monthly net returns from cattle production in Tongkuno sub-district of Muna District in Southeast Sulawesi is Rp495,536 (Lasahudu et al., 2017). In Konda sub-district of South Konawe District, the monthly net returns is Rp603,836 (Sahiruddin et al., 2015). Both results are much below the average net returns from rice production (Saediman et al., 2019d), cocoa (Jusmanto, 2017), patchouli (Wulandari et al, 2018), clove (Asniar, 2014), pepper (Mahardika et al., 2018), palm sugar processing (Saediman et al., 2019c). These low levels of returns show that a beef cattle keeping is only a supplementary job for farmers. Beef cattle keeping provides a more stable income for the farmers without disrupting other livelihood activities.

CONCLUSION

This study sought to find out the management characteristics of small-scale beef cattle production in Konawe District of Southeast

Sulawesi. Farmers were involved in cattle rearing with the objectives to have cash income, savings, and social security assurance policy. Most cattle that farmers have raised were Bali cattle. Each farmer kept eight cattle on average, consisting of three cows, two young cattle (female), one young cattle (male), and one bull. Cattle were sourced from breeding, purchasing from other farmers, and profit-sharing arrangement, with breeding being the main source. The breeding was done through natural mating and Artificial Insemination. Farmers did not employ hired labors; they used two family labors to take care of all operations in cattle production. The cattle production system consisted of tethering, intensive, and mini-ranch system. The intensive system required the provision of supplemental feed to the animals so that the amount of costs was higher than that in the two other production systems.

CONFLICT OF INTEREST

The authors declared that present study was performed in absence of any conflict of interest.

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AUTHOR CONTRIBUTIONS

All authors have made equal contribution in this study, and have reviewed and approved this article.

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