

Research Article

Production System, Herd Size and Productivity of Local Goats in Liquiçá Municipality, Timor-Leste

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Abstract

The goat is a species of small ruminants that has great potential in the development of its production. The aim of this study is to obtain basic data on the rearing system used by the breeders, herd size and productivity of goats kept only in a traditional subsistence production system. Data collection period starts on September 20 to December 20, 2018 or is carried out for three months. This study used the survey method and in the process of determining the research site used the intentional sampling. In determining the sample size, Slovin was used, and to determine the respondents, it used the simple random sampling method. The observed variables are herd size, herd structure, gestation period, litter size, weaning age, first giving birth, reproduction ratio and production system. The results of the research showed that all farmers who had been as the respondents generally still used the traditional extensive system, did not pay attention to the problem of feed quality and frequency of feeding; only using local feed as animal feed. alternative supplementary, does not handle the problem of reproduction ratio well, the gestational age of the goats is still normal, the litter size is low, mostly only 1-2 heads per birth, the mortality rate is low at 1%, the age at first calving is 12 months and the weaning age young goats are generally 3months - 6 months. It is recommended to improve the maintenance system with good management to increase the productivity of local goats.

Keywords: Local goat; Production system; Herd size; Productivity

Introduction

The development of animal production is often used as one of the other main targets in an effort to provide highly nutritious food to consumers, in the context of reducing hunger and malnutrition through the provision of animal protein-based foods. The goat is a species of small ruminants that has great potential in the development of its production, as it has adapted to the environment and the existing local food. Local goats in Timor-Leste were raised by 158,467 heads of households and in Liquiçá municipality around 15,096 heads of households were raised, which represents around 9.52% of the total heads of household at the national level. In the process of raising goats (Liquiçá in Number, 2015). The breeders generally still do not care about the rearing system, herd size, and animal productivity, so that, negatively affecting the development process and the effort to improve the quality of animal production. It is estimated that local goats in Timor-Leste originate from goats in Indonesia and that they crossed land borders and began to be recognized and raised by the community, especially by farmers in the territory. In the effort to achieve high product performance, it is necessary to improve the rearing system, the reproduction ratio, the quality of food and technical assistance, especially to the problem of goat reproduction,

in order to reduce as much as possible, the interval between births. According to [1], the factors that influence the productivity of goats are race, age, production frequency, nutritional needs and duration of gestation. Good management can be applied in goats, it is very likely to regulate the young goats weaning age at the right calving interval, thus, it is estimated that it can give birth twice in a year and a half, however, it should provide a good treatment, especially the food quality. Basically, goat breeders in rural areas have two important goals, namely to maintain social status as respected people and as mistresses in the family. Basically, goat breeders in rural areas have two important goals, namely maintaining social status as respected people and as saving in the family. The goats they raise on a small scale can be sold if they need money for household purposes. The aim of this study is to obtain basic data on the rearing system used by the breeders, herd size and productivity of goats kept only in a traditional subsistence system at the study site.

Materials and Methods

Description of the research area

Liquiçá municipality is one of municipalities in the Timor-Leste nation, located in the Southeast Asia. Occupying half the island of Timor is ringed by coral reefs teeming with marine life. Liquiçá municipality is located in the northern coast of the country, about 32 km west of Dili, the capital of Timor-Leste. It is bounded in the north and the west by the Savu Sea, on the south by the municipality of Bobonaro and Ermera and the east by Dili. Global Positioning System (GPS) coordinates of Liquiçá: Decimal Degrees (DD) coordinates: -8.5875 125 34194 and Degrees/Minutes/Second (DMS) coordinates: -8°35'15.00" S 125° 20' 30.98". Topography - most of the area is mountainous, rugged and undulating, discontinuous by a steep valley, mostly located in the middle, and a mountain range that extends from West to East. The research data collection period starts on September 20 to December 20 2018 or is carried out for three months.

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Sample size estimation

This study used the survey method with case study techniques, including interviews with goat owners as respondents and carried out direct observation of the object under study, including the rearing system, feeding method, frequency and the quality of food provided. In the process of determining the research site used the intentional sampling method based on secondary data from the 2015 head household Census of Liquiçá municipality. In determining the sample size, Slovin was used according to the recommendation of [2] with the following formula:

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

where:

n= Total smple (head household as respondente) N=Total population (goat farmer) d² = Desired percentage (in this research, we determined 10% of the population).

A total number of farmers households who were concentrated in the municipality of Liquiça out of a total of 46.154. Therefore, the formula is as following:

$$n = \frac{46.154}{1 + 46.154x(0.1)^2} = 99.78 \approx 100$$

According to Slovin's formula, we have at least one hundred (100) goat's breeder's household as respondents. Therefore, the minimum sample or total of respondents that must be interviewed and observed in this study at least one hundred (100) respondents. However, to get the maximum data, two thousand and three (2003) goats breeders were interviewed as respondents in this study. To determine the respondents, it used the simple random sampling method with the intention that all producers registered in the municipality of Liquiçá had the same opportunity to be selected as respondents.

Observed variables

The variables were interviewed and observed in this research, such as herd size, herd structure, gestation period, litter size, weaning age, first giving birth, reproduction ratio, production system, and mortality rate, and the type of supplementary feed most used.

Interview method

The interview method used in this research is to meet directly with respondents and use semi-structured questionnaires that were designed to obtain primary data. Questionnaires are a very important material in survey research to obtain the necessary information, to be processed and analyzed according to each variable that wants to measure and observe. The interview is a technique used to ask questions carefully so that the interviewee, possibly, provides accurate information according to the researcher's wishes. The conception is the implementation of a survey is a process whose objective is the collection of thematic, valid, and reliable information, obtained from the individual answers given to a set of questions by a representative group of respondents, which produced. Conclusions that can be generalized to the universe of the study population Thayer-Hart et al. [3].

Data analysis

The data obtained in this study were coded, tabulated, and subjected to descriptive statistical analysis according to [4], using the

SPSS program, Version 25, to determine the mean, mode, standard deviation, standard error and relative percentage of each variable observed according to with the objectives of the study.

Result and Discussion

Production system

Based on the results of observations and interviews, it shows that about 90% of the total respondents still use the subsistence system. This system greatly affects the productivity and quality of local goat production because it does not pay attention to the quality of feed, reproductive control, and the health of the goats that are kept. The factors that encourage farmers to continue using the system are because it is considered easy and does not require high production costs, as well as technical assistance in the process of raising goats. However, the breeding system adopted by breeders at the research site is still very simple and primitive, causing low goat production According to Murdjito et al. [5], that breeders who have small capital only keep goats on a small scale, which is around 2-7 heads so that production is low. Mardikanto [6] states that the more goats owned by the breeder will affect the way of thinking to accept and adopt new innovations in their livestock production.

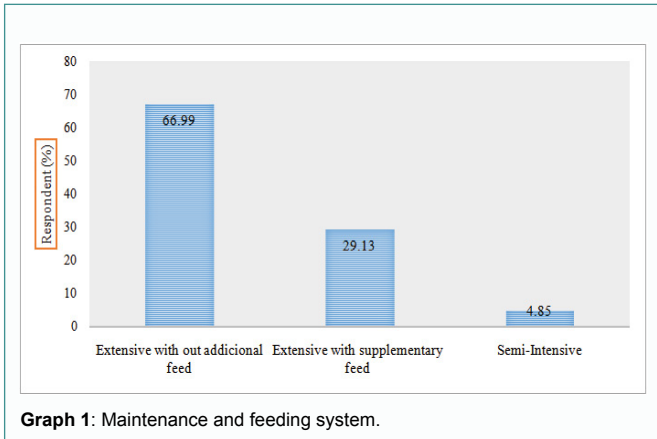
In addition, basically, goat farming activities are still classified as secondary activities from other agricultural activities. The system and handling of goats, especially in maintenance and feeding, is as shown in Graph 1.

Goat feed resource and availability

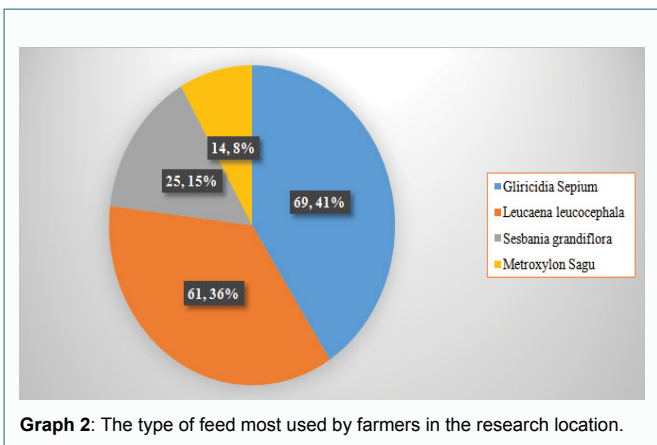
The feed resource and availability in research area is shown in Graph 2. In general, goat farmers at the research site state that they use only local types of feed resource to provide additional feed to the animals. The types of energy and vegetable protein feed sources that are provided as additional animal feed. Local feed production, especially the type of feed for legumes, is very potent and its growth and development are very good and sustainable. However, due to the limited knowledge of farmers, feed utilization was not maximized to increase goat production. About 90% of respondents stated that according to their knowledge, good feed for goats is classified into three types, namely field grass, young leaves, and sago, as well as separate feeding methods to maximize feed efficiency. The farmers stated that there is no need to pay attention to the nutritional problems of the feed because the purpose of keeping goats is for a long period and can sell or slaughter when needed. Whereas goats really need energy, protein, vitamins, minerals, fiber, and water to live and produce properly. Nutritional needs for goats in generally not the same or different between nations but the implementation always refers to a list of tables that have been available for livestock conditions in the Asian region, even though the agro-climate is both tropical Saniapar et al. [7], therefore, the results of the observations in the research indicate that there is a need for technical assistants, especially with regard to advising and transferring new technologies in intensive livestock farming, but with a reduction in production costs so that can be achieved by rural producers.

Herd size, herd structure and reproduction ratio

According to the results of the study, it was found that the size of the goat herd in each head of the household was 2 to 16 heads with an average of 7.98 ± 2.84 heads per breeder. Goat size calculation is performed during the dry season, namely in April or at the end of the rainy season, as ruminant productivity is highly dependent on feed quantity and quality. In April, the availability of food is high enough



Graph 1: Maintenance and feeding system.



Graph 2: The type of feed most used by farmers in the research location.

to increase the production of goats, which is one of the factors that determine the size of the herd. The results of the observations show that basically the producers do not know a good way to maintain the size of the herd, mainly in the summer period. According to Sabrani et al. [8], the development of livestock production is very dependent on social life, the economy and the will of producers in the activity of raising animals. In the goat population structure, the results showed that there were differences in the number of goat population structures in each breeder. Basically, it can be classified according to age, namely kid of goats aged 1-3 months, young goats aged 4 to 7 months, and adult goats aged 7 months and over. The results of the analysis showed that of the total goats owned by farmers who were used as respondents, the herd structure was as follows: kid of goats 22.71%, easy goats 24.57%, and adult goats 52.71% of the total goats observed the proportions of physiological status and sex were classified into two groups as shown in Table 1.

In accordance with the results of the classification in Table 1, it can be seen that the highest percentage of adult goats is 55.72%, meaning that from March to April the goat structure is still stable, without additional stock, for reasons of no disturbance such as illness, loss, and theft. The sex ratio is still in accordance with the needs because several male goats can be sold to meet the economic needs of the family. The number of goats that have been observed as many as 1294 goats with details of 271 male goats and 573 female goats with a sex ratio of 1:2 (1 male goat versus 2 female goats). This result is not the same as the recommendation from [9] that to get a good goats production, the reproduction ratio should be 5:16 (5 male goats compared to 16 adult female goats) or 1 male goat can serve 3-4 female goats.

Goats productivity

The results of the descriptive statistical analysis of goat productivity for each variable observed in this study, consisting of mean, standard deviation, mode and percentage are shown in Table 2. These results of this study indicate that local goats kept in traditional subsistence production systems show low productivity.

Gestation Period: Based on the results of the descriptive statistical analysis presented in Table 2, it appears that the gestation period of the local goat in the municipality of Liquiçá is 5.55 months, the fastest and the longest being 5.69 months. About 43.40% of the total respondents stated that the goat's gestation period was normally around 5 months. According to Elieser et al. [10], the normal gestation period for goats is 144.90 - 150.94 days or about 4.83-5.09 months.

Litter size: The results showed that the litter size of the local goats at the study site was at least 1.11 and the largest was 2.79 with a mean of 1.95 ± 0.08 . This means that the litter size is 1-2 heads and can reach 3 heads, although this is rare. According to [11] that normally a goat can produce 2 heads per calving, although there are also goats that can produce 4 to 5 heads in one calving, which rarely happens. The results of this study do not differ much from the findings of [12] that a goat can produce 1.31-2.69 offspring, with an average of 2.0 ± 0.88 per birth.

Mortality rate: The results of the descriptive statistical analysis showed that the percentage of goat deaths from birth to weaning was 1.24% - 1.5%, and about 39.60% of those interviewed stated that the number of goats that died in general was 1 per calving. Goat deaths occur due to lack of technical control, poor feed quality, lack of cages for safe shelter for goats and lack of attention from producers. Thus, mortality is one of the most dangerous factors in animal production. According to Utomo et al. [13], the mortality rate in goats can reach 3.95% - 5.77% per birth. The existence of the high mortality rate is probably due to the fact that older pregnant mothers in extensive maintenance do not receive enough nutrients, with a wild grazing system the feed obtained is only grass, and this is considered insufficient because in semi-intensive and intensive maintenance the feed provided is quite good in terms of quality.

First giving birth: On the parameter of first calving age, the results of descriptive statistical analysis showed that female goats that were kept extensively at the study site generally gave birth for the first time at the age of 10.65 - 13.23 month or with an average age of 11.94 ± 1.29

Table 1: Classification based on the physiological status and sex of the goat.

| Classification | Total Goats | Percentage (%) |
|----------------|-------------|----------------|
| Young: ♂ | 203 | 15.69 |
| ♀ | 370 | 28.59 |
| Adults: ♂ | 271 | 20.94 |
| ♀ | 450 | 34.78 |
| Total | 1294 | 100 |

Obs.: ♂= male; ♀= female

Table 2: Productivity of Local Female Goats in Liquiçá Municipality, East Timor.

| Characteristics | Mean \pm (Se) | Mode | Percentage (%) |
|----------------------------|------------------|------|----------------|
| Gestation period (month) | 5.62 ± 0.07 | 5 | 43.4 |
| Litter size (goat) | 1.95 ± 0.08 | 2 | 53.8 |
| Mortality rate (%) | 1.37 ± 0.13 | 1 | 39.6 |
| First giving birth (month) | 11.94 ± 0.12 | 12 | 61.3 |
| Weaning age (month) | 4.61 ± 0.07 | 6 | 46.2 |

months. However, 61.30% of the total respondents stated that female heifers generally give birth for the first time at the age of 12 months. The results of this study are considered better when compared to the results of the research of [14] which states that female goats can give birth for the first time at the age of 15 months - 18 months with an average litter size of 1.57 per birth.

Weaning age: In accordance with the results of interviews, the weaning age of young goats occurred in the age range of 4 months - 6 months with an average of 5.06 ± 1.03 months. Of the total respondents interviewed, around 46.20% stated that in general, young goats can be weaned at the age of 6 months. Recommends that weaning can occur naturally at the age of 3 - 6 months, because at that age the young goats are able to find their own food [15]. According to [16], when weaning young goats, it is also necessary to be aware of live weight, as there is a very close relationship with its development and survival in the future. As related by [17] that goats will grow healthy if their body temperature is around 39.5°C - 40.5°C , heart rate is 70-80 per minute, and breathing rate is 12-13 times per minute.

Conclusion

The results of the research on the production system, livestock size, livestock structure, and goat productivity showed that all farmers who had been as the respondents generally still used the traditional extensive system, did not pay attention to the problem of feed quality and frequency of feeding, only using local feed as animal feed. alternative supplementary, does not handle the problem of reproduction ratio well (1:2), but the gestational age of the goats is still normal, the litter size is low, mostly only 1-2 heads per birth, the mortality rate is low at 1%, the age at first calving is 12 months and the weaning age young goats are generally 3 months - 6 months.

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