

Goat Production Systems In Covalima, Timor-Leste, As Perceived By Farmers

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Abstract

The goat is a species of small ruminant that has great production potential in Timor-Leste. The objective of this study is to obtain data on the rearing system that are commonly adopted by goat breeders, herd size, and goat production raised in a subsistence rearing system. The data collection period started from August to November 2021. The survey method was used in this study. To determine the sample size, Slovin's method was used, and, to determine the respondents, simple random sampling was used. The variables observed were herd size, herd structure, gestation period, litter size, age at weaning, age of first kidding, mortality rate, and production system. The survey results showed that all the producers interviewed generally still use the traditional extensive system, not worrying about the problem of feed quality and frequency of feeding the animals. Using only local feed as a complementary alternative to animal feed, and does not deal well with the problem of reproduction rate, the gestational age of the goats thus makes the number of litters low, only 1 to 2 heads per kidding. However, the mortality rate is low, about 1% per kidding; the age at first kidding is about 12 months and the weaning age of the pups is 3 to 5 months. It is recommended to improve the breeding system with good management to increase the productivity of the goats in the future, so that can bring high benefit benefits.

Keywords: *Local goat, production system, herd structure, productivity.*

Introduction

The development of animal production is often used as one of the other main target 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 can easily adapt to its environment and the existing local food. Local goats in Timor-Leste were raised by 158,467 households and in Covalima municipality around 2,164 households raised goats, which represents around 1.37% of the total household at the national level. In average there are about 3 to 4 goats per household (Covalima in Number, 2018). The breeders generally still do not care about the rearing system, herd structure, and productivity that, negatively affects the development process and the effort to improve the quality of goats production. It is estimated that local goats in Timor-Leste originate from goats in Indonesia. It is believed that

they crossed land borders and began to be recognized and raised by the community, especially by farmers in the border areas.

There are some systems that need to be improved if breeders want to achieve high performance production. In the effort to achieve high performance of production, it is necessary to improve the rearing system, the reproduction ratio, the quality of food, and technical assistance. This is aimed especially to solve the problem of goat production and reproduction, to reduce as much as possible, the kidding interval.

There are several factors that affect the goat productivity. According to Susilawati (2008), the factors that influence the productivity of goats are race, age, production frequency, nutritional needs, and duration of gestation.

Good management can be applied into goats to improve their production system. This can be done by regulating the young goats weaning age at the right kidding interval to increase kidding rate. It is estimated that by this act alone, it can help goats to

give birth twice in a year and a half. However, the goat should be provided with good treatment, especially the quality food and be raised with modern production system.

Generally, goat breeders in rural areas have two important goals in breeding animals. These are maintaining social status as respected people and as living bank for families. As the living bank, goats raise on a small scale can be sold by farmers if they need to fund household. This study aims to obtain basic data on the rearing system used by the breeders, herd structure and productivity of goats kept only in a traditional subsistence system at the study site.

2. Materials and Methods

2.1. Description of the research area

Covalima is a municipality of Timor-Leste. It is located in the Southwest part of the country. It has an area of 1230 km². The capital of the municipality is Suai, which lies 136 km from Dili, the national capital. There are six administrative posts of Covalima. These are Fatululic, Fatumean, Fohorem, Zumalai, Maucatar, Suai and Tilomar. Covalima borders the Timor Sea to the south, the municipalities of Bobonaro, to the north, Ainaro to the east, and the Indonesian province of *Nusa Tenggara Timur* to the west (Timor-Leste household Census, 2015). This research was carried out in two administrative posts namely Zumalai and Suai for three month. In Zumalai, two villages were taken as research sites namely village of Tazhilin and Fatu-Letu and in Suai, four villages, namely village *Akarlaran*, *Camanasa*, *Debos* and *Suai Loro*.

2.2. 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 sites, purposive sampling method was used based on secondary data from the Agricultural Census (2019), especially the results of the Covalima census. In determining the sample size, Slovin's method was used according to the recommendation of Sugiyono (2014) with the following formula:

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

where:

n= Total sample (head household as respondents)
N=Total population (goat farmer) d²= Desired percentage (in this research, we determined 10% of the population). A total number of farmers (breeders) households who were concentrated in the municipality of Covalima out of a total of 2164. Therefore, the formula is as following:

$$n = \frac{2164}{1 + 2164 \times (0.1)^2} = 95.58 \approx 100.$$

According to Slovin's formula, we have at least one hundred breeders' 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. To determine the respondents, simple random sampling method was used to allow all producers registered in the municipality of Covalima have the same opportunity to be selected as respondents.

2.3. Observed Variables

There are 9 variables analyzed and observed in this research. These variables are herd size, herd structure, gestation period, litter size, weaning age, first giving birth, reproduction ratio, production system, and mortality rate.

2.4. 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 we want to measure and observe. The interview is a technique used to ask question carefully so that the respondents can provide accurate information according to the researcher's objectives. The implementation of a survey is a process whose goal is to collect relevant, valid, and reliable information from individual responses to a set of questions provided by a representative group of respondents, resulting in conclusions that can be applied to the entire study population (Thaeyer-Hart, et al., 2010).

2.5. Data Analysis

The data obtained in this study were coded, tabulated, and subjected to descriptive statistical analysis based on Hill and Hill (2012), 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.

3. Result and Discussion

3.1. Production System

Most goats breeders in Covalima adopt all the three breeding system but most of them adopt extensive breeding system. Based on the results of observations and interviews, it showed that there are about 36% of the total respondents still use the extensive production system, 40% used the semi-intensive production system, 13% use the conventional intensive production system and 11% use the subsistence production system. The application of an extensive, a semi-intensive and a subsistence production system greatly affects the productivity and quality of local goat production. This is because in these three systems, farmers do not pay attention to the quality of feed, reproductive control, and the health of their goats. There are at least three factors that influence farmers to continue adopt extensive, semi extensive and subsistence system. First, these systems are considered easy and secondly they do not require high production costs and thirdly, these systems do not require technical assistance in the production system. As the result of these adoption systems, the goats production is low. This low production is also related to the number of goats farmers raised or kept. According to Murdjito et al. (2011), 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 (2009) states that the more goats owned by a breeder will affect the way of thinking to accept and adopt new innovations in their livestock production. Another factor that contributes to the low production of goats is that goat farming activities are still classified as secondary activities from other agricultural activities.

The production system and handling of local goats is as shown in figure 1. The description of age, experience as a goat farmer and family member who participates in the farmer's activities is presented in Table 1.

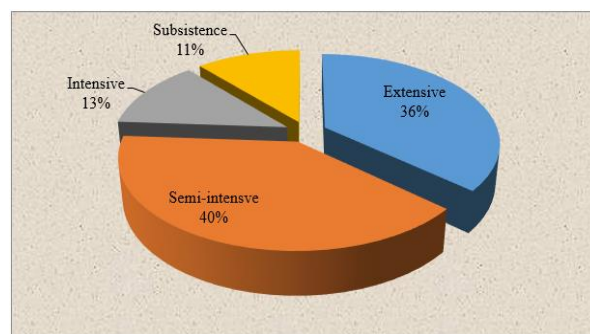


Figure 1. Goats Production system in the Municipality of Covalima, Timor-Leste

Table 1. Description of age, experience and family member of respondents (n=100)

Variable	Minimum	Maximum	Average	SEM	Mode	Frequency	% Valid
Age (year)	22	79	48.06	1.35	40	7	7
Experience (year)	4	56	24.18	1.25	20	12	12
Family member	2	10	5.57	0.18	4	21	21

The results in Table 1 showed that producers started raising goats between 22 and 79 years old, more often at 40 years old. On the other hand, about 88% of breeders with more than 20 years of experience in this activity have the participation of 2 to 10 family members, although this activity is still considered only as a secondary activity of the family. Age and experience can be considered as supporting in the agricultural activities. The productive age is a natural force and the greatest experience is a resource capital that is not exhausted in human life. The number of family members who participate in agricultural activity determines the workforce of the same family, which contributes to reducing the cost of labor in agricultural production. In the decision-making process to stay or leave as a farmer, it is usually a process of collecting, interpreting and analyzing alternatives, often incomplete, whose result is the making of a satisfactory and not optimal decision. In this sense Pinto (2010) present four orientations of rural producers' decisions, namely: instrumental, social, expressive and intrinsic orientation, which the farmer acts with satisfaction, enjoys outdoor agricultural work, values hard work and independence in decision.

3.2. Description of the Level of Education of Interviewee's

The result of the study showed that there was a variation in the level of education of the respondents, is described in **Figure 2**. It is noticed that the variation in the level of education from literacy to university education. In the municipality of Covalima, about 60% of respondents still had no

level of education or literacy. So that, the level of the respondents' can also be considered as one of the factors that interfere with changes in attitudes and productivity in agricultural activities, due to the lower capacity in the process of absorbing technologies for the improvement of dedicated activities. In general, people with less knowledge in specific areas find it difficult to increase their capacity and update their knowledge daily to facilitate the activities in which they are dedicate. The productive value of education has its roots in two different parts: a higher level of education can allow the producer to get more with the resources at hand; this is called the worker effect. Thus, the marginal product of education, measured by the production function, is the worker effect and the second, to be distinguished, is the allocator effect. According to Sobourin (nd) people with a higher level of education can increase the producer's ability to acquire and codify information about new inputs and costs, facilitating the donation of new production factors and consequent modernization.

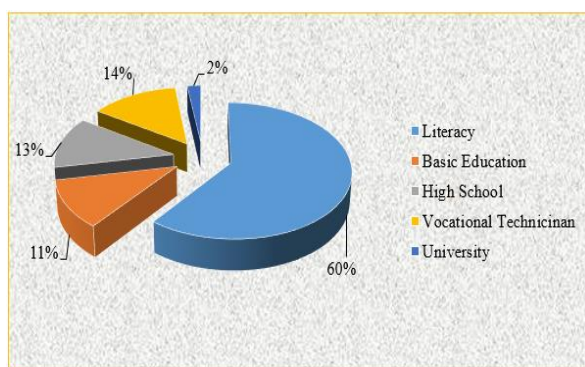


Figure 2. Description of education of the interviewee's

3.3. Herd Size, Herd Structure and Reproduction Ratio

According to the results of the study, it was found that the size of the goat herd was 4 to 16 heads with an average of 7.98 ± 2.84 heads per group. 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 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. (1995), 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 2.

Table 2- Classification based on the physiological status and sex of the goat

Classification	Total Goats	Percentage (%)
Young: bucks	92	24.42
does	135	20.35
Adults: bucks	70	29.07
does	145	26.16
Total	445	100.00

In accordance with the results of the classification in Table 1, it can be seen that the highest percentage of adult goats (bucks and does) is 55.23%, 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 bucks can be sold to meet the economic needs of the family. The number of goats that have been observed as many as 495 goats with details of 215 bucks and 280 does with a sex ratio about 1:2 (1 buck versus 2 does). This result differs from Mulyono's (2012) proposal that for excellent goat production, the reproduction ratio should be 5:16 (5 bucks to 16 adult does), or one buck can serve 3-4 does.

3.2.2. 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.

Table 2. Productivity of Local Does in Covalima Municipality, Timor-Leste

Characteristics	Mean \pm (Se)	Mode	Percentage (%)
Gestation period (month)	5.60 \pm 0.07	5	43.40
Litter size (goat)	1.85 \pm 0.20	2	53.80
Mortality rate (%)	1.27 \pm 0.12	1	39.50
Age at first kidding (month)	12.94 \pm 0.12	12	59.30
Weaning age (month)	4.61 \pm 0.70	7	39.20

3.2.3. 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 Covalima is 5.53 months, the fastest and the longest being 5.67 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. (2012), the normal gestation period for goats is 144.90 - 150.94 days or about 4.83-5.09 months.

3.2.4. Litter Size

The results showed that about 53.80% of total respondents stated that the litter size of the local goats at the study site was at least 2 per kidding and the mean of the litter size is 1.85 ± 0.20 . This means that the litter size is 1.65 to 2.05 heads per kidding. According to Subandryo (1995) that normally a goat can produce 2 heads per kidding, although there are also goats that can produce 4 to 5 heads per kidding, which rarely happens. The results of this study do not differ from the findings of Sarwono (2011) that a goat can produce 1.31-2.69 offspring, with an average of 2.0 ± 0.88 per birth.

3.2.5. Mortality Rate

The results of the descriptive statistical analysis showed that the percentage of goat deaths from birth to weaning was 1.15 - 1.39%, and about 39.60% of those interviewed stated that the number of goats that died in general was 1 per kidding. Goat deaths occur due to lack of technical control, poor feed quality, lack of yard 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. (2005), the mortality rate in goats can reach 3.95 - 5.77% per kidding. The existence of the high mortality rate is probably due to the fact that older pregnant does in extensive maintenance do not receive enough nutrients, with a field grazing system, the feed obtained by goats 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.

3.2.6. Age at First Production

On the parameter of first kidding age, the results of descriptive statistical analysis showed that does that were kept extensively at the study site generally giving the first kidding at the age of

12.82 - 13.06 months or with an average age of 12.94 ± 0.12 months. However, 59.30% of the total respondents stated that young does generally giving first kidding at the age of 12 months. The results of this study are considered better when compared to the results of the research of Setiadi (2001) which states that does can give first kidding at the age of 15-18 months with an average litter size of 1.57 per kidding. This of course assumes that the report from the respondents is accurate.

3.2.7. Weaning Age

In accordance with the results of interviews, the weaning age of young goats occurred in the age 4 to 5 months with an average of 4.61 ± 0.70 months. About 39.20% respondents stated that in general, young goats can be weaned at the age of 6 months. Mulyono (2003) 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. According to Sulastri (2001), 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.

4. Conclusion

The data from this study revealed that all of the respondents continued to use the previous extensive method and paid little attention to the issue of feed quality and frequency of feeding. As a result, litter sizes are tiny (only 1-2 heads each birth) and farmers struggle with the reproduction ratio (1:2) problem. Despite this, the goats' gestational age is normal, their death rate is low (less than 1%), their age at first kidding is good (12.82 to 13.03 months), and their age at weaning is better than usual (generally 3.91 to 5.31 months).

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6. Conflict of Interest Declaration

We certify that there is no conflict of interest with any financial organization regarding the material discussed in the manuscript.

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