



Identifying Pastoral Range for Goats as Local Feed Resources in Selayar, Indonesia

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Abstract

Basically, livestock development is intended to utilize and manage natural resources such as land, feed, and the other factors. The aim of this study was to identify the potential of pastoral range as local feed resources for goats. This study was conducted in Selayar Regency, Indonesia during a period of one year; from July 2015 to June 2016. Data was classified into two; primary data and secondary data. Primary data was obtained using survey methods through direct interview to the farmers as respondents with the help of a questionnaire. Number of respondents interviewing in the present study was at least 10% of the total farmers at each location and they were randomly chosen. In addition, primary data was also collected by direct observation. Focus group discussion was performed to the farmers that related to their land, number of animals, and the characteristic of the farmers. Secondary data was obtained from related institutions as well as other supporting data such as study reports and references that related in this study. The results of this study showed that the pasture in Selayar Island is still natural, whereas in the pastoral range, the proportion of grass is relatively low in comparison to legume and other plants (11% vs. 24% and 65%). This condition is in line with the goats' raising management by the farmers; whereas raising management of the goats were mainly free in the day-time and return back to the house or simply tied at around the owner's house (68.8%). Nevertheless, chance to improve the pastoral range especially the quality and quantity of forage production are still possible as well as chance to increase the population of goats.

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It can be concluded that the pastoral range for goats as local feed resources in Selayar Island is still sufficient enough for current population of goats. Since the pastoral ranges in this region are still natural, it is a great potential for improving the botanical composition in the future that are suitable for goats feeding. This suggests that this region has possibility to develop and increase the population of goats in the future.

Keywords: Pastoral range; Grass; Legume; Plant.

1. Introduction

Basically, livestock development is intended to utilize and manage natural resources such as land, feed, and the other production factors; for example labor and capital. In Indonesia, especially in villages region, livestock development is directed to increase the farmers' income, providers of labor, and consumption as well as capitalization. One of the important ruminant livestock that are mostly developing by the farmers in the villages as small holders farms is goats. In raising goats, land and feed resources are the factors contributing for successfully this development in order to achieve high level of production.

In Indonesia, annual production of this ruminant is about 3%, while demand for this product approximately 6% per year [1]. If this situation continues for long time, it is not impossible that in the future, Indonesia will import this product. Therefore, it is important to accelerate goat production in this area to anticipate high demand of this product. The first strategy in developing goat production is identifying the regions that are suitable for goat.

Basically, goats can be raised in the regions with extreme climate conditions. The advantages of these ruminants such as adaptable in dry environment, heat resistant, and does not require a large capital. On the other hand, if the management of goats conducted with respect to better raising goats, this ruminant can be used as an instrument to reduce poverty in the countryside. One district in South Sulawesi Province of Indonesia that is can be used as region for development of goats with high population (84,202 heads) is Selayar. This region is an island area that geographically separated from the mainland of Sulawesi Island. The geographically advantages of this island is possibility of reducing the transmission of disease that comes from outside [2], subsequently reducing the cost for goats health, reducing mortality rate, and increase production.

However, so far, it is not clear how many populations of goats can be raised in this region as well as potential natural resources especially pastoral range that can be used as local feed. Therefore, it is necessary to identify the potential of pastoral range as local feed resources for goats in this region.

2. Materials and Methods

2.1. Location

The study was conducted in Selayar Island, South Sulawesi Province of Indonesia during a period of one year; from July 2015 to June 2016. Four locations of sub-districts were chosen in the region (Bontomatene, Bontoharu, Bontomanai, and Bontosikuyu). These locations were purposively chosen based on high, middle, and low population of goats. Bontomatene represents for high goats population, Bontomanai and Bontosikuyu represent for middle population, and Bontoharu represents for low population.

2.2. Raising and feeding systems of the goats

Basically, raising goats by the farmers involved in the present study were mainly free in the day-time and return back to the house or simply tied at around the owner’s house (68.8%) (Table 1). This housing management is applied by the farmers for long time. There was no special technology for housing the goats. In the area of Bontomatene, where the density of goats’ population is high, mostly the farmers allow their goats for grazing in the day-time and housing in the night-time (67.7) or tied in the evening without housing (12.5%) (Tabel 1). The remaining 20% farmers keep their goats in the housing all the day.

Tabel 1: Raising system of the goats by the farmers at different location in Selayar Island.

Location	Raising system			
	Free all the day	Free in the day-time and tied in the evening without housing	Free in the day-time and housing in the evening	Housing all the day
	%			
Bontomatene	0.0	12.5	67.5	20.0
Bontomanai	14.3	25.0	20.6	40.0
Bontoharu	0.0	62.5	11.8	20.0
Bontosikuyu	85.7	0.0	0.0	20.0
Total	23.0	13.1	55.7	8.2

The farmers in this area feed their goats in the pastoral range freely during the day-time. However, some of them whereas their animal are keep in the housing during all day, cut and carry system is applied to feed the animals. In Table 2 shows that type of forage that mainly used for feeding the animals are grasses and leaves; accounted up to 90.2% at all areas.

Tabel 2: Feeding system of the goats by the farmers at different location in Selayar Island.

Location	Type of forage			
	Grasses	Grasses and leaves	Grasses and agricultural wastes (Rice straw)	Grasses, leaves and agricultural wastes
	%			
Bontomatene	0.0	45.5	0.0	0.0
Bontomanai	66.7	18.2	100.0	0.0
Bontoharu	0.0	16.2	0.0	50.0
Bontosikuyu	33.3	20.0	0.0	50.0
Total	4.9	90.2	1.6	3.3

2.3. Data collection

Data collected in this study was classified into two; primary data and secondary data. Primary data was obtained using survey methods through direct interview to the farmers as respondents with the help of a questionnaire. Number of respondents interviewing in the present study was at least 10% of the total farmers at each location and they were randomly chosen [3]. In addition, primary data was also collected by direct observation. In order to get more information, focus group discussion was performed to the farmers especially related to their land, number of animals, and the characteristic of the farmers.

Secondary data was obtained from related institutions including statistical data that related to geographically region, human resources, land potential and their utilization, as well as plantation and livestock in the region. The other supporting data such as study reports and references that related in this study were also used as secondary data.

The quality of each forage was analyzed using Van Soes and proximate analysis that consisted of moisture, crude protein, crude fat, crude fiber, Nitrogen-free Neutral Detergent Fiber (NDFn), ash, and dry matter based on the procedure of AOAC [4].

2.4. Data analyses

Data collected in this study was classified into two; primary data and secondary data. All data were tabulated in Excel for Windows program. Descriptive statistic was used to characterize the percentage of botanical composition as well as nutritive value of the plantation in the pasture. Population of goats was converted to animal unit (AU).

3. Results and Discussion

3.1. Botanical composition and nutritive value

One of the magnitudes of botanical composition in pastoral range is to predict the carrying capacity and forage production as well as the nutritive value of the area that are used for the animals as feeding. In general, botanical composition of the pastoral range in Selayar Island is shown in Figure 1. In this pastoral range, the proportion of grass is relatively low in comparison to legume and other plants (11% vs. 24% and 65%). Higher composition of the other plants in the present study was predicted in the beginning. This due to that the pasture in these areas is still natural without any intervention for development both from the farmers and the government. Nevertheless, this situation is a potential asset for future development.

In addition, high proportion of forage non-feed (other plants) indicated that the pastoral range that usually used for feeding the animals in Selayar Island are generally needs to be improved. Existence of the other plants in the pastoral range is simultaneously with grasses and legumes to compete each other for obtaining nutrients in the soil; subsequently, it is necessary to manage this pastoral range to improve this condition by increasing the proportion both grasses and legumes. One of the methods to improve this pastoral range is to introduce several types both grasses and legumes.

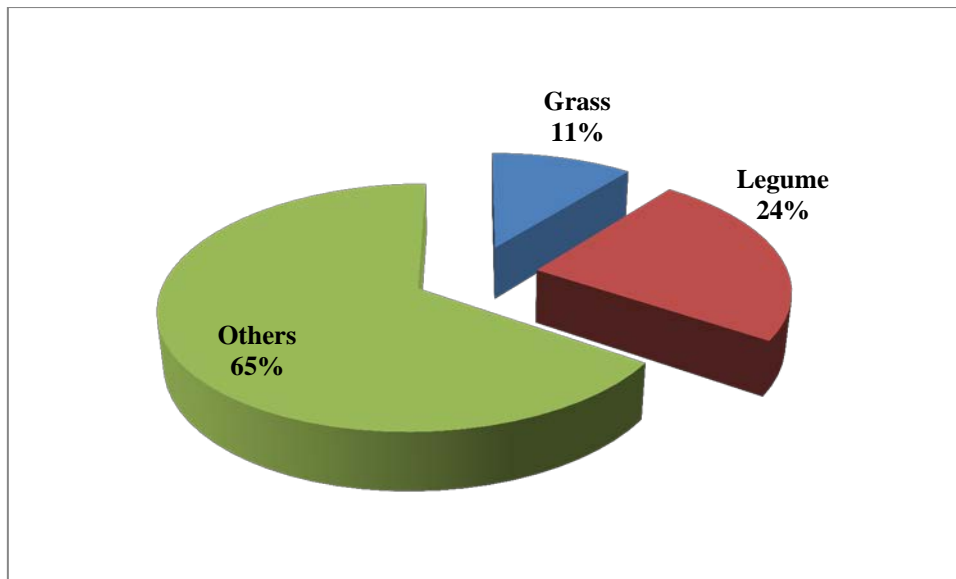


Figure 1: Botanical composition of pastoral range in Selayar Island.

As shown in Table 3 and 4, four locations in Selayar Island were characterized for their plant species composition and forage production. The main species of grasses in the pasture consisted of *Cynodon dactylon*, *Axonopus compressus*, *Cyperus rotundus*, *Synedrella nodiflora*, *Virnonia cinerea*, *Chloris gayana*, *Hedyotis corymbosa*, and *Chrysopogon aciculatus*. Furthermore, the legumes in the pasture consisted of *Desmodium intortum*, *Centrosema pubescens*, *Crotalaria juncea*, *Desmanthus virgatus*, and *Calopogonium mucunoides*. Likewise, the other plants consisted of *Lamtana camara*, *Chromolaena odorata*, *Stachytarheta jamaicensis*, *Azadirachta indica*, and *Mimosa pudica* (Table 3).

Tabel 3: Composition of plant species in the pasture in Selayar Island.

Plant species composition		
Grass	Legume	Other plants
<i>Cynodon dactylon</i>	<i>Desmodium intortum</i>	<i>Lamtana camara</i>
<i>Axonopus compressus</i>	<i>Centrosema pubescens</i>	<i>Chromolaena odorata</i>
<i>Cyperus rotundus</i>	<i>Crotalaria juncea</i>	<i>Stachytarheta jamaicensis</i>
<i>Synedrella nodiflora</i>	<i>Desmanthus virgatus</i>	<i>Azadirachta indica</i>
<i>Virnonia cinerea</i>	<i>Calopogonium mucunoides</i>	<i>Mimosa pudica</i>
<i>Chloris gayana</i>		
<i>Hedyotis corymbosa</i>		
<i>Chrysopogon aciculatus</i>		

Botanical composition of the pasture had significant effect on the goats' performance. As generally known that the performance of the goats is affected by genetic and environmental factors, that is subsequently affecting the quality of carcass [5] and carcass yield [6].

The average forage production in four different locations that calculated in the present study was 2.479 ton/ha/year. For forage production of the pasture, this study confirmed that different area had produced different forage production. In the area of Bontomatene that are high population of goats, total forage productions per year was only 1.314 ton/ha/year; lower than the last three locations; middle and low population of goats (Table 4). This suggests that the areas for both middle and low population of goats have potentially sufficient of local feed resources for development and increasing the population of goats in the future.

It has been stated that feedstuffs are the things that consume by the animals that containing energy and nutrients [7], and subsequently it is used by the animals to grow, fattening, reproduction, and production. Feedstuffs consist of dry matter and moisture [8] as well as consist of protein, lipid, carbohydrate, minerals, and vitamins.

Table 4: Forage production of the pasture in (ton/ha/year) in Selayar Island based on different location.

Location	Grass	Legume	Other plants	Total
	ton/ha/year			
Bontomatene	0.140	0.336	0.838	1.314
Bontoharu	0.204	0.868	2.496	3.568
Bontomanai	0.208	0.840	1.720	2.768
Bontosikuyu	0.508	0.316	1.440	2.264
Total	1.060	2.360	6.494	9.914
Average	0.265	0.590	1.624	2.479

Nutritive value of the plantation in the pasture is a reflection of the forage quality. This suggests that high quality of the forage is affecting the performance of the animals. Therefore, in order to achieve high performance of the animals especially for goats, it is necessary to have high quality forage. In the present study, the forage in the pasture are still growing naturally, whereas the nutritive value of the sample obtained in the field is shown in Table 5. The average of dry matter was 24.74% with crude protein was 7.46%. This nutritive value is affected by the botanical composition, whereas in the field, the percentages of both grasses and legumes were only 11% and 24%, respectively (Figure 1). This means that the ratio between grass and legume is 1:2 For better ratio between grasses and legumes, Crowder and Chheda [9] suggested 3 portion of grass and 2 portion of legume. Generally, legumes produce higher quality forage than grasses [10]. Therefore, for the future advantage, it is necessary to enhance the nutritive value of the pasture by introducing some species of legumes.

3.2. Population of the goats in Selayar Island

Generally, the population of goats at different locations in Selayar Island is shown in Table 6. Bontomatene area is the highest population of goats in this region; and about 40% of the total population. Basically, population of goats in Selayar Island can be increased by application of better management for raising goats by the farmers. Availability of feed resources in the pastoral range in this region are still the main source that supporting the

development for these animals. Likewise, chance to improve the pastoral range especially the quality and quantity of forage production are still possible; due to that the pastoral range in this region are still natural without any improvement so far. Hence, chance to increase the population of goats in this region is also widely open.

Tabel 5: Nutritive value of plant in the pasture in Selayar Island.

Item	Nutritive value			Average
	Grass	Legume	Other plants	
	(%)			
Moisture	76.32	73.03	76.43	75.26
Crude Protein	5.70	9.53	7.16	7.46
Crude Fat	1.87	4.67	4.85	3.80
Crude Fiber	25.87	25.24	18.20	23.11
NDFn*	44.89	45.62	56.03	48.85
Ash	21.66	14.95	13.75	16.79
Dry matter	23.68	26.98	23.57	24.74

*NDFn = Nitrogen-free Neutral Detergent Fiber

Tabel 6: Population of goats in Selayar Island based on different location.

Location	Population	
	Head	Animal Unit (AU)
Bontomatene	32,408	3,446
Buki	4,564	485
Bontomanai	6,815	725
Benteng	444	47
Bontoharu	1,404	149
Bontosikuyu	8,319	885
Pasimasunggu	7,554	803
Pasimasunggu Timur	4,616	491
Pasimarannu	9,418	1,002
Pasilambena	2,243	238
Takabonerate	2,372	252
Total	80,157	8,523

As shown in Table 7, carrying capacity of the pasture in Selayar Island differed at different location and it was very low (0.451); <2. McIlroy [11] stated that the carrying capacity of the tropics generally at 2-7 AU per

hectare. Lower carrying capacity in this region is related to lower of forage production due to botanical composition of the pasture that dominated by non-feed plants. This suggests that it is difficult to raise more animals without any improvement of the range. Carrying capacity reflects the number of animals that can be survived in the range in the time manner.

Tabel 7: Carrying capacity of the pasture in Selayar Island (ton/ha/year).

Location	Annual Production	PUF* 40%	Moisture	Dry Matter	Carrying Capacity
Bontomatene	7.884	3.154	2.365	0.788	0.239
Bontoharu	21.408	8.563	6.422	2.141	0.649
Bontomanai	16.608	6.643	4.982	1.661	0.503
Bontosikuyu	13.584	5.434	4.075	1.358	0.412
Total	59.484	23.794	17.845	5.948	1.803
Average	14.871	5.948	4.461	1.487	0.451

*PUF = Proper Use Factor

This study concluded that the pastoral range for goats as local feed resources in Selayar Island is still sufficient enough for current population of goats. Since the pastoral ranges in this region are still natural, it is a great potential for improving the botanical composition in the future that are suitable for goats feeding. This suggests that this region has possibility to develop and increase the population of goats in the future.

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