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To cite this article: Sulastrı *et al* 2019 *IOP Conf. Ser.: Earth Environ. Sci.* **372** 012022

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# Population Performance of Saburai Goat at Saburai Goat Breeding Area, Tanggamus regency, Lampung Province

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**Abstract.** The survey method was conducted to investigate the population performance of the Saburai goat breeding area in Tanggamus Regency, Lampung Province. The population performance was evaluated based on natural increase (NI) and the ability of the region to supply Saburai breeds and based on net replacement rate (NRR) . Direct observations were made since the Saburai goat was designated as the Lampung Province's local genetic resource based on the Decree of the Minister of Agriculture of the Republic of Indonesia Number 359 / Kpts / PK.040 / 6/2015 until 2018. The result showed that the population of Saburai goat in 2015, 2016, 2017 and 2018 were 1,469, 2,369, 2,860, and 3,293 tails, respectively. The average length of use of male and female goats was  $4.44 \pm 0.20$  and  $5.033 \pm 0.21$  years, respectively. The highest needs of replacement stock was in 2018 (5.40% for males and 5.47% for females). The average percentage of births of male kid was  $9.72 \pm 6.57\%$  and female kid was  $19.72, \pm 5.18\%$ . The NI value for male goat was  $9.25\% \pm 6.23\%$  and for female goat was  $19.13 \pm 4.22\%$ . The highest NRR value for male goat occurred in 2015 (1028.21%) and for female goat in 2016 (528.34%). It could be concluded that the population performance of the Saburai goat from 2015 to 2018 was in a good category and was able to provide replacement stock from its own territory.

**Keyword:** Saburai goat, breeding stock, natural increase, net replacement stock, local genetic resources

## 1. Introduction

The Saburai goat was determined by the Ministry of Agriculture of the Republic of Indonesia as the Lampung Province's local genetic resource based on the Decree of the Minister of Agriculture of the Republic of Indonesia Number 359/Kpts/PK.040/6/2015. The determination must be followed by an increase in population performance so that Tanggamus Regency is immediately designated as the Saburai goat development area.

About 75% of the genetic Saburai goats come from Boer goats and 25% from the Etawah Grade (EG) goats. Boer goats are meat type goats that have fast growth, good meat quality, and high fertility [1]. The Boer goats were mated with Etawah Grade goats in Tanggamus Regency by grading up



method so that Saburai goats were formed [2]. Ettawa Grade goat is a dual-purpose goat type and is the result of a cross between the Kacang goat and the Etawah goat. The body of a EG goat is large, its ears are hanging, and its face profile is convex [3].

One of the requirements for a region to be designated as a source of breed is that the percentage of livestock population that becomes a local genetic resource is not less than 80%. Government Regulation Number 48 of 2011 Article 45 paragraph 4 mandates that the source area of the seed is determined by the potential of the area and meets the criteria for producing breed from a herd or species of livestock based on a proposal from the regent or governor. The success of the breed source area activities can be evaluated through a macro approach. The macro approach is carried out by the regency government, among others, by maintaining the established breed/species [4].

Efforts to maintain the existence of Saburai goat clump were carried out by evaluating and controlling the performance of the Saburai goat population. The population performance included the structure of the Saburai goat population, the percentage of male and female Saburai goats in the population, the use of male and female Saburai goats as breed, the percentage of births and deaths of goats in one year, availability of replacement stock, replacement stock needs, livestock growth natural or natural increase (NI), and the ability of the region to provide livestock seeds or the net replacement rate (NRR) [5, 6].

Livestock breeding in Indonesia has not received serious attention from employers and the government. Lately breeding activities and programs in the largest breeding center of Etawah Grade goat in Indonesia which are in Kaligesing Subdistrict, Purworejo District, Central Java Province has decreased due to changes in government policies, increased capital, lack of export markets, high slaughter of female goat, limited facilities and postharvest technology [7]. That is why the evaluation of the performance of the Saburai goat population in Tanggamus Regency must be carried out intensively. The purpose of this study was to determine the performance of Saburai goat populations in Tanggamus District since it was established as a local genetic resource of Lampung Province in 2015.

## 2. Methodology

This study was conducted in Gisting Subdistrict, Sumberejo District, and Kota Agung Timur District, Tanggamus District. The research material was in the form of questionnaires and recordings belonging to each farmer. The research was conducted by survey method.

The variables observed included the number of male and female Saburai goats, the number of male and female young goats, the number of male and female kid, number of kid births and kid deaths per year, duration of male and female goat used in breeding areas. The results of the observations on the variables were analysed and calculated to obtain data on breed needs (replacement), percentage of births, percentage of deaths, NI values, and NRR with the formula as follows [5] [8].

### Need of replacement for male goat

$$\text{Need of replacement for male goat (\%)} = \frac{(\text{Number of mature male goat/population}) \times 100\%}{\text{Length of male goat use (year)}}$$

### Need of replacement for female goat

$$\text{Need of replacement for female goat (\%)} = \frac{(\text{Number of mature female goat/population}) \times 100\%}{\text{Length of female goat use (year)}}$$

### Percentage of kid birth

$$\text{Percentage of kid birth (\%)} = \frac{\text{number of kid birth (tail)}}{\text{Population (tail)}} \times 100\%$$

**Percentage of kid death**

$$\text{Percentage of kid death (\%)} = \frac{\text{number of kid death (tail)}}{\text{Population (tail)}} \times 100\%$$

**Natural Increase (NI) (%)**

$$\text{NI (\%)} = \text{Percentage of kid birth} - \text{Percentage of kid death}$$

**NI value for male (%)**

$$\text{NI for male (\%)} = \frac{\text{Number of male kid (tail)}}{\text{Population of Saburai goat (tail)}} (100\%)$$

**NI value for female (%)**

$$\text{NI for female (\%)} = \frac{\text{Number of female kid (tail)}}{\text{Population of Saburai goat (tail)}} (100\%)$$

**NRR value for male**

$$\text{NRR for male (\%)} = \frac{\text{NI for male (tail)}}{\text{Replacement need for male (tail)}} \times 100\%$$

**NRR value for female**

$$\text{NRR for female (\%)} = \frac{\text{NI for female (tail)}}{\text{Replacement need for female (tail)}} \times 100\%$$

All parameters calculated were analysed and discussed with descriptive method.

**3. Results and Discussion****Structure and Composition of Population**

The results showed that the Saburai goat population from 2015 to 2018 showed an increase (**Table 1**). The increase was caused by the high birth rate seen from the increase in the number of male and female goat kids every year. The increase in the number of kids is caused by an increase in the number of adult female goats every year.

Adult female goats were mated naturally with male Saburai goats at the study site. The number of adult male Saburai goats every year is relatively high so the comparison between the number of male and female adult goats in the study location is not ideal. The ideal ratio of adult male and female goats is 1:10 [9] [10]. The number of adult male goats that are too high only increases maintenance costs but does not increase the population like female goats that support an increase in population through child birth. This condition causes the low application of artificial insemination at the study site.

The adult female goat population in the livestock business is an important factor related to reproductive performance and the prediction of the rate of population increase in a particular region. Kid production is increasing with dam maintenance which causes an increase in farmer income [11].

**Need old Replacement Stock**

The results showed that the average duration of male and female Saburai goats in breeding areas from 2015 to 2018 varied between 4.2 to 4.7 years in male goats and between 4.6 and 5.2 years in female goat. (**Table 2**). Variations in male and female livestock use in breeding areas at the study site were carried out so that genetic variation occurred and avoided inbreeding. Male and female livestock use that is too long in the breeding area results in increasingly uniform genetic herds so that the population

is not responsive to selection. Selection does not result in increased performance in generations of offspring if carried out in populations with low or relatively uniform genetic diversity [5] [12].

**Tabel 1.** Structure and composition of Saburai goat population at Tanggamus Regency from 2015 to 2018

Year		Age group							Population
		Adult			Young		Kid		
		M	F	Ratio M:F	M	F	M	F	
2015	Total (tail)	109	304	1.0 : 2.8	249	232	281	294	1469
	%	7.42	20.69		16.95	15.79	19.31	20.01	100
2016	Total (tail)	125	427	1.0 : 3.42	547	567	216	487	2369
	%	5.28	18.02		23.09	23.93	9.12	20.56	100
2017	Total (tail)	557	878	1.0 : 1.58	447	487	123	368	2860
	%	19.48	30.7		15.63	17.03	4.3	12.87	100
2018	Total (tail)	836	919	1.0 :1.10	123	368	209	838	3293
	%	25.39	27.91		3.74	11.18	6.35	25.45	100

M = Male, F = Female

Selection was carried out on goat children who were prepared to be replacement stock. Therefore goats have to get good care because it is a replacement stock that will replace male or female goats whose productivity has declined [13].

The duration of use of female goats is shorter than that of male goats because the health of female goats declines faster as more and more births, milking, and care for their kids. Male goats do not experience a reproduction process that is heavier like female goats so that their performance do not rapidly decline as do female goats.

Male replacement needs are lower than females (**Table 2**) because male goats are used longer in breeding areas so they do not need replacements in a fast time as do female goats. The length of use of female goats in breeding areas is shorter so that they are eliminated faster and require replacement female goat.

**Tabel 2.** Length of use of male and female Saburai goats in the population and replacement stock needs

Item	Tahun							
	2015		2016		2017		2018	
Sex	M	F	M	F	M	F	M	F
Total	109	304	125	427	557	878	836	919
Percentage	7.42	20.69	5.28	18.02	19.47	30.69	25.39	27.91
Duration use (year)	4.2	4.6	4.4	4.8	4.45	5.20	4.70	5.10
Replacement stock need	1.77	4.49	1.19	3.75	4.37	5.90	5.40	5.47

M = Male, F = Female

The duration of the use of male and female goats as elders in breeding areas is the same as the results in Karang Endah Village, Terbanggi Besar District, Central Lampung Regency. Etawa Grade goats were used in breeding areas for  $4.25 \pm 0.57$  years and  $5.69 \pm 1.31$  years respectively in male and female goats. The average length of use of male and female goats in breeding areas for Rambon goats was  $3.74 \pm 0.88$  years and  $3.88 \pm 0.59$  years, respectively, while for Kacang goats of  $4.67 \pm 1.05$  years and  $4.54 \pm 0.49$  years, respectively [14].

### Regional Ability to Provide Saburai Goat Breeds

The ability of the region to provide breeds or replacement stock for Saburai goats is reflected in the NRR value. The results showed that the highest NRR value was achieved in 2015 when Saburai goats were designated as local genetic resources of Lampung Province. In 2015 the Tanggamus Regency

was able to provide replacement stock needs from its own territory. This was seen in the NRR values of male and female goats which were higher than 100% (male NRR 1028.81%, females 426.71%). Region can be declared capable of experiencing a surplus of livestock and is able to provide a replacement stock from its own region if the NRR value is more than 100% [8].

The high NRR value of male Saburai goats in 2015 was caused by the high birth rate of male goats (19.13%) and the low mortality of male goats (0.95%) and the low need for male replacements (1.77%). The NRR value of male and female Saburai goats from 2015 to 2018 is more than 100% except male NRR in 2017 which is less than 100% (92.68%). The low NRR value is caused by a replacement stock requirement that is higher than its availability (4.38% requirement, 4.04% availability). The low availability of male replacements is due to the low birth of male kids in 2017, which is 123 (4.3%) with the death of 7 (0.24%).

**Tabel 2.** Regional capability in providing Saburai goat replacement stock in Tanggamus Regency

Item	Tahun							
	2015		2016		2017		2018	
a. Sex	M	F	M	F	M	F	M	F
b. Population	1469	1469	2369	2369	2860	2860	3293	3293
c. Replacement stock need (%)	1.77	4.5	1.2	3.76	4.38	5.9	5.4	5.47
c. Kid birth (tail)	281	294	216	487	123	368	209	838
d. Percentage	19.13	20.01	9.12	20.56	4.3	12.87	6.35	25.45
e. Number of death (tail)	14	12	13	17	7	14	5	11
f. Percentage	0.95	0.82	0.55	0.72	0.24	0.49	0.15	0.33
g. NI	18.18	19.2	8.57	19.84	4.06	12.38	6.19	25.11
h. NRR	1028.81	426.71	714.56	528.34	92.68	209.66	114.69	458.94

M = Male; F = Female

The NI value of Saburai goats in Tanggamus District, the results of this study, do not have much disputes with the results in Pekon Dadapan, Sumberejo District, Tanggamus Regency. The value of male NI was 12.77% and female was 14.89%. The NI value of male Boerawa goat was 4.40% and female was 11.32%, NI male Rambon goat was 16.15% and female was 11.18%, NI male goat was 7% and female was 13.28%. [16] reported the NI value of Etawa Grade goat for male goat was 23.4% and for female goat was 14.89%, male Rambon goats of 15.11% and female goat of 14.22%, while for male and female Kacang goat were 15.38% and 11.94%, respectively [15].

The NRR value of male and female Saburai goats were 756.23% and 192.27%, respectively, for male and female Boerawa goats were 191.81% and 125.71%, respectively, for male and female Rambon goats were 636.21% and 134.19%, respectively, and for male and female Etawa Grade goats were 246.53% and 143.99%, respectively [15]. Furthermore, NRR value of 668.00% and 306.38% for male and female of Etawa Grade goat, respectively, 397.00% and 179.94% for male and female Rambon goat, and 221.00% and 317.80% for male and female Kacang goat, respectively [16].

NRR values that vary between sexes and breeds are due to the varying percentage of births and deaths that affect the value of NI. In addition, the population of adult male goats and the length of their use as elders in the population influences the need for replacement stock. Male and female goats that are too quickly removed from breeding areas require higher amounts of replacement stock than those used for longer periods in breeding areas. The disadvantage of too long livestock being used in breeding areas is the low level of livestock genetic diversity which results in the responsiveness of livestock to the implementation of selection [6]. Progress of selection depends on the effective utilization of additive genetic diversity [17].

Deaths of goat kid in the study area mostly occur in the type of birth of twins and triplet. This is caused by the limited milk obtained by the kid. Death rarely occurs in goats born in a single birth type. Mortality rate of goats from crosses between male Boers and female Kacang goat tended to increase with increasing of litter size. The death of goats as much as 16.67% occurred in single births type and

27.27% in twin birth types. This was caused by the limited milk obtained by goat kid because it was divided into more than one kid [18]. increase in litter size tends to reduce birth weight, pre-weaning growth, and weaning weights [19].

#### 4. Conclusions

It can be concluded that population performance of the Saburai goat from 2015 to 2018 was in a good category and was able to provide replacement stock from its own territory.

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