



Growth Traits of Saburai Goats Concerning Locations in Lampung Province, Indonesia

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Abstract | The low performance of Saburai goats was due to the limited number of females so almost all Saburai goats were selected as potential stock in the area. This results in a low intensity of selection and a lower increase in the growth of the next generation. This research was conducted in Gisting and Sumberejo Subdistricts, Tanggamus District and we aimed to determine the body weight and body sizes of Saburai goats doe who have single and twin birth types. Data collection was carried out on 62 Saburai goats doe in the study area. Data were analyzed by t-test. The results showed that the average body weight, body length, shoulder height, chest circumference, chest width, chest depth, hip width, and hip height were 43.62 ± 1.08 kg, 62.79 ± 2.76 cm, 62.31 ± 1.57 cm, 75.74 ± 2.56 cm, 20.39 ± 2.41 cm, 30.54 ± 1.89 cm, 15.93 ± 0.86 cm, 68.35 ± 0.73 cm in single births does and 44.25 ± 1.34 cm, 64.05 ± 2.62 cm, 66.48 ± 1.86 cm, 81.55 ± 1.24 cm, 22.95 ± 1.03 cm, 32.51 ± 0.71 cm, 17.31 ± 0.69 cm, and 69.91 ± 0.81 cm in twin births does respectively. The results of the t-test showed that the average body size of the single-birth-type was significantly ($P < 0.05$) different from twin-breed Saburai goats. The quantitative performance of the Saburai goat doe with twin birth types was higher than that of the single birth type.

Keywords | Birth type, Body measurements, Quantitative performance, Saburai goat doe

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INTRODUCTION

Goats are considered as an integral part of farming systems, they are most economically important ruminant after cattle and buffalo. They provide food economic security to landless and marginal farmers (Mebratie et al., 2022; Bhattarai et al., 2019). The population of Indonesia has increased yearly, in 2018 it reached 265 million people and in 2019 it increased to 267 million people. The increased population contributed to increased demand for food sources of animal protein. To increase the productivity of goats to meet the demands and improve the welfare of the community, several efforts have been made,

including crossing local goats with other breeds for higher productivity (Central Bureau of Statistics, 2019). Lampung Province has great potential for goat development because it has a carrying capacity that can support livestock productivity. The carrying capacity includes forage animal feed, and agricultural agro-industrial waste, including onggok, corn stalks, and molasses. In addition, its location is close to Jakarta and other big cities in Java which require a supply of livestock products. Goats are suitable to be developed in various regions because they are easy to adapt to various environmental conditions (Ginting, 2009; Dakhlani et al., 2021; Saleh et al., 2022).

One of the goat families currently being developed in Lampung Province is the Saburai goat. The Saburai goat is a broiler resulting from a Boer male and Etawa Peranakan (PE) female which is designated as a local genetic resource for Lampung Province based on the Decree of the Minister of Agriculture of the Republic of Indonesia Number 359/Kpts/PK.040/6/2015 (Adhianto et al., 2017, 2019). The low performance of Saburai goats was due to the limited number of females so almost all Saburai goats were selected as potential stock in the area of source of goat breeds for Saburai goat development. This results in a low intensity of selection and a lower increase in the growth of the next generation. The female Saburai goat has single birth, twins, and even more. This type of birth is regulated by genes that are eternal and do not change throughout life. According to Sutiyono et al. (2006), female PE with certain birth types is thought to have identifiable characteristics both from the exterior and from body sizes. Body length and hip width of female PE with single birth were not different from that of twins but different from does who had more than two births.

The bones that make up the body length and hip width experience faster growth in the does with the type of twins or more so that the abdominal space is larger than the doe with the type of single birth. Body length and hip width are body measurements that can be used to predict the litter size of goats (Sutiyono et al., 2006; Bhattarai, 2020; Chakraborty et al., 2022). The diversity of quantitative traits in different doe goats is thought to have a relationship with the type of birth that each parent has. Therefore a better understanding of the phenotypic and genetic variation of biometric traits in goats in extensive production systems is necessary (Pariacote et al., 2023). The problem faced in efforts to increase the production of Saburai goats is that the quantitative performance of Saburai goats with single or twin birth types has not been identified. Based on this fact, we aimed to examine the quantitative performance of Saburai goats doe that have single and twin birth types.

MATERIALS AND METHODS

MATERIALS

The research materials consisted of 30 Saburai goats that had given birth to a single and 32 Saburai goats that had given birth to twins. The tools used are measuring sticks, measuring tape merk Rondo, stationery, and a camera merk Canon EOS 100D.

LOCATION OF THE STUDY

Tanggamus District is one of the regencies/cities in Lampung Province. This district has 20 sub-districts, namely Wonosobo, Semaka, Bandar Negeri Semuong, Kota Agung, Pematang Sawa, Kota Agung Barat, Kota

Agung Timur, Pulau Panggung, Ulu Belu, Air Naningan, Talang Padang, Gunung Alip, Pugung, Bulok, Cukuh Balak, Kelumbayan, West Kelumbayan, Limau, Gisting, and Sumberejo the location can be seen in Figure 1. The capital city of Tanggamus District is located in Kota Agung (Performance Report of Tanggamus Regency Government, 2022).



Figure 1: Map Tanggamus District

The research was conducted in the subdistricts of Gisting and Sumberejo. Gisting subdistrict is located 12 km from Kota Agung which is the capital of Tanggamus District and 75 km from Bandar Lampung. The boundaries of the Gisting subdistrict are as follows: to the north, it is bordered by Sumberejo District, to the south by the Limau subdistrict, to the west by the East Kota Agung subdistrict, and to the west by Gunung Alip subdistrict.

Sumberejo subdistrict is located 29 km from Kota Agung and 79 km from Bandar Lampung City. The boundaries of the Sumberejo subdistrict are as follows: Pulau Panggung subdistrict North, Gisting subdistrict South, Wonosobo subdistrict West, and Talang Padang subdistrict East.

Gisting and Sumberejo subdistricts are located at an altitude of 206–700 m above sea level with an air temperature of 18–28 °C and an air humidity of 65–100%. The average annual rainfall in these two sub-districts is quite high. High and low rainfall, temperature, and humidity are factors that support the development of agricultural and livestock activities. Wetlands and drylands in Gisting and Sumberejo sub-districts are very extensive, this is a driving factor for residents to make their main livelihood as farmers. In addition to being farmers, residents usually

raise goats as an additional source of income.

ANIMAL UNDERSTUDY

The animals were raised at an altitude of 206-700 m above sea level with an air temperature of 18-28 °C and an air humidity of 65-100%. The average annual rainfall in these two sub-districts is quite high. High and low rainfall, temperature, and humidity are factors that support the development of agricultural and livestock activities. Wetlands and drylands in Gisting and Sumberejo sub-districts are very extensive, this is a driving factor for residents to make their main livelihood as farmers. Goats are kept in stilt pens, given food twice a day with chopped forage.

RESEARCH METHODS

This research was conducted using a survey method at the location of the farm. Data were taken by purposive sampling by collecting primary data. Primary data were obtained by observing the management of rearing, housing, and feeding, direct measurements which included birth type, body size (body weight, body length, chest circumference, chest width, chest depth, shoulder height, hip height, hip width and interviews with farmers at the research site.

RESEARCH PROCEDURE

Stages include a survey of the research site, determining the sample of livestock that will be used as research material with the criteria of being a breeder with single and twin birth types, taking body measurements, and tabulating and analyzing data with the t-test.

DATA ANALYSIS

Quantitative data obtained from the results of the study were tabulated and then calculated on average to determine the difference in overall quantitative data with the t-test according to [Nazir's \(1995\)](#) recommendation.

The square of each data to obtain the standard deviation (sd) and diversity (S²X) values for the single- and twin-breed Saburai goat group.

Standard deviation formula (sd):

$$sd = \sqrt{\frac{\sum X^2 k.n - \{(\sum X k.n)^2/n\}}{n-1}}$$

Where: $\sum X k.n$: Total number of data; $\sum X^2 k.n$: Sum of squares of each data; n: Number of samples.

The mean or mean of each group. The mean of the first group of observations is denoted by X_1 and the second observation is denoted by X_2 .

HOMOGENEITY S_d

The homogeneity test was done by knowing the diversity of traits in the two groups which are analyzed by calculating the value of S_d. The formula S_d is:

$$s_d = \sqrt{\frac{s^2 x_1}{n_1} + \frac{s^2 x_2}{n_2}}$$

Where:

S²x₁: Group variety of single-birth Saburai goats; S²x₂: Group variety of Saburai goats parent type of twin birth; n: Number of samples of single-birth-type Saburai goats.

Number samples of single-birth Saburai goats diversity:

$$S^2 X = \frac{\sum X^2 k.n - [(\sum X k.n)^2/n]}{n-1}$$

Description: $\sum X k.n$: total number of data; $\sum X^2 k.n$: sum of squares of each data; n: number of samples

t-test:

$$t - test = \frac{\bar{X}_1 - \bar{X}_2}{s_{\bar{a}}}$$

X_1 : The average of the first observation; X_2 : The average of the second observation.

RESULTS AND DISCUSSION

The potential of goat farming in the two sub-districts is quite large because it has a high carrying capacity, namely the availability of grass and legumes which are commonly used as goat feed. The goats that are mostly kept in Gisting and Sumberejo sub-districts are Etawa goat grade, Rambon, and Saburai goats as goats that are continuously developed because they are local genetic resources in Lampung Province.

The Saburai goat is a cross between the Etawa female and the Boer male. This cross is intended to obtain high genetic quality in the growth and production of meat and can adapt to environmental conditions in Lampung Province. The goat contains 75% genetic Boer and 25% Etawa genetics so its production is close to Boer ([Lampung Province Livestock and Animal Health Office, 2015](#)).

The results of the observation of the quantitative performance of 30 single-born Saburai goats and 32 twins ([Table 1](#)) showed that the higher the type of birth, the higher the quantitative performance of the doe. stated that parents with a larger body size have prolific characteristics compared to the body size of parents with only kids ([Zulharnaim et al., 2016](#)).

Table 1: Growth traits of Saburai goats doe with single and twin birth type.

Variable	Birth type		T-test
	Single	Twin	
Number of goats (heads)	30	32	
Body weight (kg)	43.62±1.08	44.25±1, 34	P<0.05
Body length (cm)	62.79±2.76	64.05±2.62	P<0.05
Shoulder height (cm)	62.31±1.57	66, 48±1.86	P<0.05
Chest circumference (cm)	75.74±2.56	81.55±1.24	P<0.05
Chest width (cm)	20.39±2.41	22.95±1.03	P<0.05
Inside Chest (cm)	30.54±1.89	32.51±0.71	P<0.05
Hip width (cm)	15.93 ±0.86	17.31±0.69	P<0.05
Hip height (cm)	68.35±0.73	69.91±0.83	P<0.05

QUANTITATIVE PERFORMANCE

BODY WEIGHT

The average body weight of Saburai goat doe (Table 1) was influenced by feeding regularly and meeting the nutritional needs of livestock. Goats were fed two to three times daily. However, if during the day the feed runs out and the goat looks restless and hungry, the goats were given lunch.

Body weight is very important to know whether the nutritional needs of goats are met or not. Because this is related to the ability of goats to give birth to the number of kids, as stated by Harris et al. (2009), litter size is influenced by several factors, including genetics, age of calving, the body weight of doe, male influence, health, and nutritional level (Abecia et al., 2020; Bangar et al., 2020; Al-Khamaiseh et al., 2020).

BODY LENGTH

Observation of the body length of Saburai goats doe with single and twin birth types (Table 1) revealed a significant (P<0.05) difference. Ulfah (2016) stated that doe cattle that have a long body posture show the breadth of the abdomen that supports the cattle to produce large offspring or have a large number because it has sufficient space for fetal development. Zulkharnaim et al. (2016) showed that the body length of the goat is a criterion that must be considered in the selection of stock because goat doe with twins has a longer body length than those with single birth type.

The growth of body length is a reflection of the growth of the spine which continues to increase with age. Body length is a linear measurement of the body that is closely related to body weight because it has a positive correlation with body weight of livestock (Trisnawanto et al., 2012; Kurniawati et al., 2019).

SHOULDER HEIGHT

Data on the average shoulder height (Table 1) showed

a significant (P<0.05) difference between the single and twin birth types. The data showed that the shoulder height of the Saburai doe that gives birth to twins is greater than those of single birth type. This follows Zulkharnaim et al. (2016), that the shoulder height of goats with twins has a larger size than goats with single birth type. The growth rate of goats with twins from birth to puberty is faster, causing a large size of shoulder height when mature with an average of 69.77 ± 4.65 cm (Sutyono et al., 2006).

Shoulder height describes the bones that make up the forelegs and the bones that make up the back. The bones that make up the forelegs experience faster and earlier growth according to their function to support the body. Shoulder height is not directly related to the area of abdominal space, but is related to parental activity. The shoulder blade consists of the bones of the forelegs that are arranged as a support for the body and grow earlier than other bones (Victori et al., 2016).

CHEST CIRCUMFERENCE

Circumference is obtained by wrapping a measuring tape on the chest behind the shoulder (Utami, 2008). The chest circumference of the Saburai goat doe (Table 1) showed a significant (P<0.05) difference. Chest circumference is closely related to the size of the body of the animal and can be used to estimate the body weight of the animal. This follows Taofik and Depison (2008), that chest circumference is livestock performance that can be used as a predictor factor to determine genetic quality.

According to Lake (2016), changes in the size of the chest circumference are influenced by the growth of the chest ribs and the accumulation of thicker meat. The chest circumference of PE goats ranged from 77.38 to 79.57 cm (Rasminati, 2013). According to Malewa (2009), chest circumference is a body measurement that has the closest relationship with body weight. This is because it shows that bone development has started to slow down and PE goats have reached adulthood and development has led to internal organs, meat, and fat attached to the cattle's ribs.

CHEST WIDTH

The chest width of Saburai goats (Table 1) showed a significant (P<0.05) difference. The width of the chest describes the growth of the shoulder bones and the width of the chest cavity of an animal. Zulfahmi (2016) adds that changes in chest width are influenced by the development of internal organs and the growth of flesh or muscle tissue attached to the shoulder blades. Alfah (2009) stated that the growth of the breastbone is influenced by the development of internal organs and the attachment of meat to the shoulder and chest bones which suppress the body's capacity. Feed affects livestock growth, lack of nutrients during growth will be an obstacle in the growth

process. Nutrients from feed consumed by livestock will be used by livestock to meet the needs of body metabolism, growth, and reproduction.

CHEST DEPTH

The chest depth of Saburai goats showed a significant ($P < 0.05$) difference. This result is relatively the same as the previous study by [Sutiyono et al. \(2006\)](#), that the chest depth of PE goats with single calf, twins, and more than two were 30.76 ± 3.90 cm, 31.60 ± 4.5 cm, and 30.38 ± 5.15 cm, respectively.

In the chest depth, the single is smaller than the twin birth type. [Noor \(2008\)](#) stated that the difference in performance is caused by genetic and environmental effects and the interaction of livestock with their environment. [Pane \(1986\)](#) reported that the growth of body sizes is influenced by genetics and the environment. This means that genetics, nutrition consumed, age, health, and cleanliness of the cage influence the chest.

HIP WIDTH

The average hip width of the Saburai goat doe showed a significant ($P < 0.05$) difference. Hip width is closely related to fetal development. [Sutiyono et al. \(2006\)](#) stated that the width of the hips will affect the area of the abdomen which ensures the development of twins in the uterus during pregnancy. The goats who have a twin or more have a larger body size compared to goats who have single birth. This is because the bones of body size experience rapid growth in the doe with the twin so that the abdominal space is larger than the single birth.

HIP HEIGHT

The hip height of the Saburai goat doe showed a significant ($P < 0.05$) difference. The hip bones are the bones that make up the pelvis. [Alfah \(2009\)](#) stated that the hip bone can widen during the parturition process so that the fetus can pass through.

The difference in body size is thought to be influenced by the genetic factors of the parents and the interaction of livestock with their environment. [Noor \(2008\)](#) reported that performance differences are caused by genetic and environmental effects and the interaction of livestock with their environment. The growth of body sizes is influenced by genetics and the environment ([Pane, 1986](#); [Kawecka and Pasternak, 2020](#)).

The significant difference in the results was because the body size of the doe who has a twin birth has a larger size compared to the doe who has a single birth. [Sutiyono et al. \(2006\)](#) stated that does who have a twin or more have a larger body size compared to does who have a single birth. [Priyanto \(1994\)](#) stated that the amount and quality of

sufficient feed will affect the growth of body weight and size. This means that if feed requirements are met, livestock growth will be maximized. [Sulaksana and Farizal \(2010\)](#) added that in the situation in the village, the seasonal factor also plays an important role in the availability of feed because during the rainy season, the available feed is more and the nutrients contained are better. The same thing was conveyed by [Williamson and Payne \(1993\)](#) that in general forage contains more nutrients in the rainy season than in the dry season.

CONCLUSIONS AND RECOMMENDATIONS

The quantitative performance (body weight, body length, shoulder height, chest circumference, chest width, chest depth, hip width, and hip height) of Saburai goat doe with twins was higher than the single birth type.

Paying attention to lineage and the feed given is a must to maximize the possibility of brooders giving birth to twins.

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NOVELTY STATEMENT

The present study highlighted the quantitative performance of saburai goat doe with single and twin births, that is not identified before.

AUTHOR'S CONTRIBUTION

All authors are equally sharing.

CONFLICT OF INTEREST

The authors have declared no conflict of interest.

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