

Morphometry of Kacang and Ettawa Crossbreed Goats Raised in Bali

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Abstract. The consumption of animal protein from goats in Bali continues to increase every year. The supply level is not adequate with the level of demand, prompting the local government of Bali to improve the development of goats farmer in several areas of Bali. So far, the data on the morphometry of Kacang and the Ettawa crossbreed goats as the main supplier of lamb in Bali has not been found. Based on these considerations, this study is interesting to present. Observations on goat morphometry were carried out by measuring body length, head width, head height, chest width, chest depth, wither height, chest girth, and body length. The results of the observations were then analyzed by SPSS 25 program. The data of the study showed that the morphometry of Kacang and Ettawa crossbreed goats were almost different ($P < 0.01$) in all parameters except the head width, chest width, and tail width. On the other hand, the morphometric of both Kacang and Ethawah crossbreed goats showed larger than another that raised out of Bali. This genetic resource must be maintained at its potential from decreasing quality in the future.

Keywords: Kacang goat, Ettawa crossbreed goat, morphometry, raised in Bali

I. INTRODUCTION

Goat farming development in Indonesia is very rapid as a result of the tropical climate conditions which are very suitable for its development [1]. There are various types of local goats, namely the Kacang goat with the largest population and is considered a local Indonesian goat because it has been bred for generations [2]. The Kacang goat is categorized as a

prolific goat because of its low live weight and growth capacity. Kacang goat has several advantages including its ability to adapt to a barren land with limited feed availability, and its resistance to disease [3]. Meanwhile, the Ettawa crossbreed goat is the result of a cross between the Ettawa goat from India and the Kacang goat with a population of around 9.0% is

known as a dual-purpose type goat because it produces milk and meat [4].

Suparno states [5] that livestock growth is a change in size which includes changes in the composition and weight of livestock including changes in organs, tissues, and tissue components, organ components such as muscle, bone, and other components such as protein, fat, water content, and ash. The productivity of livestock (Kacang goats and Ettawa crossbreed goats) can be seen from the performance or appearance of livestock which is influenced by genetic factors and environmental factors as well as their interaction of both factors [6].

Furthermore, morphometrics is the study of the body shape and size of livestock. Body size is the distance between one part of the body to another part of the body. Morphometric characters that are often used as performance markers for livestock include chest girth, chest width, chest depth, wither height, hip height, body length, and body weight [7]. Based on the absence of morphometric studies on Kacang and Ettawa breed goats bred in Bali, for which this morphometric

information is very important to be used as a reference so that it is very important to present research on the morphometric study of Kacang and Ettawa breed goats that raised in Bali.

II. MATERIALS AND METHODS

A total of 20 adult female goats aged over 2 years consisting of 10 Kacang goats and 10 Ettawa crossbreed goats were used as research samples. Samples were taken from livestock farmer groups which are fostered farmer groups from Agricultural Technology Study Center (BPTP) Bali located in Tabanan, Singaraja, and Karangasem Regencies. Goat morphometry measurements were carried out by measuring the outer shape of the goat including head length, head width, head height, chest width, chest depth, wither height, chest girth, body length, and left front leg canon girth as shown in Figure 1 according to the method that applied by Tagoi et al [8] with slide modifications.

The measurement data are presented descriptively in the form of arithmetic mean, standard deviation, and coefficient of diversity. The mean value was then

analyzed by the General Linear Model (GLM) and further tested by Duncan's test using the SPSS version 25 program [9].

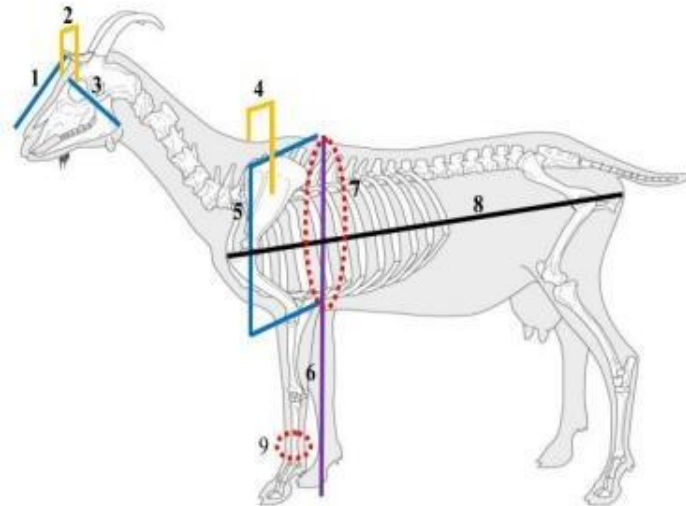


Figure 1. Morphometry of goats. 1. Head length 2. Head width 3. Head height 4. Chest width 5. Chest depth 6. Withers height 7. Chest circle 8. Body length 9. Left front leg canon girth [8].

III. RESULTS

The results of field observations showed that the Kacang and Ettawa crossbreed goats were raised intensively, i.e. they were caged and the main feed was

taken from their around. Based on the relatively similar feed pattern of both goats observed, it is expected can minimize the influence of feed on their morphometric performance of them.



Figure 1. The measurement of head height by the researchers

Table 1 shows the variation in the morphometry of Kacang and Ettawa crossbreed goats, and almost all parameters were different ($P<0.01$) except head width, chest width, and tail width. Quantitative morphometry of the Ettawa

crossbreed is significance higher ($P<0.01$) for several parameters including head length, head height, chest depth, chest girth, body length, horn length, front left leg canon girth, ear length, ear width, tail length, wither height, and hip height.

Table 1. Morphometry of Kacang and Ettawa crossbreed goats raised in Bali

Parameters (cm)	Goat types		Diversity Coefficient (%)	
	Kacang	Ettawa crossbreed	Kacang	Ettawa crossbreed
Head length	16,33±1,59 a	20,15±3.00 b	0,10	0,15
Head width	10,950±0,365 a	11,483±0,365 a	0,16	0,10
Head height	10,60±1,591 a	11,933±1,477 b	0,15	0,12
Chest width	16,983±5,902 a	16,042±2,891 a	0,35	0,18
Chest depth	26,108±2,994 a	30,408±2,388 b	0,11	0,08
Chest girth	69,233±5,157 a	78,167±6,546 b	0,07	0,08
Body length	55,067±7,026 a	69,242±6,220 b	0,13	0,09
Horn length	8,642±2,601 a	9,833±9,833b	0,31	0,61
Front left leg canon girth	7,858±0,528 a	9,233±1,470 b	0,07	0,16
Ear length	18,067±3,371 a	32,417±3,484 b	0,19	0,11
Ear width	8,175±0,549 a	11,592±2,095 b	0,07	0,18
Tail length	14,300±2,843 a	18,342±2,724 b	0,20	0,15
Tail width	3,767±0,479 a	4,050±0,800 a	0,13	0,20
Wither height	53,967±6,540 a	66,675±19,224 b	0,12	0,29
Hip height	58,221±6,105 a	73,575±4,095 b	0,10	0,06

Notes: The same letter shows no significant difference ($P>0.05$) and different letters indicate a very significant difference ($P<0.01$).

IV. DISCUSSION

The morphometric characteristics observed in this study was intended as an attempt to compare the genetic quality of the cross goat to other goats raised in Bali. Morphometry of an animal includes body weight, body length, height, chest circle, hip height, head size, and BCS (body condition score) as a

reflection of the productivity performance of the livestock concerned. This performance is influenced by genetic, and environmental and the interaction between them [10].

The results of the morphometric measurements of the Ettawa crossbreed goat showed that the body size was relatively larger than that of the Kacang

goat in several parameters. The results of the study in Table 1 show that the morphometric sizes of female-Kacang goats in Bali are higher if it was compared to adult female-Kacang goats which are kept intensively in Kampar Regency, Riau Province as in head length 14.44 cm, ear length 13.46 cm, chest circle 57.12 cm, chest width 14.987 and deep of chest 23.88 cm[11]. Morphometric data for adult female-Ethawah crossbreed raised in Bali also showed higher than Ettawa crossbreed parity-2 raised in Kendal Regency. The research data showed chest depth, chest width, and body length were 29.23, 77.89, and 66.91 cm, respectively[12]. The higher morphometric value of female adult Ettawa crossbreed goats raised in Bali was also detected if they were compared with the Indonesian National Standard of goats with the number SNI 7352:2008. In the standard, it was stated the parameters such as chest girth, body length, and ear length were 76 ± 7 , 57 ± 5 , and 26 ± 3 cm, respectively except wither height with a value of 71 ± 5 cm [13].

Based on the data in Table 1 that show Ettawa crossbreed goats have higher morphometric sizes than Kacang goats. Kumala Dewi and Wahyuni [14] stated that the genetic quality of livestock is the inherited ability that comes from individual parents and ancestors. This

ability will be appeared after cooperating with the influence of environmental factors in which the livestock are raised. Cross-breeding is one of the methods to improve genetic quality in addition to selection techniques and is considered a shortcut for obtaining individuals that have several superior traits possessed by the two parents. Offspring will acquire traits from the male and the female parent. It will never happen that a child receives all the characteristics from the male or female parent only [10].

The difference in morphometric size between Kacang and Ettawa crossbreed goats raised in Bali compared to other regions is a result of the environmental factor specific to the management effects. As a geneticist, Stern [6] states that environmental factors are the biggest factors that influence the appearance of the phenotype. In other words, the same genotype can show different phenotypes if the environment for the two phenotypes is different. In this study, the heritability of Ettawa crossbreed goats seems to be highly originated from their parents. Dewi and Wahyuni [14] stated that livestock that has high heritability, tend to produce offspring that have high performance, and vice versa. On the other hand, the slight difference in phenotype with Ettawa crossbreed goats

reared outside Bali is most likely due to environmental variations. The phenomenon of the dominant phenotypic change caused by environmental factors and is not hereditary is known as "Phenocopy". In this study, the phenocopy condition most likely resulted in a change in the phenotype of the Ettawa crossbreed goat raised in Bali compared to other places. Some environmental aspects that are thought to play an important role include aspects of feed, temperature, and exercise that interact with genetic factors [10].

V. CONCLUSION

The Ettawa crossbreed goats raised in Bali have morphometric characteristics higher than the Indonesian Standard of Ettawa crossbreed goats with the number SNI 7325:2008 as well as Kacang goats in most of the parameters. On the other hand, both Kacang and Ettawa crossbreed goats were also detected to have morphometric characteristics that higher than others which were raised out of Bali.

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