

Body measurements of etawa crossbreed goats in Sidamulih District, Pangandaran Regency

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ABSTRACT

Goats are small ruminants useful for humans as animal protein producers in the form of milk and meat. This research was carried out on 25-26 May 2024 in Sidamulih District, Pangandaran Regency. This research aimed to determine the measurements of etawa crossbreed goats, measuring 33 goats with ages <1 year, 1-2 years, and >2 years in the Sidamulih District. The research method used is a quantitative descriptive method. The results showed that the body measurements of etawa crossbreed goats in Sidamulih District are relatively uniform; however, in Doethe, the doe <1 year old is not uniform. The average chest circumference in Doedoe and bucks aged <1 year, 1-2 years, >2 years were 53.10±13.90 cm, 72.92±10.92 cm, 78.55±12.75 cm, and 51.90±0.60 cm, 82.83±6.83 cm, 90.20±14.20 cm, respectively. The average body lengths of Doedoe and bucks aged <1 year, 1-2 years, >2 years were 53.10±13.90 cm, 72.92±10.92 cm, 78.55±12.75 cm, and 51.90±0.60 cm, 76.83±5.83 cm, 81.80±12.20 cm, respectively. The average shoulder height of Doedoe and bucks aged <1 year, 1-2 years, >2 years were 51.37±10.37 cm, 73.88±10.88 cm, 77.30±7.89 cm, and 50.25±1.75 cm, 78.05±1.95 cm, 86.00±9.70 cm, respectively. The last variable, the average body weights of Doe and bucks aged <1 year, 1-2 years, >2 years were 17.50±9.50 kg, 42.13±4.88 kg, 53.00±4.00 kg, and 14.50±0.50 kg, 43.20±11.80 kg, 68.40±27.40 kg. These results indicate that female and male goats aged 1-2 years and >2 years have met the SNI requirements. Female goats aged <1 year do not meet the SNI requirements, while male goats aged <1 year and >2 years do not meet the SNI requirements.

Keywords: Body measurements, Buck, Doe, Etawa Crossbreed Goat

INTRODUCTION

Goats are small ruminant livestock that are useful for humans as producers of animal protein in the form of milk and meat. Maintenance is also relatively more straightforward than several other livestock types, which is one of their advantages.

The diversity of genetic resources in Indonesia is very abundant, goats are included in the diversity of genetic resources in Indonesia. Goats are a popular type of livestock in Indonesia. According to data from the Badan Pusat Statistik (BPS) in Indonesia 2022, the goat population reached 18,560,835. West Java is a province that has a goat population of 1,373,978 (Badan Pusat Statistik, 2024). Indonesia's goat population is very diverse, including the etawa crossbreed goat.

Etawa crossbreed goats have long, soft, drooping ears with slightly curved tips. Etawa crossbreed goats also have convex, curved faces, and bearded chins with wattles growing from the corners of the beard under the neck (Christi et al., 2019). This goat has a tall, flat body with a wavy back line, and its horns have a slight curve at the tips—long and thick thigh hair, on the shoulders, back, neck, and thighs. Although rarely found, goats can have single colours such as brown, black, and white. Etawa crossbreed goats generally have two- or three-colour patterns, such as black, brown, or white with black spots (Batubara et al., 2006). The bucks have hair on the lower and upper parts of the neck, and on the shoulders and back thighs; the hair grows longer. Meanwhile, long hair (*rewos*) only grows around the back thighs of female etawa crossbreed goats.

The maintenance of Etawa crossbred goats as milk and meat producers has great potential due to their ability to adapt to tropical and subtropical regions, making them suitable for the climate in Indonesia (Sumartono et al., 2016). The high adaptability of Etawa crossbred goats to environmental conditions in Indonesia is one of the main reasons why this type of livestock is in great demand by farmers (Budisatria et al., 2018; Rusdiana et al., 2016).

Existing goat farming businesses can be improved through efforts to evaluate the performance of the goats. Determining body weight and size is important for assessing the quality of livestock, especially in selecting breeds (Sulastri et al., 2020; Syamsi et al., 2023). Requirements for selecting breeds usually use criteria for body weight and body size of livestock. Selection of breeds is often carried out to select superior breeds to increase livestock productivity (Saputra et al., 2023). The process of selecting livestock to be used as parents for future generations is called selection (Purwanti et al., 2019).

Goats are selected as breeds based on their qualitative and quantitative characteristics. Body size, such as body length, shoulder height, chest circumference, and body weight, is a quantitative characteristic that must be considered. The quantitative characteristics of a goat are determined by genetic and environmental influences (Basbeth et al., 2015; Swuandana et al., 2022). Optimal growth and weight gain can be achieved by increasing the feed composition, which is influenced by the genetic factors of the livestock (Purnomo, A., 2003). Therefore, the body size of the livestock must also be considered in the selection of candidate breeds. Quantitative traits related to production are information that can be used as a basis for standardization. Livestock development needs information about quantitative traits (Khasanah et al., 2022; Rasminati, 2017).

The selection of etawa crossbreed goats can be done by considering quantitative characteristics, including animal age, body weight, and body size. Determining the size and weight of livestock is very important in selecting breeds so that body size and body weight are included in the criteria in the selection process (Tagoi et al., 2020). Quantitative traits that correlate with the composition and condition of the livestock's body are body size and weight. In addition, body measurements such as chest circumference, body length, and shoulder height are also included in the assessment of the physical performance of livestock (Septian et al., 2015; Tama et al., 2016).

Given the importance of selecting livestock with the best genetic advantages to improve performance, research on the quantitative characteristics of the Etawa crossbreed goats is fundamental. Livestock productivity usually uses body measurements such as shoulder height, body length, and chest circumference.

MATERIALS AND METHODS

The total number of Etawa crossbred goats measured was 33, with ages <1 year, 1-2 years, and >2 years, which are livestock used as research objects in Sidamulih District, Pangandaran Regency, West Java Province. The livestock used are spread across groups around the Sidamulih District, Pangandaran Regency. This study uses a quantitative descriptive research

methodology, namely statistical analysis, to analyze, summarise, and describe quantitative data (Sudirmana et al., 2023).

Research Procedure

The data collection process was carried out directly in the field using Etawa crossbred goats as the object. The goats measured were female and male goats aged <1 (less than one year), 1-2 (one to two years), and >3 (more than three years) by measuring the body weight and body measurements of the goats.

Observed Variable

The observed variables include body length, shoulder height, chest circumference, and body weight. The method of measuring body weight is to weigh the observed variables (Djegho et al., 2021).

Shoulder Height

Shoulder height is measured perpendicularly from the top of the shoulder (os. vertebrae thoracic) to the ground using a measuring stick in centimetres (cm).

Body Length

Body length measurement is measured from the humerus bone's edge to the ischial tuberosity. Measured in centimetres (cm) using a measuring stick.

Chest Circumference

Chest circumference measurement is done by measuring around the chest cavity behind the shoulder joint (os scapula) using a measuring tape in cm units.

Body Weight

Individual goat weight measurement is carried out by weighing the goat using a kilograms (kg) digital scale. Weighing is carried out before grazing or feeding.

Data Analysis

The data obtained is then processed descriptively and analytically to produce frequency and percentage values, in addition to a number of other statistical metrics (Nazir, 2011; Sudirmana et al., 2023). The data is then described against the minimum value, maximum value, average value, standard deviation, and coefficient of variation. These values can be calculated using the formula (Sastrosupandi, 1994; Sudjana, 2005).

Minimum value

The minimum value is the smallest data value from a population or observed variable.

Maximum value

The maximum value is the most significant data value from a population or observed variable.

Average / Mean

The average / mean is the value obtained from all the data points divided by the number of data points, using the formula:

$$\bar{x} = \frac{\sum xi}{n}$$

Description:

\bar{x} = Average value

xi = Value of the i-th sample

n = Number of samples

Standard Deviation

Standard deviation is the degree of spread of data from its mean, calculated using the formula:

$$s = \sqrt{\frac{\sum (xi - \bar{x})^2}{n}}$$

Description:

s = Standard deviation

\bar{x} = Arithmetic mean value

\bar{x}_i = Value of the i sample

n = Number of samples

Coefficient of Variations

The coefficient of variation is a measure used to determine the magnitude of data variation, calculated using the formula:

$$KV = \frac{s}{\bar{x}} \times 100\%$$

Description:

KV = Coefficient of Variation

s = Standard deviation

\bar{x} = Arithmetic mean value

RESULTS AND DISCUSSION

Based on the coefficient of variation in Table 1, it can be seen that the shoulder height data of the Etawa crossbreed goats is relatively uniform, but in the Doe aged <1 year, it is not uniform. The uniformity in the body length of does and bucks in Sidamulih District is due to the grouping carried out on livestock based on age, and they are not too far apart. The non-uniformity of Doe aged <1 year is caused by the difference in age and growth rate, which is quite far from that of the goat.

Table 1. Description of The Shoulder Height of Etawa Crossbred Goats.

Description	Doe			Buck		
 Age (years).....					
	<1	1-2	>2	<1	1-2	>2
Number of goats (head)	4	8	4	2	10	5
Average (cm)	51.37	73.88	77.30	50.25	78.05	86.00
Minimum Value (cm)	41.00	63.00	69.50	48.50	76.30	76.30
Maximum Value (cm)	61.50	83.00	85.00	52.00	80.00	100.00
Standard Deviation (cm)	9.88	7.09	6.39	1.75	1.22	7.62
Coefficient of Variations (%)	19.24	9.60	8.27	3.48	1.56	8.86

The maximum values in Table 1 regarding the shoulder height of Doe aged <1 year, 1-2 years, >2 years are 61.50 cm, 83.00 cm, 85.00 cm, and 89.00 cm. Meanwhile, the maximum shoulder height values in bucks aged <1 year, 1-2 years, and >2 years are 52.00 cm, 80.00 cm,

and 100.00 cm. The minimum values in Table 3 regarding the shoulder height of Doe aged <1 year, 1-2 years, and >2 years are 41.00 cm, 63.00 cm, and 69.50 cm. Meanwhile, the minimum shoulder height values in buck goat aged <1 year, 1-2 years, and >2 years are 48.50 cm, 76.30 cm, and 76.30 cm.

The average shoulder height in doe aged <1 year, 1-2 years, and >2 years was 51.37±10.37 cm, 73.88±10.88 cm, 77.30±7.80 cm and in bucks was 50.25±1.75 cm, 78.05±1.95 cm, and 86.00±9.70 cm. According to the SNI requirements, the average shoulder height of Doe aged <1 year, 1-2 years and >2 years is 60.00±50.00 cm, 71.00±50.00 cm, 75.00±50.00 cm and in bucks it is 67.00±50.00 cm, 75.00±80.00 cm, 87.00±50.00 cm. These results indicate that Doe and bucks aged 1-2 years and >2 years have 33 met the SNI requirements. Doe aged <1 year do not meet the SNI requirements, as do male goats aged <1 year and >2 years, which do not meet the SNI requirements (Badan Standar Nasional Indonesia, 2008).

Based on the coefficient variation in Table 2, it can be seen that the data on the body length of etawa crossbreed goats in Sidamulih District is relatively uniform, but in females aged <1 year, it is not uniform. This aligns with the opinion that livestock populations with a coefficient of variation value below 15% are still considered uniform. The uniformity of body length in does and bucks in Pangandaran District can occur because the grouping is based on age and growth rate, which are not too far from each age group of the goats. The non-uniformity of Doe aged <1 year 30 is caused by the difference in age and growth rate, which are quite far from the goats.

Table 2. Description of The Body Length of Etawa Crossbred Goats.

Description	Doe			Buck		
 Age (years)					
	<1	1-2	>2	<1	1-2	>2
Number of goats (head)	4	8	4	2	10	5
Average (cm)	53.10	72.92	78.55	51.90	76.83	81.80
Minimum Value (cm)	40.00	62.00	65.80	51.30	71.00	71.00
Maximum Value (cm)	67.00	81.00	89.00	52.50	81.00	94.00
Standard Deviation (cm)	11.76	5.97	8.50	0.60	3.48	6.49
Coefficient of Variations (%)	22.15	8.19	10.82	1.16	4.53	7.94

The maximum values in Table 2 regarding the body length of Doe aged <1 year, 1-2 years, and >2 years are 67.00 cm, 81.00 cm, and 89.00 cm. Meanwhile, the maximum body length values in bucks aged <1 year, 1-2 years, and >2 years are 52.50 cm, 81.00 cm, and 94.00 cm. The minimum values in Table 3 regarding the body length of Doe aged <1 year, 1-2 years, and >2 years are 40.00 cm, 62.00 cm, and 65.80 cm. Meanwhile, the minimum body length values in bucks aged <1 year, 1-2 years, and >2 years are 51.30 cm, 71.00 cm, and 71.00 cm.

The average body length of Doe aged <1 year, 1-2 years, and >2 years was 53.10±13.90 cm, 72.92±10.92 cm, 78.55±12.75 cm, and in bucks it was 51.90±0.60 cm, 76.83±5.83 cm, and 81.80±12.20 cm. According to the SNI requirements, the average body length of Doe aged <1 year, 1-2 years, and >2 years is 50.00±50.00 cm, 57.00±50.00 cm, 60.00±50.00 cm, and in bucks it is 53.00±80.00 cm, 61.00±70.00 cm, 63.00±50.00 cm. These results indicate that Doe and bucks aged 1-2 years and >2 years have met the SNI requirements, while Doe and bucks aged <1 year do not meet the SNI requirements.

Table 3. Description of The Chest Circumference of Etawa Crossbred Goats.

Description	Doe			Buck		
 Age (years)					
	<1	1-2	>2	<1	1-2	>2
Number of goats (head)	4	8	4	2	10	5
Average (cm)	51.25	78.50	82.50	52.25	82.83	90.20
Minimum Value (cm)	42.00	74.00	69.00	50.50	71.00	76.00
Maximum Value (cm)	67.50	83.00	89.00	52.00	86.00	101.00
Standard Deviation (cm)	9.86	3.67	7.79	1.75	3.62	7.08
Coefficient of Variations (%)	19.25	4.68	9.47	3.35	4.32	7.85

Based on the coefficient variation in Table 3, it can be seen that the chest circumference data of crossbreed goats in Sidamulih District is relatively uniform, but in Doe aged <1 year, it is not uniform due to the coefficient variation obtained being 19.25%. Livestock populations that have a coefficient of variation value below 15%. Uniformity of chest circumference in female etawa crossbreed goats aged 1-2 years, >2 years, and bucks aged <1 year, 1-2 years, >2 years in Sidamulih District is caused by the age difference that is not too far, and maintenance with the same treatment on the goats. At the same time, the non-uniformity of female etawa crossbreed goats aged <1 year is caused by the age difference, which is quite far from the goats. Age can affect goats' body proportions (Pålsson & Vergés, 1952). The growth rate from birth to sexual maturity is rapid (Budiarsana M., 2005; Sugiharto, 2022; Sugiharto et al., 2021). However, the growth rate slows and remains low after sexual maturity (Faqih et al., 2022; Sudarmono & Sugeng, 2008; Sutiyono et al., 2006). Based on Table 3, it can be seen that the growth of chest circumference in bucks is greater than that of Doe. The growth of chest circumference performance in Doe and bucks in Sidamulih District has increased, although not too high. The average chest circumference in female goats aged <1 year, 1-2 years, and >2 years is 51.25 ± 16.25 cm, 78.50 ± 4.50 cm, and 82.25 ± 13.25 cm and in males, it is 51.90 ± 0.60 cm, 82.83 ± 6.83 cm, and 90.20 ± 14.20 cm.

The average chest circumference of Doe aged <1 year, 1-2 years, >2 years according to SNI requirements is 63.00 ± 60.00 cm, 76.00 ± 70.00 cm, and 81.00 ± 70.00 cm, and in bucks it is 71.00 ± 60.00 cm, 80.00 ± 80.00 cm, and 89.00 ± 80.00 cm. These results indicate that Doe and bucks aged 1-2 years and >2 years have met SNI requirements, while Doe and bucks aged <1 year do not meet SNI requirements. Based on the coefficient of variation in Table 4, the values obtained for the body weight of nanny and bucks in Sidamulih District show that the data on the body length of etawa crossbreed goats in Sidamulih District are relatively uniform. However, in females, there are differences in feeding. Besides genetics, feed also plays an important role in supporting the increase in livestock body weight (Mulyono S., 2000; Nafiu et al., 2020). In this study, the goats used were livestock with intensive maintenance, so feeding depends on the farmer (Susilorini, 2008). According to Girsang & Gurusinga (2016), the greater the variation produced, the greater the possibility of overall quality improvement.

Table 4 shows that the growth of body weight performance in Doe and bucks in Sidamulih District experienced a high increase in performance. This can occur because the increase in body weight is related to the increasing age of the livestock. The increase in performance is thought to be influenced by the goat breed and the age of the livestock, which are estimated to be non-uniform (Nurmediansyah et al., 2017).

The maximum values in Table 4 regarding the body weight of Doe aged <1 year, 1-2 years, and >2 years are 27.00 cm, 47.00 cm, and 57.00 cm. The maximum body weight values in bucks aged <1 year, 1-2 years, and >2 years are 15.00 cm, 55.00 cm, and 74.00 cm. The minimum values in Table 4 regarding the body weight of Doe aged <1 year, 1-2 years, and

>2 years are 8.00 cm, 38.00 cm, and 51.00 cm. The minimum body weight values in bucks aged <1 year, 1-2 years, and >2 years are 14.00 cm, 33.00 cm, and 41.00 cm.

Table 4. Description of The Body Weight of Etawa Crossbred Goats.

Description	Doe			Buck		
 Age (years)					
	<1	1-2	>2	<1	1-2	>2
Number of goats (head)	4	8	4	2	10	5
Average (cm)	17.50	42.13	53.00	14.50	43.20	68.40
Minimum Value (cm)	8.00	38.00	1.00	14.00	33.00	41.00
Maximum Value (cm)	27.00	47.00	57.00	15.00	55.00	74.00
Standard Deviation (cm)	8.56	3.72	2.35	0.50	5.93	4.32
Coefficient of Variations (%)	48.91	8.84	4.42	3.45	13.72	6.31

Table 4 shows the results of the average body weight of Doe at the ages of <1 year, 1-2 years, and >2 years of 17.50±9.50 kg, 42.13±4.88 kg, 53.00±4.00 kg, then the average body weight of bucks at the ages of <1 year and 1-2 years, and >2 years of 14.50±0.50 kg, 43.20±11.80 kg, and 68.40±27.40 kg. According to SNI requirements, the average body weight of Doe aged <1 year, 1-2 years, and >2 years is 22.00±5.00 kg, 34.00±6.00 kg, 41.00±7.00 kg, and in bucks it is 29.00±5.00 kg, 40.00±9.00 kg, 54.00±11.00 kg. These results indicate that Doe and bucks aged 1-2 years and >2 years have met SNI requirements, while Doe and bucks aged <1 year do not meet SNI requirements.

Aged <1 year is not uniform. The very high coefficient of variation value for body weight can be triggered by bucks aged <1 year, 1-2 years, and >2 years, which are 15.00 cm, 55.00 cm, and 74.00 cm. The minimum values in Table 4 regarding the body weight of Doe aged <1 year, 1-2 years, and >2 years are 8.00 cm, 38.00 cm, and 51.00 cm. The minimum body weight values in bucks aged <1 year, 1-2 years, and >2 years are 14.00 cm, 33.00 cm, and 41.00 cm.

Table 4 shows the results of the average body weight of Doe at the ages of <1 year, 1-2 years, and >2 years of 17.50±9.50 kg, 42.13±4.88 kg, 53.00±4.00 kg, then the average body weight of bucks at the ages of <1 year and 1-2 years, and >2 years of 14.50±0.50 kg, 43.20±11.80 kg, and 68.40±27.40 kg. According to SNI requirements, the average body weight of nanny goats aged <1 year, 1-2 years, and >2 years is 22.00±5.00 kg, 34.00±6.00 kg, 41.00±7.00 kg, and in bucks it is 29.00±5.00 kg, 40.00±9.00 kg, 54.00±11.00 kg. These results indicate that Doe and bucks aged 1-2 years and >2 years have met SNI requirements, while Doe and bucks aged <1 year do not meet SNI requirements.

CONCLUSION

It concluded that the body measurements of Etawa Crossbred Goats are in Sidamulih District, Pangandaran Regency. These results indicate that female and male goats aged 1-2 years and >2 years have met the SNI requirements. Female goats aged <1 year do not meet the SNI requirements, while male goats aged <1 year and >2 years do not meet the SNI requirements.

CONFLICT OF INTEREST

A statement that there is no conflict of interest with any party regarding the material discussed in the article, funding, and differences of opinion between the authors.

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