

## Study of Characteristics of Samosir Panorusan Goat in Samosir District

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### ABSTRACT

*This study aims to determine Panorusan Samosir goat's characteristics in Samosir district. The method used in this research is the observation method. The sampling technique was purposive sampling, namely 64 samples consisting of 7 males goat, 30 broodstock, 20 female lamb, 9 male lamb for quantitative traits while 264 qualitative traits. The data collected are quantitative characteristics including: body weight, body length, shoulder height, chest circumference, chest width, chest depth and ear length while for qualitative characteristics include: coat color, ear shape, horn color and nail color of Panorusan Samosir goats in the district Samosir. The data that has been collected was analyzed using the T-test. The average value of the quantitative characteristics of Panorusan Samosir goats was analyzed using the T2-hoteling statistical test, then principal component analysis was used to identify quantitative traits in goats. Data processing was assisted by using statistical software SPSS 20. The results showed that gender did not affect the quantitative characteristics of the Panorusan Samosir goats, while for the qualitative characteristics, namely the color of the coat was still dominated by white (57.44%), the shape of the ears was erect (72, 92%), the color of the horns is dominated by white (69.32%), and the color of the nails is also dominated by white (79.17).*

### KEYWORDS

*quantitative characteristics; qualitative properties; Panorusan Samosir goat.*

## INTRODUCTION

Goat is a livestock commodity that has good development prospects in meeting the needs of meat. Goats are quite popular with the community because they have their own characteristics in their meat and are relatively cheap compared to beef and are often used in religious events or there are customs. One of the local goats that has the potential to be developed is the Panorusan Samosir goat in Samosir district, North Sumatra province. Panorusan Samosir goat is a germplasm owned by North Sumatra province, precisely Samosir district. Where this area has the potential of the area with wide enough grazing land so that it is potential enough for the development of goat livestock.

Panorusan Samosir Goat is a germplasm owned by North Sumatra Province, precisely Samosir Regency. Where this area has the potential of the area with wide enough grazing land so that it is potential enough for the development of goat livestock. However, the management of livestock cultivation is still very simple, apart from that the livestock owned by the community are still very small and the maintenance system applied is still traditional. Historically, this goat has been kept by local residents for generations on Samosir Island, in the middle of Lake Toba, Samosir Regency, North Sumatra Province.

Preservation of Samosir goat germplasm is to collect basic data in the form of characteristics of Samosir goats such as qualitative and quantitative characteristics in the population by means of characterization. Characterization is an activity in order to identify the important characteristics possessed by Samosir goats which have economic value or are the identifiers of the family in question. The purpose of characterization is to obtain data on the nature or morphological description of goats which aims to determine the various phenotypes and how much genetic diversity such as coat color, ear shape and earlobe length (Nurfaizin and Matitaputty, 2017). Quantitative characteristics are the characteristics of livestock that appear from the outside and can be described through: body weight (BW), body length (BL), shoulder height (SH), chest circumference (ChC), chest depth (ChD), chest width (ChW), hip height (HH), canon circumference (CC) and scrotum (SC).

This characterization is a very important basis for knowing population structure, effective conservation plans and the use of genetic resources in the future so that breeders or the government can take action in handling the preservation of the Samosir goat.

## RESEARCH METHODS

This research was conducted in Samosir Regency. This research was conducted from July to August 2022. The material used was 64 Panorusan Samosir goats to identify quantitative traits, while 264 were used for qualitative traits. The tools used are scales, measuring tape and long ruler

The methods used in this study were interviews and direct observation. The sampling technique was carried out by purposive sampling and 64 goats were used for quantitative characteristics and 264 goats for qualitative characteristics of BW Panorusan Samosir goats. Data collected in the form of quantitative characteristics including chest circumference (ChC), chest depth (ChD), chest width (ChW) and hip height (HH) were then grouped based on gender, namely male and female. As for the qualitative nature of the data collected includes coat color, ear shape, horn color and nail color. Research sampling was carried out in all sub-districts that have Panorusan Samosir goats in Samosir district.

The analytical method used to process data quantitatively and qualitatively. Quantitative analysis was analyzed by means of statistics, namely obtaining the average quantitative data. While qualitative analysis by describing data and qualitative characteristics that have been determined.

The diversity of the quantitative properties of the panorusan samosir goat is obtained by calculating based on the formula;

1. Average (Mean), namely the number obtained from the entire amount of data divided by the number of sample data. The formula is: 
$$\bar{x} = \frac{\sum_{i=0}^n Xi}{n}$$

Description: Xi = Total data, n = Number of sample data i = 1,2, ... n = Average sample Source: (Sudjana, 2002)

2. Variety (S<sup>2</sup>) is the average squared deviation of each individual. The formula is:

$$s^2 = \frac{n \sum x_i^2 - (\sum x_i)^2}{n(n-1)}$$

Description: Xi = Value of each individual in the sample  $\mu$  = Sample mean n = Number of sample data i = 1,2,...n s<sup>2</sup> = Variety of samples Source: (Sudjana, 2002).

3. Standard Deviation (sd) is the root of the variance. The formula is:  $s = \sqrt{s^2}$

Description: S = sample s<sub>2</sub> = Variety of samples Source: (Sudjana, 2002)

4. The coefficient of variation (KV), is an illustration of the diversity of a trait being measured.  $KV = \frac{s}{\bar{x}} \times 100\%$

Description: s = Standard deviation of the sample = Average of the sample Source: (Sudjana, 2002).

Then analyzed again using the T test (Gaspersz, V. 2006). Data processing is assisted by using Microsoft excel software and SPSS 20 statistics.

## RESULTS AND DISCUSSION

### *Quantitative characteristics of Panorusan Samosir goats*

Quantitative traits include body weight, chest circumference, chest depth, body length, shoulder height, chest width, ear length in Panorusan Samosir goats in Samosir Regency are presented;

**Table 1.** Variations in quantitative traits.

<b>Avarage</b>				
	Brood Goat	Male Goat	Male Lamb	Female Lamb
Body Weight (kg)	20,36±5,20 <sup>a</sup>	19,49±3,48 <sup>a</sup>	10,04±5,49	6,89±3,86
Chest Circumference (cm)	62,15±8,24 <sup>a</sup>	59,43±7,01 <sup>a</sup>	47,44±6,63	39,91±5,34
Chest Depth (cm)	23,62±3,13 <sup>a</sup>	22,58±2,66 <sup>a</sup>	18,03±2,52	15,17±2,03
Body Length (cm)	58,03±6,56 <sup>a</sup>	56,00±8,15 <sup>a</sup>	43,00±6,07	38,82±4,53
Shoulder Length (cm)	53,38±7,89 <sup>a</sup>	50,14±6,22 <sup>a</sup>	41,00±5,53	38,82±3,41
Chest Width (cm)	15,08±1,78 <sup>a</sup>	15,14±1,54 <sup>a</sup>	12,00±2,16	11,00±2,31
Ear Length (cm)	13,95±2,11 <sup>a</sup>	13,57±1,67 <sup>a</sup>	12,00±1,60	11,30±1,15
<b>Coefficient of Diversity</b>				
	Brood Goat	Male Goat	Male Lamb	Female Lamb
Body Weight (kg)	32,05	17,84	54,67	38,57
Chest Circumference (cm)	14,70	11,80	13,98	26,73
Chest Depth (cm)	19,59	11,80	13,98	13,38
Body Length (cm)	12,55	14,56	14,12	11,68
Shoulder length (cm)	16,21	12,41	13,48	8,78
Chest Width (cm)	12,83	10,15	18,02	21,04
Ear length (cm)	15,98	12,33	13,31	10,21

### **Body Weight**

Body weight (BW) is obtained by weighing or measuring using a measuring instrument so that the result is a number. In Table 1 it can be seen that the average body weight of panorusan broodstock, male, male and female goats on Samosir Island was 20.36 ± 5.20 kg, 19.49 ± 3.48 kg, 10.04 ± 5.49 and 6.89 ± 3.86 with a coefficient of variation of 32.05% in brood goats, 17.84% in male goats, 54.67% in male goats 38.57% in female goats The results of this study were compared with the doloksaribu study et al., (2015) the average body weight of broodstock panorusan goats was 23.4–33.94 kg and the body weight of broodstock panorusan goats was 23.4–33.94 kg. While the average body weight of female Panorusan goats in this study was 20.64 ± 5.67 kg in broodstock Panorusan goats and 18.48 ± 2.91 kg in panorusan goats. When compared, the results of this study are lower. In addition to the

age factor, the growth rate is also influenced by sex, birth weight, quality of feed consumed and the environment in which the livestock are reared.

### **Chest Circumference**

Circumference of the chest (shoulders) is measured around the chest cavity behind the shoulder joint (os scapula) measured with a measuring tape (cm). The mean breast circumference of broodstock, male, female and male goats on Samosir Island were  $62.15 \pm 8.24$  cm,  $59.43 \pm 7.01$  cm,  $47.44 \pm 6.63$  cm and  $47.44 \pm 6.63$  cm with a coefficient of variation of 14.70% in brood goats, 11.80% in male goats, 13.98% in male goats and 26.73% in female goats means that the coefficient of variation for chest circumference is high. The results of this study when compared with the study of doloksaribu et al., (2015) the average chest circumference of adult females is  $57.23 \pm 5.43$  cm and adult males is  $51.65 \pm 4.37$  cm. While the average chest circumference of female Panorusan goats in this study was  $62.60 \pm 7.08$  kg in broodstock Panorusan goats and  $58.20 \pm 7.71$  kg in female panorusan goats. When compared, the results of this study are not much different from previous studies.

### **Chest Depth**

The average breast size of panorusan broodstock, male, male and female puppies on Samosir Island was  $23.62 \pm 3.13$  cm,  $22.58 \pm 2.66$  cm,  $18.03 \pm 2.52$  cm and  $15.17 \pm 2.03$  cm with a coefficient of variation of 19.59% in brood goats, 11.80% in male goats, 13.98% in male goats and 13.38% in female goats, meaning that the coefficient of variation for chest circumference is high. The results of this study when compared with the study of doloksaribu et al., (2015) The mean in the chest of adult females is  $28.67 \pm 4.21$  cm and  $21.41 \pm 4.12$  cm for adult males. While the average chest circumference of female Panorusan goats in this study was  $23.79 \pm 2.69$  cm in broodstock Panorusan goats and  $22.12 \pm 2.93$  cm in male Panorusan goats.

### **Body Length**

Body length is the distance in a straight line from the outer edge of the scapula bone to the protrusion of the sieve bone (os ischium). The average body length of Panorusan goats, male, male and female puppies on Samosir Island is  $58.03 \pm 6.56$  cm,  $56.00 \pm 8.15$  cm,  $43.00 \pm 6.07$  cm and  $38.82 \pm 4.53$  cm with a coefficient of variation of 12.55 % in brood goats, 14.56 % in male goats, 14.12 % in male goats and 11.68% in female goats, meaning that the coefficient of variation for body length is high

The results of this study when compared with the study of doloksaribu et al., (2015) the average body length of Panorusan brood goats was  $57.61 \pm 5.33$  cm and for males  $52.41 \pm 5.61$  cm. While the average chest circumference of female Panorusan goats in this study was  $58.23 \pm 5.40$  cm in broodstock Panorusan goats and  $55.20 \pm 8$  cm in female panorusan goats.

### **Shoulder Height**

Shoulder height is from the shoulder to the ground, measured with a measuring tape (Cm) seen the average body length of panorusan broodstock, male, male and female offspring on Samosir Island is  $53.38 \pm 7.89$  cm,  $50.14 \pm 6.22$  cm,  $41.00 \pm 5.53$  cm and  $38.82 \pm 3.41$  cm with a coefficient of variation of 16.21 % in brood goats, 12.41 % in male goats, 13.48 % in male goats and 8.78% in female goats, meaning that the coefficient of variation for shoulder height is high. The results of this study when compared with the study of doloksaribu et al., (2015) The average shoulder height of adult females is  $50.65 \pm 5.28$  cm and adult males is  $48.30 \pm 6.37$  cm. While the average chest circumference of female Panorusan goats in this study was  $53.40 \pm 4.92$  cm in broodstock Panorusan goats and  $49.40 \pm 6.23$  cm in male

Panorusan goats. The shoulder height of an animal is also part of livestock growth which is influenced by several factors, namely livestock breed, sex, genetics, feed, age and maintenance management (Syefridonal, 2007)

### **Chest Width**

The width of the chest is the distance between the center of the left and right sternum. The mean chest width of panorusan broodstock, male, male and female goats on Samosir Island were  $15.08 \pm 1.78$  cm,  $15.14 \pm 1.54$  cm,  $12.00 \pm 2.16$  cm and  $11.00 \pm 2.31$  cm with a coefficient of variation of 12.83% in brood goats, 10.15% in male goats, 18.02% in male goats and 21.04% in female goats, meaning that the coefficient of variation for chest width is moderate up high. This diversity is partly due to differences in maintenance and feeding management (Suryana et al., 2011)

The results of this study when compared with the study of Khairiah et al., (2021) The average shoulder height of adult females is  $10.17 \pm 0.79$  cm and adult males is  $11.41 \pm 0.96$  cm. While the average chest circumference of female Panorusan goats in this study was  $15.17 \pm 1.87$  cm in broodstock Panorusan goats and  $14.60 \pm 2.28$  cm in male Panorusan goats.

### **Ear Length**

The average ear length of panorusan broodstock, male, male and female goats on Samosir Island were  $13.95 \pm 2.11$  cm,  $13.57 \pm 1.67$  cm,  $12.00 \pm 1.60$  cm and  $11.30 \pm 1.15$  cm with a coefficient of variation of 15.98% in brood goats, 12.33% in male goats, 13.31% in male goats and 10.21% in female goats, meaning that the coefficient of variation for ear length is high

In this study, the quantitative traits found were lower than the published letters of the Ministry of Agriculture, including body weights found, namely  $20.36 \pm 5.20$  kg for females and  $19.49 \pm 3.48$  kg for males. Meanwhile, for other quantitative characteristics, the results of this study are almost similar to the letter issued by the Ministry of Agriculture. The results of this study are also lower than the research conducted by doloksaribu in 2015.

Differences in the results of this study could be caused by genetic and environmental factors such as the maintenance system and the feed given. Quantitative characteristics of a livestock are part of livestock growth which is influenced by several factors, namely livestock breed, sex, genetics, feed, age and maintenance management (Syefridonal, 2007)

The diversity characteristics obtained were also quite high, because the Panorusan Samosir goats found were also varied and the rearing systems used were also different. The diversity of quantitative traits between individuals is not the same, because each individual already has the ability to express quantitative traits since the zygote is formed (Kurnianto, 2009). and this diversity is partly due to differences in rearing and feeding management (Suryana et al., 2011) and supported by Akhtar et al., (2021) this diversity of phenotypic traits is influenced by genetic elements and environmental factors from the location of the livestock rearing.

### **Quantitative Properties**

Qualitative traits including coat color, ear shape, horn color and hoof color in Panorusan Samosir goats in Samosir Regency are presented in table 2. Variations in qualitative traits

**Table 2.** Variation of qualitative properties

Feather Color			Ear Shape		
White	White And Black	White and Chocolate	Upright	Falldown	Multiple
56,44	19,70	23,86	79,92	19,32	0,76
Horn Color			Nail Color		
White	Chocolate	Balck	White	Chocolate	Black
69,32	15,53	15,15	82,20	11,0	6,06

Based on Table 2, the coat color of the Panorusan goat is white 56.44% white and black 19.70%. And white chocolate 23.86%. The results of this study are lower than those reported by Doloksaribu et al. (2015), the distribution of colors obtained was: on the body 79 tails (81.44%) were white and 18 tails (18.56%) were black and white stripes. There is a decrease in the percentage of coat color of the Panorusan Samosir goat due to genetic factors and also environmental factors that have also changed. Based on Table 2, the shape of the ears in Panorusan goats, namely upright 79.92%, falling 19.32% and folded 0.76%. The horn color of Panorusan goats is 72.35% white, 15.53% brown. And black 15.15 %. Hoof color in panorusan goats, namely 79.17% white, 11.74% brown. and black 6.06%. According to the Ministry of Agriculture (2017) the qualitative characteristics of the Panorusan Samosir goat include fur color, namely white and a combination of black and white stripes, horn color, namely brown and the shape of the ears, namely medium, upright type facing to the side. The results of research related to qualitative characteristics are still dominated by the qualitative characteristics contained in the letter from the Ministry of Agriculture, but there have been a number of goats which have experienced a shift in qualitative characteristics, such as the presence of a white-brown color on the fur, having black horns, black and brown hooves. This happens due to genetic factors from livestock. The resulting genetics comes from mating Panorusan Samosir goats with other goats or even inbreeding such as kacang goats to produce crossbreeds of the two. Different types of mating systems occur due to a lack of males owned by breeders so breeders take the initiative to marry panorusan samosir goats with other male goats or breeders lend their males to each other for mating or when goats are herded breeders do not know cross-breeding has occurred between panorusan samosir goats and other types of goats so that children produced based on the results of crosses when shepherding. The lack of male Panorusan Samosir goats is caused by breeders selling males due to the very high price of males used for certain rituals and customs.

The lower percentage of qualitative traits from previous studies was due to several factors, namely environmental factors such as changing weather conditions, the quality and quantity of feed given. This is in accordance with the opinion of Praharani (2007) which states that the color of livestock fur is probably caused by environmental factors such as temperature, solar radiation, humidity, and the quality and quantity of feed.

## CONCLUSION

Based on the results and discussion, it can be concluded that the quantitative characteristics obtained were lower than previous studies, especially on body weight. Quantitative traits are not influenced by gender and have a fairly high diversity.

The qualitative characteristics of the Panorusan Samosir goat still have a large percentage which are classified as pure qualitative traits, but farmers are still wary of the current conditions because qualitative traits are found that are far from original in one farm.

### **Suggestion**

In maintaining the qualitative and quantitative characteristics of Panorusan Samosir goat, special attention is needed, such as supervision in the mating system used, the quantity and quality of the feed given and the maintenance management applied and the number of males traded so that the males kept are not reduced.

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