

Exterior characteristics and body measurements of Bligon goat on the different agro-ecological zones in Bantul District, Yogyakarta, Indonesia

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Abstract. Rahmawati RD, Atmoko BA, Budisatria IGS, Ngadiyono N, Panjono. 2021. Exterior characteristics and body measurements of Bligon goat on the different agro-ecological zones in Bantul District, Yogyakarta, Indonesia. *Biodiversitas* 23: 143-150. The Bligon goat is one of the goat breeds those farmers mostly keep in Bantul District, Yogyakarta, Indonesia. This study was conducted to determine the exterior characteristics of Bligon goat in different agro-ecological zones in Bantul District. A total of 478 Bligon goats taken from highlands (146 head), lowlands (163 head), and coastal (169 head) were observed and grouped by age (0-6 months), young (6-18 months), and adults (>18 months). The data observed included qualitative traits (body color distribution and ear shape) and quantitative traits (withers height, chest girth, body length, ear length, and body weight). Qualitative data were analyzed descriptively, and quantitative data were analyzed using one-way analysis of variance. The results showed that the head hair coat color of Bligon goats was mostly striped (pied), with the percentages in the highland, lowland, and coastal zones being 71.9%, 69.2%, and 67.7%, respectively. The body hair coat color in the highland (52.1%) and lowland (39.6%) were striped primarily, while on the coast, it was white (70.7%). The crest color in the highland (69.9%) and lowland (44.7%) were mostly a mixture of brown, black, and white, while on the coast, it was white (70.1%). The mane ruff (*rewos*) color in the highland (88.4%), lowland (57.9%), and coast (59.3%) were primarily a mixture of brown, black, and white. Ear shapes in the highland (92.5%) and lowland (73.6%) are open principally, while in the coastal areas are mostly folded (56.9%). The average body size of Bligon goats in the coastal zone was larger than in the lowlands ($P < 0.05$), and in the lowlands was larger than in the highlands ($P < 0.05$). It was concluded that the different agro-ecological zones in Bantul District have different exterior characteristics in Bligon goats both qualitatively and quantitatively.

Keywords: Bligon goat, Indonesian goat, phenotypic characteristics, qualitative traits, quantitative traits

INTRODUCTION

Indonesia is an archipelagic country with diverse natural resources in each region (Ibrahim et al. 2020a). Small ruminants have an essential role in fulfilling meat needs and religious celebrations in Indonesia (Ibrahim et al. 2019a). Goats are one of the small ruminants popular with the community and are widely kept by farmers in Indonesia. Raising goats has several advantages, such as relatively fast-breeding, accessible housing and maintenance, and relatively small capital required (Budisatria and Udo 2013; Atmoko et al. 2020). Goats have an essential role in the development and progress of the agricultural business system in Indonesia, so it needs to be maintained and improved in quality (Budisatria et al. 2010). Bantul District has excellent potential in the livestock sector. Based on the population density of goats in the Special Region of Yogyakarta Province, the Bantul District has the highest population density of goats according to statistical data in 2019, which is 99,750 heads (BPS-Statistics of Yogyakarta 2020).

Most of the goats kept in Bantul District are Bligon goat breeds. Bligon goat is the result of a cross between Kacang goat and Etawah goat so that it has characteristics

between Kacang and Etawah grade goats. These crosses resulted in a new breed later called the Jawarandu goat (Bligon goat), which has its uniqueness because it has different physical characteristics from the Etawah grade goat and the Kacang goat (Prihatiningrum 2013; Kusminanto et al. 2020; Budisatria et al. 2021). Bantul District can be categorized into three zones based on its agro-ecological zones: highland, lowland, and coastal zones. Several districts have the highest goat population in the three zones, namely the Dlingo District (19,342 heads) and Imogiri District (16,140 head) for the highland zone, the Pajangan District (5,429 head) for the lowland zone, and the Srandakan District (2,723 head) and Sanden District (1,680 head) for the coastal zone (BPS-Statistic of Yogyakarta 2020).

One of the variables that can be used as the basis for animal development is the exterior characteristics, namely the qualitative and quantitative traits of the body. A qualitative trait is an attribute that can be observed or seen and described directly so that each individual can be classified into several groups based on hair color, horn shape, and ear shape. Quantitative traits can be known through body size measurements (Ibrahim et al. 2020b). An animal's body size can estimate body weight and as the

body condition indicator (Wibowo et al. 2021). Until now, there is still not much-published data regarding the exterior characteristics of Bligon goats in Bantul District.

Qualitative and quantitative traits are strongly influenced by genetics, environment, and interactions. The effect of environmental change on the production process results from the behavioral response to change. On the other hand, local livestock or native livestock adapt well to the agro-ecological conditions of the area. Due to various ecological zones with unique climates and vegetation, goat populations in the studied area have also developed multiple characteristics that can be adapted morphologically to survive and reproduce in these environments (Hagan et al. 2012). Determination of the choice of commodities to be developed is based on the region's socio-economic and socio-cultural factors (Ibrahim et al. 2019b). The main component of agro-ecology is the uniformity of plants and animals as biotic elements and physical elements, such as climate, physiography, and soil (Damayanti 2013). According to Baenyi et al. (2020), the division of goat breeds and the relationship between geographical locations due to the vast geographical area, diverse climate, and topography of the area influenced by natural pressures can cause genetic differentiation of livestock. Agro-ecological zones significantly impact genetic variability among goat populations determined by

large geographic regions, diverse climates, and topography. According to Selolo et al. (2015), agro-ecological zones influence all morphological variables studied. This study was conducted to determine the exterior characteristics of Bligon goats in three agro-ecological zones in Bantul District, namely highlands, lowlands, and coastal zones.

MATERIALS AND METHODS

Ethical clearance

This research has obtained ethical clearance from the Research Ethics Commission of the Faculty of Veterinary Medicine, Universitas Gadjah Mada number 0034/EC-FKH/Ex./2020.

Study area

The study was conducted from October 2020 to June 2021. The study was conducted in five districts in Bantul District, Yogyakarta, Indonesia, including Dlingo, Imogiri (highland zone), Pajangan (lowland zone), Sanden, and Srandakan (coastal area) Districts. The location selection was based on purposive sampling based on the size of the livestock population. The research location is presented in Figure 1.

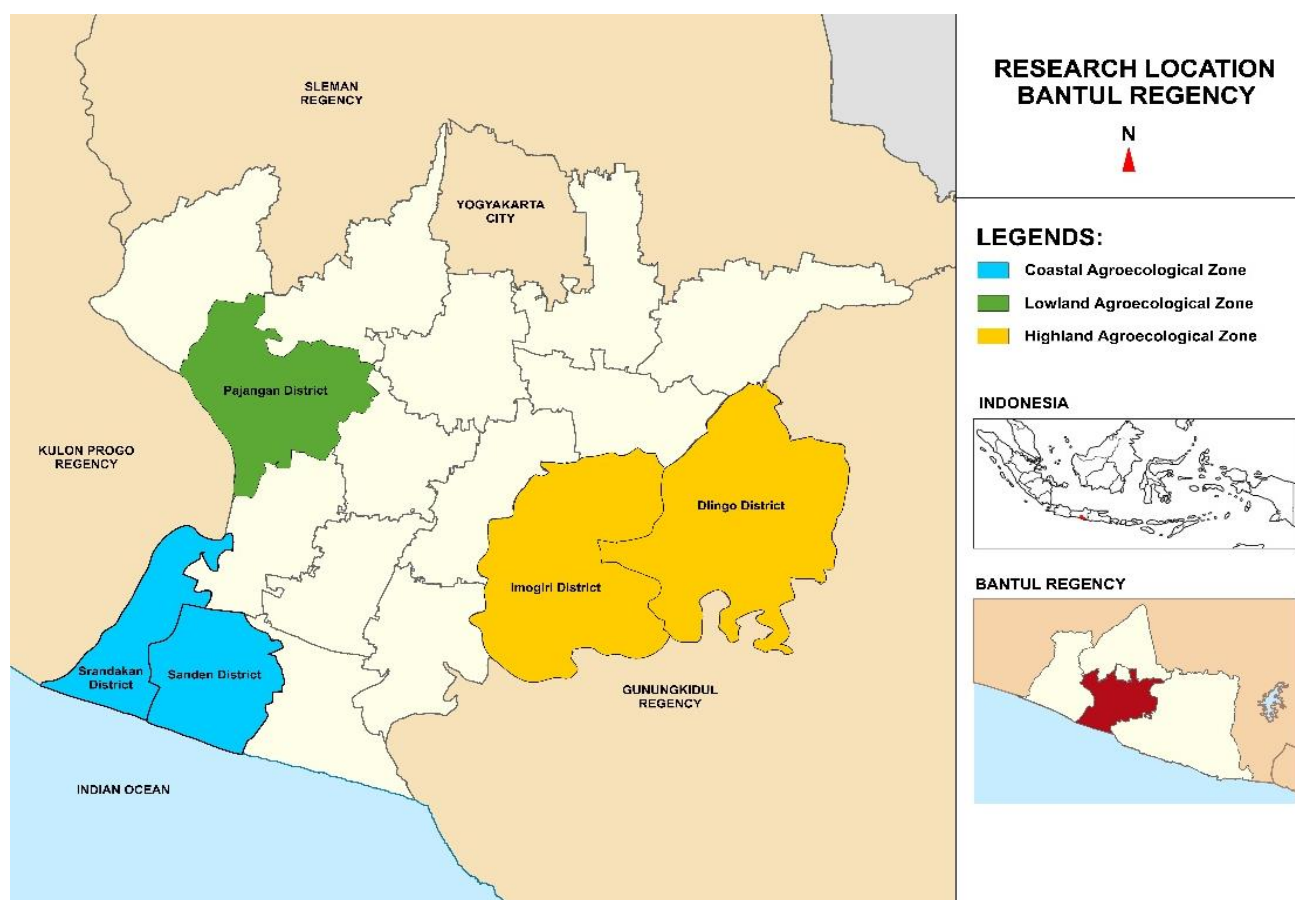


Figure 1. Research location on three agroecological zones of Bantul District, Yogyakarta, Indonesia

Bantul District is one of the regencies located in the Special Region of Yogyakarta, with an altitude of forty-five meters above sea level. Bantul District consists of a plain area in the middle, a highland area in the east and west, and a coastal area in the south. The condition of the landscape is stretched from north to south. Geographically, Bantul District is located between 14°04'50"-27°50'50" South Latitude and 110°10'41"-110°34'40" East Longitude. With an area of 508.13 km². The number of rainy days that fell during 2019 was 17 days, with the rainiest days occurring in January. While the largest amount of rainfall fell in March, reaching 511 mm³ (BPS-Statistic of Yogyakarta 2020). Based on data from the Bantul District Government (2020), Dlingo District has an altitude of two hundred meters above sea level, Imogiri District has an altitude of fifty-eight meters above sea level, Pajangan District has an altitude of thirty-eight meters above sea level, Sanden District has an altitude of nineteen meters above sea level, and Srandakan District has an altitude of twelve meters above sea level.

Animals

The livestock used in this study were 478 goats consisting of 146 heads in the highland zone, 163 heads in the lowland zone, and 169 heads in the coastal area. Goats consist of various sex and age that as shown in Table 1. Age is known based on interviews with farmers or changing incisors (Haryanti et al. 2015).

Animal measurements

The determination of the Bligon goats selected in the study based on the characteristic signs of the Bligon goats were slightly drooping ears, thick and longer than the head, slightly convex facial profile, few tufts (long coarse hair), and the brown (red), white, black, and a combination of these three colors with fine hair all over the body. Qualitative data were taken by identifying the observed goats, and quantitative data was taken by measuring the body size of the goats. The quantitative characteristics were viewed from several parameters, including shoulder height measured from a flat surface to the highest part of the shoulder through the scapular section perpendicularly, using a measuring tape, expressed in centimeters (cm). Body length was measured from the humerus (tuber humerus) to the tip of the sitting bone (tuber ischia), using a measuring tape, expressed in centimeters (cm). Chest girth was measured by wrapping a measuring tape on the chest behind the shoulder, expressed in centimeters (cm). Ear length was measured from a distance between the base to the tip of the ear using a measuring tape expressed in centimeters (cm), while body weight was measured using a calibrated scale represented in kilograms (kg) (FAO 2012). The measurement illustration is presented in Figure 2.

Animal management

The rearing system of Bligon goats in the three agro-ecosystem zones is conducted semi-intensively to intensively. Goats are housed in individual houses and colonies with the ground or stilt floors. The mating system occurred naturally. The feed given is mainly in the form of forage which is given 2-3 times a day in the morning, afternoon, and evening. Forage feed can be in the form of grass, legumes, and agricultural by-product. Some breeders provide concentrate feed that is given before forage feeding. The provision of drinking water is made ad libitum, but some only give water mixed with concentrate.

Data analysis

Qualitative data were analyzed by descriptive analysis (number and percentage). Quantitative data were analyzed using a one-way analysis of variance followed by the least significant difference (LSD) test based on differences in agro-ecological zones. The analysis was conducted with the help of the SPSS version 23 program.

Table 1. Details of the number of samples in the study

| Sex | Category | Highland | Lowland | Coastal | Total |
|--------|----------|----------|---------|---------|-------|
| Male | Kid | 13 | 21 | 9 | 43 |
| | Young | 41 | 48 | 55 | 144 |
| | Adult | 7 | 7 | 5 | 19 |
| Female | Kid | 12 | 26 | 17 | 55 |
| | Young | 28 | 21 | 31 | 80 |
| | Adult | 45 | 40 | 52 | 137 |

Note: Kid: 0-6 months old, young: 6-18 months old, adults: >18 months

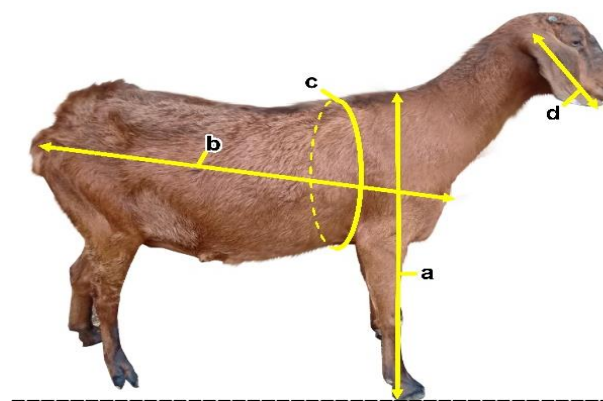


Figure 2. Body measurements scheme in Bligon goat: shoulder height (a), body length (b), chest girth (c), and ear length (d)

RESULTS AND DISCUSSION

Qualitative traits

An example of photographing Bligon goats in the three agro-ecological zones is presented in Figure 3. Qualitative characteristics are traits that cannot be measured but can be categorized. Qualitative traits include head hair color, body hair color, crest color, mane ruff (*rewos*) color, and ear shape. Data on the qualitative characteristics of Bligon goats were obtained from direct observations in the field. The following qualitative data on Bligon goats are presented in Table 2. The shape of the ears of Bligon goats in the highlands and lowlands is dominated by open ears, while in coastal areas, it is dominated by open ears. Each population observed has several variants of body hair color. Body hair color in Bligon goats was brown, black, white, and mixed or striped. Inline to Komariah et al. (2015), the dominant hair colors found in Jawarandu goats (Bligon goats) were black, brown, and white, plain, striped, or spot colors. The hair colors found in the three-study site were of three colors in the highlands, namely, striped, brown, and black, while the head hair colors found in the lowlands and coastal areas were striped and black. In addition to these three colors, other color patterns were also found at the location of the observation sample. Still, the frequency of their appearance on each animal's body in the crest and mane ruff sections was mixed, brown, black, and white.

Wahyuni et al. (2016) stated that the diversity of phenotypes of qualitative traits could be seen through hair color. A qualitative trait is a trait that can be observed or described directly. According to Ofori et al. (2021), hair color type and pattern are related to heat adaptation and regulation. Dark-pigmented animals warm up earlier and faster than light-colored animals. However, black or dark coloration made goats susceptible to high heat/stress loads

and possibly high metabolic activity and increased thyroid activity, which may be counterproductive as feed intake and growth rates may be reduced, especially during hot conditions due to climate change. This makes light-colored goats more adaptable to hot and humid environments. Conversely, white goats are dominant in areas with hot temperatures.

The most common color pattern found between the highlands, lowlands, and coastal zones are thought to be influenced by the region's geographical location. According to Destomo et al. (2017) that livestock mobility can affect the inheritance of phenotypic traits in the sense that goats residing in one area are most likely to be able to move to other areas due to buying and selling of feeder livestock or male borrowing as is often the case in the community. The dominant color pattern is the primary color with the largest area in individual goats. In contrast, the striped color is a color that has a smaller area than the dominant color. The dominant color usually consists of only one color, and the striped color can include one or more colors. Color combinations in goats between dominant colors and striped colors are quite diverse, can only be dominant colors alone or in collaboration with striped colors. According to Bedada et al. (2019), uniform coloration indicates that the goat breed has become uniform in hair color through selective breeding and the environment. Hair color is essential for regulating physiological processes and livestock adaptation to certain ecological conditions. Monau et al. (2018) state that hair color is also helpful in protecting deep tissue from excessive exposure to shortwave solar radiation in each zone. Dominant mixed hair color can be an advantage during common seasonal temperature fluctuations.

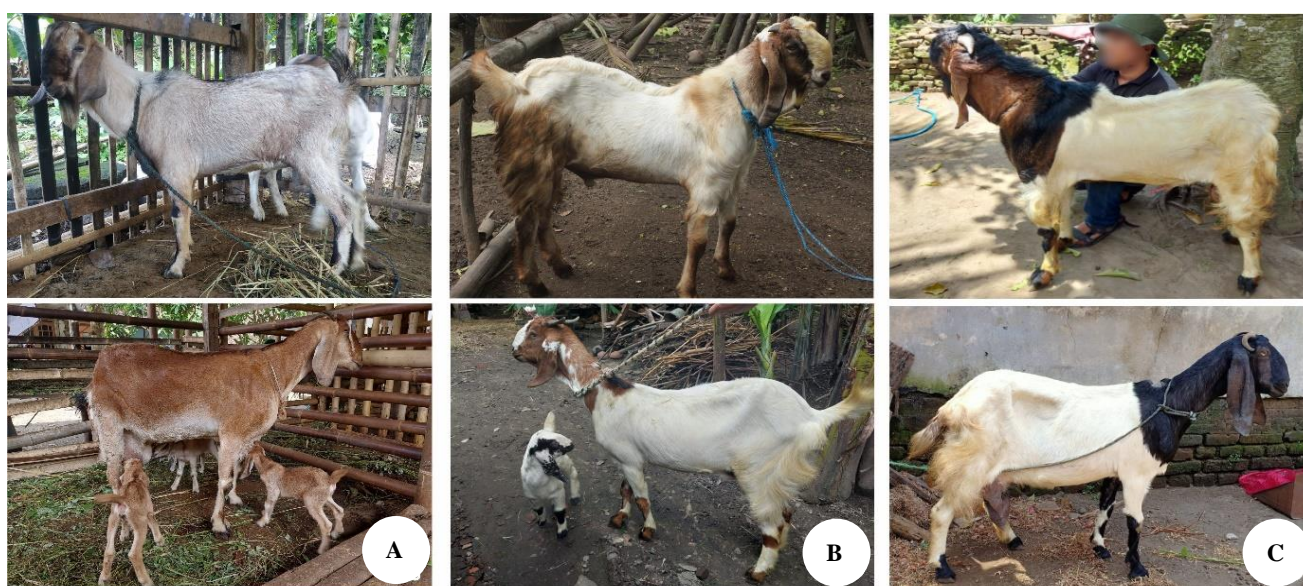


Figure 3. The male (*above*) and female (*below*) Bligon goats on the highland (A), lowland (B), and coastal (C) agro-ecological zones in Bantul District, Yogyakarta, Indonesia

Table 2. Qualitative traits of Bligon goats

| Variable | Highland | | Lowland | | Coastal | |
|----------------------------------|-----------|------|-----------|------|-----------|------|
| | N (heads) | (%) | N (heads) | (%) | N (heads) | (%) |
| Head hair coat color | | | | | | |
| Striped (peid) | 105 | 71.9 | 110 | 69.2 | 54 | 32.3 |
| Brown | 29 | 19.9 | - | - | - | - |
| White | - | - | - | - | - | - |
| Black | 12 | 8.2 | 49 | 30.8 | 113 | 67.7 |
| Body hair coat color | | | | | | |
| Striped (pied) | 76 | 52.1 | 63 | 39.6 | 25 | 15.0 |
| Brown | 49 | 33.6 | 14 | 8.8 | 7 | 4.2 |
| Black | 8 | 5.5 | 30 | 18.9 | 17 | 10.2 |
| White | 13 | 8.9 | 52 | 32.7 | 118 | 70.7 |
| Crest hair color | | | | | | |
| Mixed | 102 | 69.9 | 71 | 44.7 | 32 | 19.2 |
| Brown | 24 | 16.4 | 5 | 3.1 | 6 | 3.5 |
| Black | 8 | 5.5 | 31 | 19.5 | 12 | 7.2 |
| White | 12 | 8.2 | 52 | 32.7 | 117 | 70.1 |
| Mane ruff (<i>rewos</i>) color | | | | | | |
| Mixed | 129 | 88.4 | 92 | 57.9 | 99 | 59.3 |
| Brown | 2 | 1.4 | 6 | 3.7 | 4 | 2.4 |
| White | 11 | 7.5 | 23 | 14.5 | 48 | 28.7 |
| Black | 4 | 2.7 | 38 | 23.9 | 16 | 9.6 |
| Ears shape | | | | | | |
| Folded | 11 | 7.5 | 42 | 26.4 | 95 | 56.9 |
| Opened | 135 | 92.5 | 117 | 73.6 | 72 | 43.1 |

Quantitative traits

The quantitative characteristics data of Bligon goats were obtained from direct measurements in the field, including shoulder height, body length, chest girth, ear length, and body weight. The Bligon goats' quantitative data are presented in Table 3. The quantitative characteristics data of Bligon goats were obtained from direct measurements in the field, including shoulder height, body length, chest girth, ear length, and body weight. The Bligon goats' quantitative data has presented in Table 3. The average body size of male Bligon goats was higher ($P<0.05$) than females, except for ear length and body weight in the adult category. The animal body size and shape increase until they reach the point of optimum growth or adulthood (Getahun et al. 2020). The animal body size increases with the increasing age of livestock regardless of sex. Age influences the body weight and body measurement of livestock (Bedada et al. 2019). As the animal age increases, the bone growth will continue until it reaches the adult point of the body (Purwanti et al. 2019). Differences in body size concerning sex are partly a function of hormonal effects on the different sexes (Lorato et al. 2015). Sex is an important source of variation for body weight and body size in all age categories (Getahun et al. 2020). Agro-ecology influences body size and qualitative characteristics (Lorato et al. 2015).

The shoulder height describes the bones' growth that makes up the foreleg (anterior extremity) (Putri et al. 2014; Ibrahim et al. 2020b). The shoulder height of Bligon goats in highland was the smallest ($P<0.05$) compared to other zones, except for young male goats. The average shoulder

height of adult Bligon goats in this study was higher than female Saburai goats (58.79 cm) (Dakhlan et al. 2021), Assam Hill goats (54.57 cm) (Khargharia et al. 2015), rural African goats (60.12 cm) (Chinchilla-Vargas et al. 2018), and Kacang goat (50.85 cm) (Depison et al. 2020), but lower than Etawah grade goats (73.86 cm) (Dakhlan et al. 2020), Barcha goats (71.4 cm female and 79.8 cm male) and Atlas goats (71.6 cm female and 82.0 cm male) (Boujenane et al. 2016).

Body length is the result of a continuous growth process with every other body part. Body length is thought to be closely related to the body's skeleton growth (Ramdani and Kusmayadi 2016). Body length represents spinal growth, including thoracic, lumbar, and sacrum (Budisatria et al. 2018; Ibrahim et al. 2020b). In this study, Bligon goats in the highland area had the shortest body length ($P<0.05$), and the longest ($P<0.05$) were in the coastal zone, except for female kid goats (lowland > coastal). Adult female Bligon goats in the highland area (67.80 cm) were shorter than the Etawah grade goats (71.27 cm) (Dakhlan et al. 2020) and longer than those in the coastal area (75.45 cm). The average body length of adult Bligon goats in this study was longer than that of Kacang goats in the lowland (51.08 cm) and highland (51.31 cm) of Jambi Province (Depison et al. 2020) and to the Kejobong goats (59.7 cm male and 60.1 cm female) (Budisatria et al. 2021). However, it was lower when compared to Boer goats (85.35 cm) (Abd-Allah et al. 2019), Barcha goats (98.7 cm female and 102.5 cm male), and Atlas goats (99.5 cm female and 103.6 cm male) (Boujenane et al. 2016).

Table 3. The average body measurements and standard deviation of shoulder height, body length, chest girth, ear length, and body weight of Bligon goats in Bantul District, Yogyakarta, Indonesia

| Variable | Age categories | Sex | Agro-ecological zones | | |
|----------------------|----------------|--------|---------------------------|---------------------------|---------------------------|
| | | | Highland | Lowland | Coastal |
| Shoulder height (cm) | Kid | Male | 47.69±9.25 ^{bA} | 48.33±9.31 ^{aB} | 49.33±10.06 ^{bC} |
| | | Female | 45.41±7.59 ^{aA} | 49.36±6.48 ^{bC} | 47.05±8.60 ^{aB} |
| | Young | Male | 63.65±8.09 ^{bB} | 62.29±8.31 ^{bA} | 68.30±8.06 ^{bC} |
| | | Female | 58.64±8.97 ^{aA} | 62.23±5.97 ^{aC} | 62.22±6.00 ^{aB} |
| | Adult | Male | 62.28±13.22 ^{aA} | 66.42±8.18 ^{aB} | 76.60±4.82 ^{bC} |
| | | Female | 65.32±6.73 ^{bA} | 69.27±5.41 ^{bB} | 71.78±5.68 ^{aC} |
| Body length (cm) | Kid | Male | 43.76±9.52 ^{bA} | 45.00±9.28 ^{aB} | 45.11±9.08 ^{bC} |
| | | Female | 42.58±5.79 ^{aA} | 45.76±10.38 ^{bC} | 44.52±9.26 ^{aB} |
| | Young | Male | 59.65±7.85 ^{bA} | 61.81±6.25 ^{bB} | 66.07±8.89 ^{bC} |
| | | Female | 56.25±13.42 ^{aA} | 60.14±6.83 ^{aB} | 60.67±7.69 ^{aC} |
| | Adult | Male | 60.14±12.64 ^{aA} | 68.85±6.49 ^{aB} | 73.80±5.49 ^{aC} |
| | | Female | 67.80±7.61 ^{bA} | 71.05±6.32 ^{bB} | 75.45±6.04 ^{bC} |
| Chest girth (cm) | Kid | Male | 49.15±10.49 ^{bC} | 46.42±12.57 ^{aA} | 47.11±9.51 ^{bB} |
| | | Female | 46.33±5.83 ^{aB} | 48.61±6.40 ^{bC} | 44.58±8.66 ^{aA} |
| | Young | Male | 66.09±8.43 ^{bB} | 65.31±7.66 ^{bA} | 67.70±8.63 ^{bC} |
| | | Female | 62.42±9.94 ^{aB} | 63.28±9.10 ^{aC} | 62.00±7.63 ^{aA} |
| | Adult | Male | 64.71±12.81 ^{aA} | 76.71±6.12 ^{bB} | 77.40±4.97 ^{aC} |
| | | Female | 74.42±7.88 ^{bA} | 75.43±9.86 ^{aB} | 79.64±7.21 ^{bC} |
| Ear length (cm) | Kid | Male | 15.84±4.16 ^{aA} | 19.09±3.75 ^{bC} | 18.55±3.16 ^{bB} |
| | | Female | 16.00±2.78 ^{bA} | 18.65±3.14 ^{aC} | 18.23±3.88 ^{aB} |
| | Young | Male | 20.17±4.96 ^{aB} | 20.10±3.30 ^{aA} | 23.26±5.03 ^{aC} |
| | | Female | 20.32±3.27 ^{bA} | 22.23±3.93 ^{bB} | 24.09±3.62 ^{bC} |
| | Adult | Male | 19.00±4.35 ^{aB} | 18.71±3.09 ^{aA} | 25.50±3.87 ^{bC} |
| | | Female | 21.04±2.67 ^{bA} | 22.67±3.93 ^{bB} | 24.68±5.30 ^{aC} |
| Body weight (kg) | Kid | Male | 12.87±6.92 ^{bC} | 10.95±4.93 ^{bB} | 10.67±5.11 ^{bA} |
| | | Female | 9.77±3.75 ^{aB} | 10.80±3.37 ^{aC} | 9.73±5.65 ^{aA} |
| | Young | Male | 26.39±8.49 ^{bB} | 25.77±9.18 ^{bA} | 29.45±9.69 ^{bC} |
| | | Female | 23.06±9.04 ^{aC} | 22.60±7.34 ^{aB} | 22.38±8.30 ^{aA} |
| | Adult | Male | 28.91±14.63 ^{aA} | 37.61±12.78 ^{aB} | 40.86±8.97 ^{aC} |
| | | Female | 36.28±10.83 ^{bA} | 39.50±10.05 ^{bB} | 41.99±9.43 ^{bC} |

Note: Different superscripts on the same row (^{A,B,C}) and column (^{a,b}) indicated significant differences ($P<0.05$)

The chest girth size represents the growth of the ribs and the development of muscle tissue in the chest area. The chest girth size is closely related to body weight and is the best predictor for estimating body weight in livestock (Putri et al. 2014; Basbeth et al. 2015; Ibrahim et al. 2021). There was a significant difference ($P<0.05$) in the Bligon goats' chest girth in the three agro-ecological zones. In adulthood, Bligon goats, both male and female, in the highland area had the lowest chest girth, and the highest was in the coastal zone ($P<0.05$). In contrast, female Bligon goats in the cub and young period were the largest in the lowland area and the lowest in the coastal zone ($P<0.05$). The chest girth of adult Bligon goats in this study was lower than that of Black Creole goats (84.07 cm) (Silva-Jarquin et al. 2019), Barcha goats (74.7 cm female and 81.9 cm male), and Atlas goats (75.6 cm female and 84.9 cm male) (Boujenane et al. 2016). However, the chest girth is larger than the Saburai goat (68.02 cm) (Dakhlan et al. 2021) and the Kacang goat in the lowland (58.09 cm male and 56.28 cm female) and highland (59.08 cm male and 57.28 cm female) (Depison et al. 2020).

Ear length is not an economic characteristic but can be used as a marker of factors and breed-specific livestock (Budisatria et al. 2018; Ibrahim et al. 2020b). Table 3 shows that young and adult Bligon goats in the coastal zone

have the highest ear lengths ($P<0.05$), while in young Bligon goats, the highest is in the lowland zone ($P<0.05$). The ear length of the female Bligon goat was longer than the male ($P<0.05$), except in the kid age in lowland and coastal zones and the adult age in the coastal zone. Ear length size of adult Bligon goats in this study was longer when compared to local Tunisian oases goats (18.55 cm) (Nafti et al. 2014), Cuban Creole goats (12.68 cm), and Cuban Creole Crossbred (15.63 cm) (Chacon et al. 2011), and Kacang goat (14.86 cm) (Putra and Ilham 2019). However, it is shorter than the Etawah grade goat (30 cm male and 27 cm female) (Budisatria et al. 2018).

Body weight determines the livestock value in the selection, breeding, and fattening programs. Body weight is also used in livestock raising activities and marketing (Ibrahim et al. 2021). The body weight of male Bligon goats at the age of the kid and young in this study was higher ($P<0.05$) than the female, whereas in the adult period, it was the opposite. The body weight of adult Bligon goats in the highland area was the lightest ($P<0.05$), while the highest was in the coastal zone ($P<0.05$). The body weight of adult Bligon goats in this study was lower than Etawa Grade goat (37.07 kg) (Dakhlan et al. 2020), Boer goat (43.30 kg) (Abd-Allah et al. 2019), Barcha goat (36.9 kg female and 47.2 kg male), and Atlas goat (38.3 kg

female and 47.3 kg male) (Boujenane et al. 2016), but higher than Assam Hill goat (24.86 kg) (Khargharia et al. 2015), female Saburai goat (32.10 kg) (Dakhlan et al. 2021), and Kacang goat in lowland (18.05 kg male and 16.35 kg female) and highland (19.95 kg male and 17.34 kg female) (Depison et al. 2020). The availability of forage consumed in an area affects the weight gain of goats (Ramdani and Kusmayadi 2016).

The animal's body size and shape increase until it reaches the point of optimum growth. Differences in agro-ecological zones can affect the body weight and body size of livestock caused by varied factors such as nutrition, grazing area, presence of disease, land size and productivity, availability of feed resources, and other natural resources in environmental and environmental conditions interactions (Loreto et al. 2015; Monau et al. 2018; Getahun et al. 2020). The conditions of different agro-ecological zones will also give preference to different livestock rearing adapted to the local socio-economic and socio-cultural (Ibrahim et al. 2019a).

It was concluded that Bligon goats in Bantul District had different exterior characteristics based on their agro-ecological zones, both qualitatively and quantitatively. The hair color of the Bligon goat's head is mostly striped (pied) or a mixture of brown, black, and white. The color of the goat's body hair in the highlands and lowlands is mostly striped, while on the coast, it is white. The crest color in the highlands and lowlands is mostly a mixture of brown, black, and white, while it is mostly white on the coast. The mane ruff (*rewos*) color in the highlands, lowlands, and coastal is mostly a mixture of brown, black, and white. The shape of the goat's ears in the highlands and lowlands is mostly open while it is mostly folded on the coast. The average body size of male Bligon goats is higher than that of females, except for ear length and body weight in the adult category. The average body size of Bligon goats on the coast is larger than in the lowlands, and the body size of Bligon goats in the lowlands is larger than in the highlands.

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