The Characteristics of Local Female Sheep Raised at different Altitudes in Majalengka Regency

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Abstract. The research was conducted to investigate the characteristics of local prospective broodstock sheep raised in the highlands and lowlands from 30th May to 28th June 2018 in Bantarujeg and Jatitujuh District of Majalengka Regency, West Java Province. This location was selected based on the consideration that the area had the highest population of livestock. The livestock observed were local female sheep raised in the highland regions as many as 60 livestock in addition to 60 lowland livestock with the age range of livestock in two different areas were ≥ 1 year. This research employed purposive sampling by survey method. The observed variables were shoulder height, torso circumference, waist width, body weight, pelvic width, inner chest width, chest width, and waist circumference as well as limbs length. The data obtained were analyzed descriptively. The results indicated that local female sheep raised in the highlands had higher body size and body weight compared to local female sheep raised in the lowlands.

1. Introduction

Majalengka Regency is an area that has a variety of area characteristics with quite significant differences between regions; lowlands (0-100 m asl) in Jatitujuh District, medium plains (> 100-500 m asl) and highlands in Bantarujeg District (> 500 m asl) so that the temperature of region Lowlands to mountains vary, the height of the different regions results in different humidity, temperature and soil fertility. The environment affects sheep through two ways, namely: 1) through forage (feed) and subsequently affects the supply of feed and water as well as patterns of disease known to be indirect factors; 2) through sheep directly, namely the main environmental influences such as wind speed, temperature and humidity (physical environment), but of all environmental influences on tropical sheep heat stress is usually the most serious [4]. This difference will affect the quality and type of vegetations that grows in the area, [10], states that altitude also influences the size of the animal's body, thus affecting the characteristics and performance of the livestock itself, including sheep that may breed in the area. However, it is unknown on how big the difference in size and growth of local prospective brood stock in two regions with different altitude.

Body measurements are a factor that has a lot to do with animal performance. The use of body measurements, is very good for weight and to determine the nature of offspring and production, so that by using body measurements can assess the performance of livestock [1]. Livestock must always be in the optimal environment and they must be maintained in that area to maintain optimal functioning of growth and reproduction. Thermo Neutral Zone (TNZ) is a comfortable area with an ambient...
temperature suitable for livestock. The TNZ area for sheep in rearing is at an ambient temperature between 18–31 °C [5]. In order to get a depiction on the characteristics of local female sheep prospective broodstock in different areas of altitude it is necessary to weigh and measure body measurements. This research is focused to reveal the “characteristics of local sheep brood stock raised in different altitude in Majalengka District”.

2. Object And Research Method

2.1. Research Object

The object of research is prospective brood of local female sheep owned by local breeders; samples were taken by applying a simple random sampling method by sampling frame particularly through pre-survey followed by sampling based on purposive sampling method with a total sample of 120 local female prospective broodstock sheep (60 lowland sheep in Jatituhu District, 60 highland sheep in Bantarujeg District) with age range of ≥ 1 year.

2.2. Research Equipment

The equipment used in research includes;

1. A measuring stick, to measure shoulder height
2. Measuring tape, to measure body length and chest circumference
3. Writing stationery,
4. Camera, for taking pictures of research objects
5. Scales

2.3. Research Method

The method used in this study included primary data i.e. the measurement of quantitative properties by direct measurement in the field. Variables observed at two different places for primary data were quantitative characteristics measurements by [7], [14] including:

Information

1. Body Length (PB)  6. Pelvic Width (LePa)
2. Shoulder Height (TP)  7. Inner Chest (DD)
3. Torso Circumference (LD)  8. Chest Width (Led)
4. Waist Width (LePi)  9. Limbs Length (Pka)
5. Body Weight (BB)  10. Waist Circumference (LiPi)

![Figure 1. Parts of female sheep.](image)

Secondary data collection was conducted by interviewing techniques and obtaining data from local government agencies, the parameters used for secondary data were the area's topography (Characteristics of the place, population and potential of the region.)
2.4. Data Analysis
The data obtained were analyzed descriptively based on the formula in [12]. Calculation of statistical analysis employed SPSS 16 for windows application.

1) The average ($\mu$) is:
\[
\mu = \frac{\sum_{i=1}^{n} x_i}{n}
\]
Information
\[\sum_{i=1}^{n} x_i = \text{The sum of the observed variable x values}\]
\[n = \text{Number of samples}\]
\[i = 1,2,3,\ldots,n\]

2) Standard deviation ($\sigma$) : means to find out the average deviation of each score with the average score.
\[
\sigma = \sqrt{\frac{\sum_{i=1}^{n} x_i 2 - \frac{1}{n} \left(\sum_{i=1}^{n} x_i\right)^2}{n}}
\]
Information
\[\sum_{i=1}^{n} x_i = \text{The sum of the observed variable x values}\]
\[n = \text{Number of samples}\]
\[i = 1,2,3,\ldots,n\]

3) The Variant Coefficient (KV) is an indication of the severity of score distribution
\[
KV = \frac{\sigma}{\mu} \times 100\%
\]
Information:
\[KV = \text{Variation Coefficient}\]
\[\sigma = \text{Standard deviation}\]
\[\mu = \text{average}\]

4) Maximum value: is the highest value of the observed variable
5) the lowest value of the observed variable

The results of the analysis were subsequently compared with SNI No. 7532.1:2015 concerning Sheep Brood Part I of [2].

3. Results And Discussion
3.1. General Overview of the Area
According to Central Statistic Agency of Majalengka [3], Majalengka Regency is geographically located in the East of West Java Province, which is located in the Western part between 1080 03' - 1080 19' East Longitude, Eastern Side 1080 12' - 1080 25' East Longitude, Northern Side between 60 36' - 60 58' South Latitude and Southern Side 60 43' - 70 03' South Latitude. Majalengka Regency is administratively bordered by: North side: Indramayu Regency, South side: Ciamis and Tasikmalaya Regencies, East side: Cirebon Regency and Kuningan Regency and West side: Sumedang Regency

The area of Majalengka Regency is 1,204.24 Km2, or only about 2.71% of the total area of West Java Province (approximately 44,357.00 Km2) consisting of 26 districts. Judging from the topography, Majalengka Regency can be divided into three regional zones, namely: (1) Mountainous area with an altitude of 500-857 m above sea level with an area of 482.02 Km2 or 40.03% of the entire area of Majalengka Regency, (2) A bumpy / hilly area with an altitude of 50-500 m above sea level with an area of 376.53 Km2 or 31.27% of the total area of Majalengka Regency and (3) Lowland area with an altitude of 19-50 m above sea level with an area of 345.69 Km2 or 28.70% of the total area of Majalengka Regency.
The total sheep population in Majalengka Regency is shown in Table 1

**Table 1. Population of Sheep stocks in Majalengka Regency**

| Types of cattle | Year (quantity) | 2013      | 2014      | 2015      | 2016      |
|-----------------|-----------------|-----------|-----------|-----------|-----------|
| Sheep           |                 | 578.720   | 1.026.770 | 1.097.620 | 1.219.630 |

*Source: Central Statistics Agency of Majalengka [3] processed data*

3.2. The Quantitative Characteristic of Sheep

The difference in altitude level in Majalengka Regency influences environmental conditions such as humidity, temperature and soil fertility. According to [16], the environmental influence on livestock is directly to the level of production through metabolism, feed consumption, movement of food rates, maintenance needs, reproduction and growth, while the indirect effect is related to the quality and availability of feed.

The results of the research in measuring the characteristics of local female sheep prospective broodstock raised in areas with diverse altitude in Majalengka Regency are presented in Table 2 below.

**Table 2. Body Size Description of Local Female Sheep Prospective brood raised at various altitudes in Majalengka Regency**

| Variable         | Mean   | Standard Deviation | Max   | Min   | Variance Coefficient |
|------------------|--------|--------------------|-------|-------|----------------------|
| Body Length      | 46.85  | 40.48              | 2.14  | 2.19  | 50                   |
| Shoulder Height  | 58.58  | 57.80              | 2.17  | 1.57  | 63                   |
| Torsi Circum     | 65.59  | 61.42              | 1.96  | 2.19  | 69                   |
| Waist Width      | 19.55  | 17.58              | 3.69  | 3.41  | 28                   |
| Pelvic Width     | 21.32  | 19.20              | 2.16  | 2.06  | 26                   |
| Inner Chest      | 25.70  | 20.18              | 2.30  | 2.19  | 30                   |
| Chest Width      | 20.12  | 16.95              | 2.87  | 1.21  | 25                   |
| Limbs Length     | 39.60  | 36.82              | 2.23  | 1.18  | 45                   |
| Waist circumference | 70.58 | 69.63              | 2.49  | 1.95  | 75                   |

*TG = Highlands, RH = Lowlands*

The results of the study (Table 2) revealed that the body length of female sheep raised in the highlands of Bantarujeg District ranged from 41-50 cm with an average of 46.85 ± 2.14 cm, larger than that of sheep in the lowlands namely Subdistricts of Jatitujuh ranged from 37-45 cm with an average of 40.48 ± 2.19 cm. The body length in both regions with different heights in Majalengka District was smaller than the results of several studies, the Malewa study [8] for instance, reported that the body length of the fat-tailed sheep was 55.33 ± 3.21 cm while [15] in [14] reported that female Thin-tailed sheep body length was 60.42 ± 4.09 cm and female Wonosobo Sheep was 61.89 ± 1.52 cm. Humidity is one of the important factors for the success of a farm. Humidity also plays an important role in influencing the body of livestock. When the environment temperature rises, livestock can evaporation to reduce heat stress on their bodies. High humidity can make it difficult for livestock in conducting evaporation. When daytime humidity reaches a low enough value so that the body of a sheep experiences heat stress, the sheep can carry out an evaporation which is one way to reduce heat stress [11].

The shoulder height of female sheep raised in the highlands of Bantarujeg District was ranged from 55 to 63 cm with an average of 58.58 ± 2.17 cm, larger than that of sheep found in the lowlands of Jatitujuh District ranging from 56-62 cm with an average of 57.80 ± 1.57 cm. Shoulder height was the
highest distance from the shoulder to the ground. According to [6], shoulder height measurement in fat-tailed sheep had a value of $54.53 \pm 2.37$ cm, while in thin-tailed sheep shoulder height value was $51.17 \pm 2.16$ cm. Cattle type sheep were not expected to be tall, because the front and rear limbs were not included for carcass assessment [13]. Based on those grounds, local sheep in both Bantarujeg District and Jatitujuh District have long bodies so that they are raised for their meat, in accordance with the figures stipulated by SNI No. 7532.1: [2] which states that the requirements for female Garut sheep aged 8-12 months have reached shoulder height of 59 cm.

The results demonstrated that the pelvic width of local female sheep raised in the highlands of Bantarujeg District had pelvic widths ranging from 18-26 cm with an average of $21.32 \pm 2.16$ cm, whereas local female sheep raised in the lowlands, in the District of Jatitujuh had smaller pelvic width between 15-24 cm with an average of $19.20 \pm 2.06$ cm. The waist circumference of local sheep raised in the highlands ranges from 68-75 cm with an average of $70.58 \pm 2.49$ cm, little bit different from the waist circumference of the sheep raised in the lowlands by 67-75 with an average of $69.63 \pm 1.95$ cm. [14] reported that the mean waist circumference of female Wonosobo Sheep was $97.61 \pm 2.77$ cm and waist width had an average of $21.94 \pm 0.88$ cm. The size of the back of the body associated with the birthing process. In addition, the pelvic is important for broilers since the flesh muscle is mostly attached to the upper femur (Os femur) [9].

3.3. Bodyweight of the Female Local Sheep
The results of body weight studies of prospective local female sheep broodstock raised in areas with different altitude in Majalengka Regency are presented in Table 3.

| Score          | Body weight (kg) |
|----------------|------------------|
|                | Highland | Lowland  |
| Average        | 24.33     | 21.00    |
| Standard deviation | 2.22     | 2.87     |
| Minimum Score  | 20        | 18       |
| Maximum Score  | 29        | 27       |
| Variation coefficient | 4.93     | 8.27     |

The results of the study (Table 3) indicated that the body weights of local sheep raised in the highlands of Bantarujeg District ranged from 20-29 kg with an average of $24.33 \pm 2.22$ kg, this score was greater than the standards set by SNI No. 7532.1: [2] which stated that the requirements for female Garut sheep aged 8-12 months had a body weight of 22 kg, and was also greater than local female sheep found in the lowlands of Jatitujuh District ranging from 18-27 kg with an average $21.00 \pm 2.87$ kg. This figure was slightly below the standards set by SNI No. 7532.1: 2015 which stated that the requirements for female Garut sheep aged 8-12 months had a body weight of 22 kg.

4. Conclusion
Based on the results of the study it can be concluded that sheep raised in the highlands (Bantarujeg District) has better quantitative characteristics compared to sheep in the lowlands (Jatitujuh District). The highland area (Bantarujeg District) can be used as a sheep development area to increase sheep population and achieve self-sufficiency in meat and supply of animal protein sources in Majalengka Regency. Lowlands of Jatitujuh District could be used for developing area and improving the quality of sheep feed.
References
[1]. Alderson, G.L.H. 1999. The development of a system of linear measurements to provide an assessment of type and function of beef cattle. Animal Genetic Resources Information. 25: 45-55.
[2]. Badan Standardisasi Nasional Indonesia. 2015.No. 7532.1:2015. Bibit domba-Bagian 1: Garut.
[3]. Badan Pusat Statistik Majalengka. 2017. Kabupaten Majalengka Dalam Angka. Katalog BPS:1102001.3210. Badan Pusat Statistik Kabupaten Majalengka.
[4]. Devendra, C. dan M. Burns. 1983. Goat Production In The Tropics. Commonwealth Agricultural Bureaux, UK. 28 : 32.
[5]. Ensminger, M. E. 1991. Animal Science. 9th Ed. The InterestatePrentise and Publisher Inc. Danville, Ilionis.
[6]. Hafiz.2009. Aplikasi Indeks Morfologi dalam Pendugaan Bobot Badan dan Tipe atau Jenis pada Domba Ekor Gemuk dan Domba Ekor Tipis. Skripsi. Bogor : Program Studi Teknologi Produksi Ternak, Fakultas Peternakan, Institut Pertanian Bogor.
[7]. Heriyadi, D. 2012. Modul I Produksi Domba dan Kambing. Laboratorium Produksi Ternak Potong Fakultas Peternakan Universitas Padjadjaran. Bandung.
[8]. Malewa, A.D.G. 2007. Karakteristik fenotipe dan jarak genetic domba Donggala di tiga lokasi di Sulawesi Tengah. Tesis. Sekolah Pascasarjana. IPB. Bogor. Melalui https://repository.ipb.ac.id/handle/123456789/41407. diakses 24 Juni 2018
[9]. Nurfaridah A. 2013. Indeks Kumulatif Ukuran-ukuran Tubuh dan Bobot Badan Domba Komposit Betina Dewasa Sebagai Domba Pedaging (Studi Kasus di Kandang Percobaan Fakultas Peternakan Universitas Padjadjaran). Skripsi. Fakultas Peternakan Universitas Padjadjaran. Bandung.
[10]. Setiadi, B., D. Priyanto, M. Martawijaya. 1994. Komparatif Morfologik Kambing. Laporan Hasil Penelitian APBN 1996/1997. Balai Penelitian Ternak Ciawi, Bogor.
[11]. Sudarman, A. & T. Ito. 2000. Heat production and thermoregulatory responses of sheep fed different roughage proportion diets and intake levels when exposed to a high ambient temperature. Asian-Aus. J. Anim.. Sci. 13: 625-629.
[12]. Sujana. 2002. Metode Statistika. Tarsito. Bandung
[13]. Sutama I. K 1992. Reproductive Development ad Performance of Small Ruminant Production in Indonesia New Technologies for Small Ruminant Production in Indonesia ,SR-CRSP-Research Institute for Animal Production Central Research and Development Indonesia Ministry of Agriculture.
[14]. Syuhada I, D. Heriyadi, dan A. Sarwesti, 2014. Identifikasi Bobot Badan Dan Ukuran-Ukuran Tubuh Domba Wonasobo Betina Pada Kelompok Peternak Di Kecamatan Kejajar Kabupaten Wonosobo. Melalui http://download.portalgaruda.org/article.php?article=315525&val. diakses 20 Juni 2018.
[15]. Tirtosw, B. U. 2011. Ukuran dan Bentuk serta Pendugaan Bobot Badan Domba Garut, Domba Ekor Tipis dan Domba Ekor Gemuk. Departemen Ilmu Produksi dan Teknologi Peternakan. Institut Pertanian Bogor. Bogor. Hal 20.
[16]. Yeates, N.T.M., T.N. Edney and M.K. Hill. 1975. Animal Science. Reproduction, Climate, Meat, Wool. 1st Published. Pergamon Press., N.S.W. Australia.