The effect of birth type on quantitative characteristics in pre-weaned Bligon goats

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Abstract. This study aimed to determine the effect of birth type on growth performance in Bligon goats. In total, 88 female Bligon kids kept on a farmer group in Yogyakarta were appraised for quantitative traits. The goat does were divided into two birth types, single and twin. The traits observed were birth weight (BW), weaning weight (WW), ADG (average daily gain), body length (BL), heart girth (HG), withers height (WH) and hip height (HH). Data were analyzed using T-test. The results indicated that birth type had a significant effect (p<0.05) on BW, BL, HG and WH at birth (mean values 2.65±0.36 kg, 34.12±3.92 cm, 34.17±3.1 cm and 34.73±2.75 cm in single born and 2.03±0.35 kg, 29.43±3.08 cm, 32.29±2.59 cm and 32.88±2.64 cm in twins respectively). Birth type also had a significant effect (p<0.05) on WW, HG, WH, and HH at weaning age (mean values 10.27±2.05 kg, 43.97±3.7 cm, 51.05±4.65 cm, 49.41±4.50 cm and 51.65±4.54 cm in single born and 8.45±2.47 kg, 41.02±3.55 cm, 44.70±5.48 cm, 43.27±5.09 cm and 44.82±4.97 cm in twins respectively). The mean ADG in single born (71.31±26.09 g) was significantly (P<0.05) higher than that in twins (88.73±22.07 g). In conclusion, birth type affects quantitative characteristics in Bligon goats.

1. Introduction

Indonesia is endowed with a rich diversity of livestock resources that are characterized by well adaptive responses to a wide range of agroecology. Among all genetic resources of farm animals, goats are widely raised by small-scale livestock keepers, especially in rural areas. Goats offers advantages such as “short day” breeders, short gestation period and twinning ability. Goats are included as the group of animals called small ruminant. They contribute in the economy of landless and rural households in term of providing food, income, and savings. Goats are considered to possess adaptive mechanisms to various environmental conditions. They are easy to maintain and can be quite productive and prolific under proper conditions [1].

Bligon goat is the most numerous and widespread goat breed in Indonesia. Bligon goat has a blood composition of more than 50% of Kacang goat. Because of good productivity and adaptability to various environments, Bligon goats are widely raised by small-scale livestock farmers, especially in the North Coast of Java and Yogyakarta. Body measurements are important indicators in terms of reflecting the breed standards [2] and providing information about morphological characteristics and productivity of the animals. [2] reported that measurements of various body conformations are of
value in judging the quantitative characteristics of meat and also helpful in developing suitable selection criteria. Linear body measurements are kind of growth indicators in animal life and are also helpful in predicting body weight [2]. Increasing kid production is great interest to goat producers and thus, this trait can be regarded as an economic trait in goat farming. Despite the wide use of evaluation for type in goats, little is known about the association between body conformation and some reproductive traits in this species. Linear type traits like physical strength, less sloped rump angle show positive relationships with litter size in dairy goats [3]. The present study aimed to determine the effect of birth type on growth performance of Bligon goats.

2. Materials and methods

2.1. General
A total of 88 female Bligon kids kept on a farmer group of Gama Ngundi Lestari of Banyusoco, Gunungkidul, Special Region of Yogyakarta (DIY) were randomly collected and appraised for quantitative traits. Data were collected by a survey using a structured questionnaire, on-site observation, and physical measurements of goats. The traits observed were birth weight (BW), body length (BL), heart girth (HG), withers height (WH) and hip height (HH). Animals were weighed, to determine the birth weight and weaning weight using an electronic weighing scale with accuracy of ±0.05 kg. Body measurements including BL, HG, HS, and HH were determined according to the Indonesian national standard (INS) procedure and taken using a flexible measuring tape while the animals were on standing position.

2.2 Statistic
Collected data were analyzed in SPSS software. The fixed effects of birth type on quantitative characteristics were tested with a p-value of 0.05. Data were analyzed using T-test.

3. Results and discussion
The results of the T-test analysis are shown in Table 1. It was found that birth type significantly affected (p<0.05) body weight of kids at birth. Single kids gained higher birth weight (2.65±0.36 kg) than twin kids (2.03±0.35 kg), which appeared quite similar to the findings of [4]. In general, the present results indicated that birth weight of single kids was higher than that of twin kids. Moreover, it was observed that birth type had a significant effect on body weight at weaning age (WW), which mean weaning body weight of 10.27±2.05 kg in single kids was higher than that of 8.45±2.47 kg in twin kids. The present results agreed with the findings of [5], who reported that pre-weaning weight of single Bligon kids is higher compared to twin kids. This can be attributed to the nutrients fetus obtain from does, of which single kids may get higher nutrients than twin kids that further affect on higher growth rate of single kids compared to twin kids [5]. A higher pre-weaning weight in single kids than in twin kids leads to a higher weaning weight in single kids. In single born, there is no competition of getting milk from does. And thus, the single kids will get higher nutrients required for growth.

In this study, we also assessed the effect of birth type on body measurements. As a result, the birth type had a significant effect (p<0.05) on BL, HG, and HS at birth, with mean values of 32.12±3.92 cm, 34.17±3.1 cm and 34.73±2.75 cm in single born, respectively, and 29.43±3.08 cm, 32.29±2.59 cm and 32.88±2.64 cm in twins, respectively. At weaning age, birth type was found to have a significant effect (p<0.05) on all quantitative characteristics observed including BL, HG, HS and HH with mean values of 43.97±3.7 cm, 51.05±4.65 cm, 49.41±4.50 cm and 51.65±4.54 cm in single born, respectively, and 41.02±5.55 cm, 44.70±5.48 cm, 43.27±5.09 cm and 44.82±4.97 cm in twins, respectively. [3] reported that there is a positive relationship between litter size and some body measurements. Understanding the relationship between birth type and body measurements is important as body measurements had a significant correlation with body weight. As reported by [6], body weight has a positive relationship with body length, heart girth, withers height, and hip height. This implies that body measurements could be used to estimate live weight in goats fairly well in the situation
where weighbridges or scale were not available. [2] found that body measurements prove to be useful for predicting body weight in exotic sheep breeds.

**Table 1.** Effect of birth type on body weight and body measurements

| Period     | Growth trait        | Single (n=41) | Twin (n=47) |
|------------|---------------------|---------------|-------------|
| Birth      | Body weight (kg)    | 2.65±0.36a    | 2.03±0.35b  |
|            | Body length         | 32.12±3.93a   | 29.44±3.08b |
|            | Heart girth         | 34.17±3.19a   | 32.29±2.59b |
|            | Withers height      | 34.73±2.75a   | 32.88±2.65b |
|            | Hip height          | 35.88±4.18a   | 34.38±3.48  |
| Weaning    | Body weight         | 10.27±2.05a   | 8.45±2.47b  |
|            | Body length         | 43.97±3.7a    | 41.02±5.55b |
|            | Heart girth         | 51.05±4.65a   | 44.70±5.48b |
|            | Withers height      | 49.41±4.50a   | 43.27±5.09b |
|            | Hip height          | 51.65±4.54a   | 44.82±4.97b |

*ab* means within a row with different superscripts differ (*p*<0.05)

**Table 2.** The average of total body weight of goats in single and twin birth type

| Growth trait        | Birth type |               |
|---------------------|------------|---------------|
|                     | Single (N=41) | Twin (N=47)  |
| Total birth weight  | 2.65±0.36a | 3.91±0.93b   |
| Total weaning weight| 10.27±2.05a| 16.55±5.94b  |

*ab* means within a row with different superscripts differ (*p*<0.05)

The result of this study indicated that total birth weight in twins was higher than of in single born. In twin born, goats gained higher total weaning weight of 10.27±2.05 kg than of 16.55±5.94 kg in single born. Does with higher litter size produce lower birth weight and weaning weight of kids [1]. According to the present results, although twin born produce smaller body weight per individual than twins, increasing kid production seems to have significance on the profitability of goat farming. Twin kids seem more profitable than single kids. Hence, goats with twinning ability need to be developed.

### 4. Conclusions

It can be concluded that birth type has a significant effect on body weight and body measurements. Body weight significantly correlates with body measurements. Single kids gained higher body weight than twins. Raising twin kids may be profitable. Thus, goats with twinning ability need to be developed.

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### References

[1] Nasich M 2011 *P. J. Ternak Trop.* 12 56–62
[2] Kumar S, Dahiya S P, Malik Z S and Patil C S 2018 *Indian J. Anim. Res.* 52 1263–6
[3] Haldar A, Pal P, Datta M, Paul R, Pal S K, Majumdar D, Biswas C K and Pan S 2014 *Asian-Australasian J. Anim. Sci.* 27 628–34
[4] Banerjee S and Jana D 2010 *World Appl. Sci. J.* 9 1379–82
[5] Manu A E, Baliaarti E, Keman S and Datta F U 2007 *Buletin Peternakan* 31 41–50
[6] Yakubu A 2009 *Trakia J. Sci* 7 61–6