

Pre-Weaning Growth of Etawah Grade Kids Based on Doe's Hair Color Differences

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ABSTRACT

This study was aimed to determine the effect of in hair color differences of Etawah Grade does on the pre-weaning growth of kids. Twenty eight Etawah Grade kids which born from 21 does were divided into different hair color group : 7 goats with black-white color patterns (BW), 7 goats with brown-white color patterns (BR), and 7 goats with combination of black-brown-white color patterns (CC) or mixed colors. The research data consisted of milk consumption, pre-weaning growth of kids and body size. The data was analyzed using analysis of variance with one-way anova and continued with Duncan's New Multiple Range Test for significant differences. The results indicated that there was a significant differences ($P < 0.05$) on daily milk consumption of Etawah Grade kids born from the does with differences hair colors ((BW: 645.84 ± 311.76 g/days, BR: 711.23 ± 240.22 g/days; CC: 603.54 ± 224.97 g/days). There was no effect of hair color pattern's does on the birth weight (BW: 3.32 ± 0.34 kg, BR: 3.44 ± 0.30 kg, CC: 3.36 ± 0.39 kg, weaning weight (BW: 13.39 ± 1.72 kg, BR: 14.98 ± 2.38 kg, CC: 14.21 ± 2.45 kg), average daily gain (BW: 89.00 ± 23.74 g/days, BR: 106.88 ± 17.27 g/days, CC: 97.33 ± 16.53 g/days), and body size's of kids (body length, shoulder height, hearth girth, chest depth, and ear length). It can be concluded that the kids of Etawah Grade goats born from the doe with difference hair color patterns have the same pre-weaning growth except for milk consumption.

Keywords: Etawah Grade goat, Hair color, Pre-weaning growth

INTRODUCTION

In developing countries, goats have made a significant contribution to the rural economy as a whole (Devendra, 2001; Morand-Fehr *et al.*, 2004), play a significant role in the poor rural households (Nimbkar *et al.*, 2000; Lebbie, 2004) and contribute a substantial amount to the farmer's total income. Goats are closely linked with the poorest people in rural areas and the number of goats they keep is generally small, kept under traditional ways and for multipurpose objectives, as live savings, sources of animal protein, utilization of spare land around farmers' houses and manure resources to fertilize their crops (Budisatria, 2006). One of the goats breed kept by farmer is Etawah grade goat. Originally, Etawah grade goats produced from the crossing of male Etawah goats with female Kacang goats, the native goats in Indonesia. Etawah-grade goats are distinctly different from Kacang goats with a larger body frame, long hanging ears, convex face and larger horns (Budisatria *et al.*, 2009). Budisatria *et al.* (2015) stated that in recent years, there is a tendency that farmers prefer to keep Etawah grade goat with black head color instead of brown or mixed colors. Farmers perceived that keeping black head color will gain more benefitted, because they have relatively higher prices than the others. This perception was supported by Baskoro (2014)

who found that 68% farmers prefer to keep black-white color of Etawah Grade goat rather than other colors. Based on the scientific reason, those perception could be caused by the variation of their ancestor, the blood composition of Etawah grade was dominated by pure Etawah, while the contribution of Kacang goat was relatively low, therefore the productivity of Etawah grade almost similar with the productivity of pure Etawah goat. However, there is no evidence that performance of goat are significantly different amongst goat with different colors. There was a few information available in regard with the pre-weaning growth of Etawah grade kids based on their differences hair colors, therefore this study evaluates the pre-weaning growth and body size of kids based on different hair-colors.

MATERIALS AND METHODS

The research was conducted at Laboratory of Meat, Draught and Companion Animal, Faculty of Animal Science, Universitas Gadjah Mada. Twenty one of Etawah Grade does was divided into three categories based on their hair, black-white; brown-white and mixed colors. The doe was kept on individual housing, fed with standard diet consisted of groundnut straw and concentrate feed, and it was kept until birth. In total, 28 kids were produced from the does. The kids then were studied for their pre-weaning growth (0-90 days), it consisted of birth weight, milk consumption, weaning weight, absolute and relative daily gain, and body size of kids including body length, shoulder height, hearth girth, chest depth, and ear length. Body weight was measured monthly, while body size was measured during birth and weaning (90 days). Milk consumption was collected in the early of each month, five days consecutively, by separating the kids with their does at the night before measurement. Before milking, the kids were weighted and it was allowed for milking around 30 minutes, after finish, the kids were re-weighted. The difference weight between post and pre milking was assumed as milk consumed by the kids. One way analysis of variance was applied to identify mean differences and continued by Duncan's New Multiple Range Test for mean significant differences.

RESULTS AND DISCUSSION

Pre-weaning growth

Birth weight and pre-weaning growth is an initial indicator for growth and production due to it has genetic correlation with further growth (Al-Shorepy *et al.*, 2002 *cit.* Elieser, 2012), while weaning weight is essential for predicting the probability of further performance (Asmara *et al.*, 2012). Birth weight is the first observed trait in a life of an animal on which growth, reproduction and production traits depend. The study indicated that kids delivered from the doe with different hair color had a relatively similar birth weight since the statistical analysis showed non significant differences, although there is a tendency that kids from brown-white doe had the highest birth weight, as presented in Table 1. The non significant differences of birth weight observed in this study could be affected by feed offered to the does. All of the does in this study were offered the similar feed, groundnut and concentrate. Birth weight is predominantly affected by the nutrition of doe received during the pregnancy term. In fact, the maternal nutrition during this period plays an important role in the regulation of and placental development. Studies of various authors show that birth weight is influenced by gender, type of birth, breed, nutrition, year, season of birth, maternal age and more.

The birth weight of kid was comparable with previous study in Central Java (Budisatria *et al.*, 2010; Budisatria and Udo, 2012), however, it was lower than previous study, for

example 3.84 kg (Atabany *et al.*, 2004), 3.57±0.86 kg (Budiarsana and Utama, 2006), and 3.71±0.89 kg (Kostaman and Utama, 2006).

There is no significant differences were found on absolute and relative daily gain of Etawah grade kids with different hair colors although there is a tendency that brown-white kids had the highest daily gain, in contrast, milk consumption of kids with different hair color was differ significantly ($P < 0.05$) as presented in Table 1. Brown-white kids had highest milk consumption (711 g/h/d) compared to black-white kids (645 g/h/day) and mixed kids (603 g/h/d). It was wondering why significant differences on milk consumption did not affect the absolute and relative daily gain, since milk consumption is the main factor for the growth of pre-weaning kids as stated by Mandal *et al.* (2006) that pre-weaning growth is depend on the ability of the does to produce milk, it has a great effect primarily on the early of pre-weaning growth. It could be caused by the other factor, such as mothering ability of the doe. Mothering ability had a significant effect on kid growth, doe with high milk production but low mothering ability will limit the kids to consume maximum milk from their does. Portolano *et al.* (2002) and Hanford *et al.* (2006) stated that birth weight and daily gain of pre-weaning kids will have significant effect on the next growth rate.

Setiawan and Tanius (2005) found that average daily gain of pre-weaning Etawah grade kids was 65-110 g/h/d, while Budisatria (2006) found that it was 120 g/d/h. Pre-weaning growth is depend on the ability of the does to produce milk, it has a great effect primarily on the early of pre-weaning growth (Mandal *et al.*, 2006).

The brown-white kids had the highest weaning weight (14.98 kg) compared to and mixed color (14.98 kg) and black-white kids (13.39 kg), however the weaning weight did not significantly differs amongst the kids with different hair color, as presented in Table 1. Since the birth weight of kid did not significantly differ, similar weaning weight of weaning weight can be predicted, because there is a positive correlation between birth weight and further increasing of the live weight of animals. Weaning weight in this study was relatively high compared to previous research, Sulaksana dan Farizal (2010) found that weaning weight of Etawah Grade kids around 9.72 kg, while Utama (2009) found between 10.8 and 11.8 kg. Many factors affecting weaning weight of kids namely age of the doe, birth type, management, sex and body weight of the doe at birth delivery (Elieser, 2012).

Table 1. Body weight and pre-weaning growth

Variable	Hair color		
	Black-white	Brown-white	Mixed
Birth weight (kg) ^{ns}	3.32±0.34	3.44±0.30	3.36±0.39
Weaning weight (kg) ^{ns}	13.39±1.72	14.98±2.38	14.21±2.45
Absolute daily gain (g/day) ^{ns}	89.00±23.74	106.88±17.27	97.33±16.53
Relative daily gain (%) ^{ns}	3.02±0.43	3.46±0.65	3.30±0.60
Milk consumption (g/h/d)	645.84±311.76 ^b	711.23±240.22 ^a	603.54±224.97 ^c

Relative daily gain = (absolute daily gain/birth weight) x 100%

^{ns} Non significant

^{a,b,c} Different superscript in the same rows indicated significant differences ($P < 0.05$)

Body size of pre-weaning kids

Body size is used to compare the growth of goat between breed and within individual in the same breed and it can also be used as indicators for selection purposes. The growth of body size during early ages will have significant contribution for the future growth rate, the high initial body size, causing high body size when mature age reached.

The results of the study indicated that body size either body length, shoulder height, hearth girth or ear length of kids with different hair color did not significantly differ, except for ear length and chest depth of kids at weaning age (90 days). At the early age, black-white (15.32 cm) and brown-white kids (15.94 cm) had longer ear (more than one cm) compared to mixed color kid (14.02). At the weaning age, mixed color of kids (19.71 cm) and brown-white kids (19.71 cm) had higher chest depth compared to black-white kids (18,31 cm), as presented in Table 2. The body size, however increased in line with their ages, except for the ear length. It is in line with Judge *et al.* (1989) who stated that in the early stage, goat had fast growth rate, which can be visually seen as the development of body size including length and high,whenthey reach mature size, the development of body size (muscle, bone and other important organ) was stopped and fattening process started.

The result of this study was comparable with the previous study on body size of Etawah Grade at weaning age, for example body length, shoulder height, heart girth and ear length of weaning goat were 49.64; 47.30; 42.95 and 18 – 32 cm, respectively (Sutiyono *et al.*, 2006).

Table 1. Body size of pre-weaning kids

Variable	Age (day)	Hair color		
		Black-white	Brown-white	Mixed
Body length (cm)	0 ^{ns}	28.88±1.35	29.08±1.75	27.92±1.97
	90 ^{ns}	50.00±4.26	49.59±3.22	50.28±3.21
Shoulder height (cm)	0 ^{ns}	32.71±1.24	34.02±2.14	32.90±2.42
	90 ^{ns}	49.35±2.05	52.00±1.95	50.88±3.25
Heart girth (cm)	0 ^{ns}	30.67±1.20	30.12±2.33	29.69±3.26
	90 ^{ns}	49.35±3.94	50.33±2.94	50.23±3.40
Chest depth (cm)	0 ^{ns}	11.79±0.66	12.66±0.96	11.93±1.25
	90	18.31±1.54 ^a	19.25±1.1 ^{a,b}	19.71±0.90 ^b
Ear length (cm)	0	15.32±1.62 ^a	15.94±2.28 ^a	14.02±0.90 ^b
	90 ^{ns}	23.59±3.20	25.71±3.99	22.99±2.31

^{ns}Non significant

^{a,b}Different superscript in the same rows indicated significant differences (P<0.05)

CONCLUSIONS

The birth weight, weaning weight, daily gain and body size of black-white, brown-white and mixed color of pre-weaning Etawa grade kids was similar, however brown-white kids had the highest milk consumption.

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