BIRTH WEIGHT AND LITTER SIZE OF CROSSBRED BETWEEN BOER AND LOCAL INDONESIAN GOAT

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ABSTRACT

Study on birth weight and type of birth of crossbred between Local and Boer goat was conducted at station research of Sumber Sekar, Faculty of Animal Husbandry, Brawijaya University, Malang, Indonesia. The data of birth weight and type of birth were collected from 2004 to 2006. A number of 84 offspring resulted from crossing between dam of Local and sire of 6 (six) blood lines of Boer goat were used in the study. Data were analysed using the analysis of variance procedure with REML (Restrixted Maximum likelihood) method using mixed and GLM (General Linier Model) procedure of SAS. The overall mean of birth weight of offspring crossbred Local – Boer was 3.10 kg ± 0.73 kg. Analysis of variance showed that the average of birth weight was significantly ($P<0.05$) affected by type of birth. The mean values for single, twins and triplets kids were 3.26±0.33 3.20±0.75 and 2.51±0.64, respectively. Type of birth tended to be twins (70.24%) and the rest were for single (15.48%) and triplets (14.29%). There was no significant difference in birth weight of offspring between blood lines and also between sire within the blood lines.

Key words: Crossbred, Boer goat, Local Goat, Birth weight, type of birth

INTRODUCTION

The contribution of goat in the farming income for small ruminant keeper is subtantial. Small ruminant plays an important role as an income generating activity and being a source of animal protein to support the national demand for meat. The unique in flavor and palatability of goat meat meets today's demand for meat with less fat.

The general aim in the management animal production is to increase the productivity. The goal could be achieved by 1) improving average productivity with improving aspect of managements to give the possibility to the animal to express their genetic potential as fully as possible and 2) changing production potential of the animal population by introducing of new genotype. The introduction of exotic breed in a local breed population for meat or milk production may be a rapid solution for increasing productivity (Taufik, 2001).

In Indonesia, goats are kept primarily for meat production. Therefore, production traits of interest are the number of young weaned and the growth rate (Bradford, 1993). Litter size and birth weight of the kids are two important factors infuencing the production trait. Litter size defined as the number of kids born per kidding doe, has a very significant influence on reproduction efficiency. On the other hands, Birth weight of kids is regarded as the most important contributing factors for improving growth performance. Birth weight is also considered to be a very important criterion as it is strongly correlated with growth rate, adult body weight and kid viability. Hence it is a determinant factor for overall productivity (Devendra and Burn, 1994).

The majority of goat breeds in Indonesia is Kacang goat. Kacang is a local (indigenous) breed of goat found in Indonesia. These local goats are small in size and relatively slow growing. The average of birth weight is 1.5 kg. Consequently, there has been some interest in introduction of other genotypes to improve its capability. Genetic improvement programmes can be based on crossbreeding between local and exotic breed. Boer goat is one of the high genetic qualities for meat type goat. The Boer is an improved indigenous breed with some infusion of European, Angora and Indian goat breeding many years ago. This goat is adaptable to the region in which it was developed. The Boer goat doe is a low maintenance animal that has sufficient milk to rear a kid that is early maturing. Performance records for this breed indicate exceptional individuals are capable of average daily gains over 0.44 lb/day (200 g/day) in feedlot. More standard performance would be 0.3-0.4 lbs/day (150-170 g/day). The ovulation rate for Boer goats ranges from 1 to 4 eggs/doe with an average of 1.7. A kidding rate of 200% is common for this breed. Puberty is reached early, ususally about 6 months for the males and 10-12 months for the females. The Boer goat also has an extended breeding season making possible 3 kiddings every 2 years.

Crossbreeding programmes between local and Boer goat conducted in Faculty of Animal Husbandry aims to improve the genetic and productivity of Local breed and to exploit hybrid vigour or heterosis. The 18 sires from six different blood lines of pure Goat breed are expected to produce high heterosis effect. The resulted crossbred should give higher performance compared to average performance of the parent's breeds. Increasing the productivity of goats in Indonesia will enhance national development planing for increasing rural income and also increasing the level of protein consumption. Key production traits to consider for improving productivity in meat goat are birth weight and litter size.

The objective of this study are 1) to find out the production and reproduction level of crossbred resulted from crossbreeding programmes between Local Indonesia goat and Boer goat 2) to compare the genetic potential of different sire.

MATERIALS AND METHODS

This study was carried out by on-farm research at station research of Sumber Sekar, Faculty of Animal Husbandry, Brawijaya University, Malang, Indonesia. The data of birth weight and type of birth were collected from 2004 to 2006. A number of 84 offspring resulted from crossing between dam of Local and sire of 6 (six) blood lines of Boer goat were used in the data analysis.

The data were analysed statistically using the analysis of variance procedure with REML (Restrixted Maximum Likelihood) method using mixed and GLM (General Linier Model) procedure of SAS (SAS, 1999). The model used in this study was as followed:

$$Y_{ijkl} = \mu + L_i + T_j + S_k + (TS)_{jk} + e_{ijkl}$$

Y_{ijkl} = observation of an individual animal
μ = the overal mean
L_i = the random effect of blood lines
T_j = the fixed effect due to the j-th type of birth
S_k = the fixed effect due to k-th sex
$(TS)_{jk}$ = the effect of interaction between type of birth and sex
e_{ijkl} = random error particularly to ijkl-th observation

RESULTS AND DISCUSSION

The overall mean of birth weight of 84 offspring crossbred Local – Boer was 3.10 kg ± 0.73 kg. This performance of was better than the expected average performance of the parent breeds.This value was in the range of birth weight of Boer goat, which ranges from 3 – 4 kg (Lu, 2004). Compared to birth weight of Local Indonesien goat, the result was higher. Elieser *et al.* (2004) reported average of birth weight were 1.854 ± 0.153 kg and 1.411 ± 0.102 kg for Kacang and PE goat, respectively. Furthermore, they also concluded that the birth weight of purebred was 2.777 ± 0.103 kg. The higher birth weight in this study might be due to the crossbreeding programme using high genetic quality of Boer goat as sire.

Analysis of variance showed that the average of birth weight was significantly (P<0.05) affected by type of birth (see Table 1). The results showed that single birth was the highest birth weight followed by twins and then triplets. Data analysis indicated that birth weight of single born kid was not different to twins, which only 0.06 kg differences. Type of birth tended to be twins (70.24%) and the rest were for single (15.48%) and triplets (14.29%).

The six blood lines used in this study were evaluated and the analysis variance showed that there was no significant difference in birth weight of the offspring between blood lines and also between sire within the blood lines. However, the statistical parameter indicated that there was different value of the means of birth weight between blood lines.

Table 1. Means, standard deviation of the mean (sd) and coefficient of variaton of birth weight for each type of birth (single, twins and triplets)

Traits	N	Means (kg)	Sd (kg)	CV
Single	13	3.26[a]	0.33	9.98
Twins	59	3.20[a]	0.75	23.28
Triplets	12	2.51[b]	0.64	25.53

The same supperskrip indicated that the means were not significantly different, otherwise the means were significantly different (P<0.05).

Table 2. Means, standard deviation of the mean (sd) and coefficient of variation of birth weight for each blood line (single, twins and triplets)

Blood lines	N	Means (kg)	Sd (kg)	CV
A	16	3.01	0.56	18.56
B	9	3.39	0.82	24.22
C	4	3.75	0.65	17.21
D	9	3.04	0.69	22.76
E	47	3.04	0.76	25.04

Variance component analysis based on REML method resulted that the variance component of blood line was 0.052 and the residual variance was 0.406. Assuming that the genetic relationship between grand parent (blood lines) and grand son was 0.25, heritability could be estimated using blood lines component, which was 43.84%. Although it was not a good estimation, but es was better than no estimation at all.

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