Genetic potency of weaning weight of Boerawa F1, Backcross 1 and Backcross 2 does at Village Breeding Centre, Tanggamus Regency, Lampung Province

Sulastri[1]

Lecturer in Animal Production, Faculty of Agriculture, University Lampung, Bandar Lampung, Indonesia, currently PhD student, Faculty of Animal Science, Gadjah Mada University, Yogyakarta, Indonesia

ABSTRACT: An experiment was conducted from January, 2007 to October, 2009 at Village Breeding Centre, Campang Village, Lampung Province to study genetic potency of weaning weight and productivity of Boerawa F1, Boerawa Backcross 1 (BC 1), and Boerawa Backcross 2 (BC 2) resulted from grading up program between Ettawa Grade Goat does and Boer rams. Variables measured in this research were weaning weight of kids. genetic potency of weaning weight were evaluated through Most Probable Producing Ability (MPPA) and productivity through Dam Productivity Index (DPI). The results indicated that genetic potency and productivity of Boerawa BC 2 were the highest . It could be concluded that genetic potency of weaning weight and productivity of crossbred goat increased when the proportion of Boer genetics was higher in Boerawa grade goats.

Key words: grading up, most probable producing ability, dam productivity ndex, Boer goat

INTRODUCTION

Effort to increase the productivity of Ettawa Grade Goat (EGG) or *Peranakan Etawah* goat in Lampung was done through grading up. Grading up was one of crossing method through crossing female EGG to male Boer goats to get crossbred goat having genetics as good as imported goat. Boer goats were bred in Australia and well known as meat type having fast growth. Grading up program at Lampung Province has been producing Boerawa F1 goats resulted from crossing female EGG to male Boer goats, Boerawa Backcross 1 (Boerawa BC 1) resulted from crossing female Boerawa F1 to male Boer goats, Boerawa Backcross 2 (Boerawa BC 2) resulted from crossing Boerawa BC 1 to male Boer goats.

Genetic potency of crossbred goat at each stage of grading up program should have been evaluated to study genetic potency and productivity. The productivity of goat as meat producer could be studied in weaning weight. Weaning weight was an economic growth performance and positively correlated with yearling weight and postweaning growth.

This research was conducted to study genetic potency through calculating Most Probable Producing Ability (MPPA) and productivity through calculating Doe Productivity Index (DPI) of Boerawa F1, Boerawa BC 1, and Boerawa BC 2.

MATERIALS AND METHODS

Experimental method was conducted at Boerawa Village Breeding Centre, Campang Village, Gisting Subdistrict, Tanggamus Regency, Lampung Province from February 1st, 2007 to October 31st. Research materials consisted of 30 female EGG mated to male Boer goats by artificial insemination using semen produced by Terbanggi Besar Installation of Frozen Semen Production, Centre Lampung Regency, Lampung Province. In the first year (2007), female EGG mated to male Boer goats to produce Boerawa F1, in the second year (2008), female Boerawa F1 mated to male Boer goats to produce Boerawa BC 1, and in the third year (2009), female Boerawa BC 1 mated to male Boer goats to produce Boerawa BC 2.

[1] Corresponding author: sulastri_sekar@yahoo.com

Ration given containing 56.00 g of crude protein (CP) and 456.00 g of total digestible nutrient (TDN) consisted of forage without concentrates. Average feed intake per animal was 2.40 kg/d.

Variables observed were weaning weight, kidding interval (mo) and litter size. Weaning weight of kids in the first and second parity were determined by weighing each kid at weaning time whichwere at about 3 mo old. Weaning weight was corrected to estimate repeatability and to calculate MPPA and DPI. The weaning weight was corrected by age factor of doe (Table 1) and type of birth (Table 2) as recommended by Hardjosubroto (1994).

Table 1. Correction factor of age to correct weaning weight of doe

Age of doe,yr	Factor	Age of doe, yr	Factor
1	1.21	6	1.02
2	1.05	7	1.05
3	1.05	8	1.06
4	1.03	$\geq$ 9	1.15
5	1.00		

Table 2. Correction factor of birth type

Type of birth	Type of rearing	Correction factor
Twin	Twin	1.15
Twin	Single	1.10
Single	Single	1.00

Corrected birth weight, weaning weight, and yearling weight were calculated using formula as recommended by Hardjosubroto (1994) as follows:

$$CBW = RBW \text{ x } CFS \text{ x } CFBT \text{ x } CFDA$$

$$CWW = (RBW + \left(\frac{RWW - RBW}{\text{Length of lactation}} \right) \text{x } 90) \text{ x } CFS \text{ x } CFDA \text{ x } CFBT$$

$$CYW = \left(\frac{CYW - CWW}{\text{Grace period}} \right) \text{x } CFS \text{ x } (365 - AWA) + CWW$$

where:

CBW = corrected birth weight
RBW = real birth weight
CFS = correction factor of sex
CFDA = corrected factor of dam age
RWW = real weaning weight
RBW = real birth weight
Length of lactation = the period of lactation, d
Grace period = the period from weaning time to 1 yr old
CFS = corrected factor of sex
CFBT = correction factor of birth type
CYW = corrected yearling weight
CWW = corrected weaning weight
AWA = average weaning age
CYW = corrected yearling weight
CFS = correction factor of sex

$$= \frac{\text{ave. male goat body wt}}{\text{ave. female goat body wt}}$$

The variables were used to estimate reapeatability and to calulate MPPA and DPI through the following formulas. Repeatability estimate of weaning weight was calculated by interclass correlation method as recommended by Becker (1992):

$$r = \frac{\Sigma xy}{\sqrt{(\Sigma x^2)(\Sigma y^2)}} = \frac{\Sigma XY - \frac{\Sigma X \Sigma Y}{n}}{\sqrt{(\Sigma X^2 - \frac{(\Sigma X)^2}{n})(\Sigma Y^2 - \frac{(\Sigma Y)^2}{n})}}$$

where:
X = weaning weight of kids at first parity
Y = weaning weight of kids at second parity
n = number of doe

MPPA was calculated by formula as recommended by Hardjosubroto (1994):

$$MPPA = \frac{nr}{1+(n-1)r}(Pi - \overline{P}) + \overline{P}$$

where:
n = number of parity
r = repeatability of weaning weight
Pi = average of weaning weight of kid each doe
$\overline{P}$ = average of weaning weight of population

DPI, kg, was calculated by formula as recommended by Hardjosubroto (1994) as follows:

$$DPI = LS\ X \frac{12}{KI} \text{ x Weaning weight}$$

where:
DPI = Doe Productivity Index, kg
KI = kidding interval, mo
BS = weaning weight
LS = litter size

RESULTS AND DISCUSSION

Most Probable Producing Ability (MPPA)

The average MPPA for weaning weight of EGG and Boerawa are presented in Table 3.

Table 3. Average MPPA for weaning weight of EGG and Boerawa

Breed	Average weaning weight, kg	Repeatability estimate for weaning weight	Number of parity	Average MPPA,kg
EGG	17.70±0.46	0.19±0.16	2	18.09 ± 0.41
Boerawa F1	21.01±1.35	0.34±0.292	2	21.51±0.10
Boerawa BC1	22.12±1.93	0.36±0.01	2	22.57±0.63
Boerawa BC2	23.35±2.03	0.82±0.16	2	23.93±1.25

Average MPPA for weaning weight of Boerawa BC 2 was higher than that of Boerawa BC1. Average MPPA for weaning weight of Boerawa BC1 was higher than that of Boerawa F1, average MPPA Boerawa F1 was higher than that of EGG. The average MPPA Boerawa BC 2 was the highest because average weaning weight (23.35±2.03 kg) and repeatability estimate for weaning weight

(0.82±0.16) was also the highest. Average MPPA for weaning weight, average weaning weight, and repeatability of weaning weight Boerawa BC1 were higher than those of Boerawa F1. average MPPA for weaning weight, weaning weight, and repeatability estimate for weaning weight Boerawa F1was higher than that of EGG. The research indicated that MPPA value was affected by weaning weight and repeatability estimate.

Aaverage MPPA, weaning weight, and repeatability estimate for weaning weight increase when the crossbred goats contain high genetic potency of Boer. Genetic potency of Boerawa BC 2 consisted of 87.5 % genetic potency of Boer goat and 12.5 % genetic potency of EGG. Genetic potency of Boerawa BC 1 consisted of 75.0 % genetic potency of Boer goat and 25.0 % genetic potency of EGG. Genetic potency of Boerawa F1 consisted of 50.0 % genetic potency of Boer goat and 50.0 % genetic potency of EGG. Weaning weight of Boerawa BC 2 was high resulted of Boer goat inheritance. Boer goat was wellknown as meat type goat having fast growth and prolific (Ted and L. Shipley, 2005).

Repeatability estimate for weaning weight of Boerawa BC 2 (0.82±0.16) indicated that differences in weaning weight of individual between first parity and second parity, 82 % was caused by genetic factor and permanent environment factor and 18 % by temporal environment factor. Falconer and Trudy (1996) stated that repeatabiliy estimate was part of phenotypic variance caused by genetic variance and permanent environment factor. Repeatabiliy estimate resulted in this research could be classified as high class when its value more than 0.3. That value indicated that weaning weight of kid resulted does at the first parity was similar second parity.

Doe Productivity Index

Average Doe Productivity Index (DPI) of EGG, Boerawa F1, Boerawa BC 1, and Boerawa BC 2 was presented at Table 4.

Table 4. Average DPI of EGG, Boerawa F1, Boerawa BC 1, and Boerawa BC 2

Breed	Kidding interval, mo	Average weaning weight, kg	Average litter size	Average DPI, kg
EGG	10.41±2.01	17.70±0.46	1,72±0.26	35.09±2.50
Boerawa F1	9.61±1.76	21.01±1.35	1.94±0.28	50,89±1.90
Boerawa BC1	9.21±1.98	22.12±1.93	1.92±0.23	55,34±1.28
Boerawa BC2	9.06 ±1.76	23.35±2.03	1.93±0.18	59,68±1.23

Average DPI of Boerawa BC 2 was higher than that of Boerawa BC 1. Average DPI of Boerawa BC 1 was higher than that of Boerawa F1. average DPI of Boerawa F1 was higher than that of EGG (Table 3). Average DPI of Boerawa BC 2 (59,68±1.23 kg) was the highest because kidding interval (9.06 ±1.76 months) was low however average weaning weight (23.35±2.03 kg) and average litter size (1.93±0.18 heads) were the highest than that of Boerawa BC 1, Boerawa F1, and EGG. average DPI of EGG (35.09±2.50 kg) was lowest because kidding interval (10.41±2.01 months) was long however litter size (1,72±0.26 heads) and weaning weight (23.35±2.03 kg) were low.

Result of this research indicated that productivity Boerawa were high because of higher genetics of Boer than that of EGG. Boer goats transmitted its potency as meat type having high body weight, especially weaning weight. The average weaning weight of Boer goat was 24,00 kg (Barry and Godke, 2005).

Productivity of Boerawa BC 2 was the highest because the grade goats had genetic potency of Boer which was higher than that of EGG (87.50 % vs. 12.50%). Productivity of EGG was the lowest because the goats did not have any genetic potency of Boer. Kidding interval of Boerawa BC 2 was the lowest because Boer goats usually mates at 8 mo old while EGG at 12 mo old. Lactation period of Boer does was about 2 mo, while that of EGG was about 2 mo.

Lu (2008) stated that Boer does was partially seasonal breeders and had estrous cycles all year long when it was under good management. Estrous cycles of Boer does were lasting every 18- 21 d.

Average estrous length was 37.4 h, the average of pregnancy length was 148 d. Postpartum anestrus were lasting from 37 to 60 d . Post partum estrous cycle was about 20 d. Average litter size of Boer doe was from 1.6 to 2.1 (Barry and Godke, 2005), and 1.92 ± 0.12 (Browning et al. , 2006).

CONCLUSIONS

Result of study showed that genetic potency and productivity of Boerawa BC 2 was the best.

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