Increasing Local Sheep Growth Performance through Rapid Selection at Fattening Farm

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ABSTRACT

Sheep fattening farms have recently been growing rapidly to produce better quality of sheep meat, however the bussiness could make a crucial loss of good quality of local sheep because they can be sold. It is therefore elite flocks of sheep in a fattening farm should be selected. The experiment was conducted at PT Tawakal, a sheep fattening farm located in Caringin, Bogor. One hundred and sixty nine young male sheep (less than one year old) were selected based on physical judging and their average daily gain (ADG) into two groups having the highest growth rate (above 150 g/head/day) and lowest group (leass than 65 g/head/day). Selection differential and its progress of the selected flock was also calculated. The results showed that there were 13 heads of fast growing and 11 heads of slow growing sheep with the average daily gain of 173.8 ± 26.3 g/head/day and 53.9 ± 15.7 g/head/day, respectively ($P<0.01$), while the ADG of their population was 98.5 ± 43.6 g/head/day. Based on selection differential calculation (75.3 g/head/day), it was found that selection progress was 7.53 gr/head/day of ADG per year and therefore it may need 6.8 years to improve sheep population to achieve ADG of 150 g/head/day, a relatively short period of a genetic improvement program. It is concluded that rapid selection approach can be recommended as among other selection methods used to increase growth performance of local sheep thus continuously in general, to develop sustainable sheep agribussiness.

Key words: selection, local sheep, growth

INTRODUCTION

Local sheep has a very good potency to be developed, as they have some advantages: prolific, well adapted, more disease resistant, quick yielding and low capital input than cattle, besides their weakness, i.e, slow growth rate compared to 'imported' breed (70-80 vs 200-250 g/head/day, respectively; Edey, 1983; Cottle, 1991).

In recent years, private sectors have been attracted to sheep agribussiness, but still on sheep fattening bussines, because it is less in capital and land needed and also fast in return. The fattening bussines is raising, fattening period of 2-4 months period and post weaned lamb of 6-9 months under intensive and good management practices could stimulate optimal growth of the lambs. But with this fattening bussiness, the best quality lambs can be sold and slaughtered, as previous study showed that the average daily gain (ADG) of local lambs in a fattneing farm had a very large range from 30 g/head/day to 250 g/head/day (Yamin et al., 2002; Yamin et al., 2003).

Similar condition may occur in small sheep farms, the loss for good quality lambs tend to be high because the fattening animal will have better price. These conditions will endanger sheep production and population in Indonesia, because it will decrease the genetic quality of local sheep.

It is therefore, selection of the best sheep in the population of fattening farms was proposed, aiming at obtaining elite flock as genetic sources for sheep breeding improvement. Selection methods used was low cost, simple technique, output oriented, easy to do and the results will be more obvious and sustainable.

This study was conducted (a) to develop group of sheep farmers as initial step to establish fast growing local sheep that adapted to local condition, socially and culturally; (b) to identify selection criteria for sheep flock in Bogor.

MATERIALS AND METHODS

Locations and Time of Experiment

This experiment was conducted in the Lab. of Small Ruminant Production, Lab. of Animal Breeding and Genetics, Faculty of Animal Science, Bogor Agricultural University and Sheep commercial farm "Tawakal Farm" Cimande village, Bogor. This research was conducted for 3 months (July-September 2009).

Experimental Animals

Local sheep used in this experiment were 169 heads from sheep fattening farm 'Tawakal' Cimande Bogor. The sheep were selected from the total number of 1071 heads in the farm, based on average daily gain (ADG) and morphometric parameters (girth, body length and body height). Two groups of fast and slow growing sheep (FG and SG) were determined based on ADG. The two groups of selected sheep had ADG of above 150 g/head/day and less than 50 g/head/day, respectedly for FG and SG. The sheep were lambs (I_0), with the age between 6-12 months of age. The reason of using lambs within the of 6-12 months old, because the growth rate within this ages was is in its peak period for effective growing, as reported by Otoikhian et al. (2008).

Data Analysis

Analysis of variance

Data were analysed by T-test, with design model as follows:

$$t = \frac{\bar{d} - \mu_d}{\frac{s_d}{\sqrt{n}}} \text{ or if } \mu_d = 0 \text{ then } t = \frac{\bar{d}}{\frac{s_d}{\sqrt{n}}}$$

where degrees of freedom (df) = n-1
D = difference between individual or object paired
μ_d = value of difference mean d population from whole data pairs, usually 0
$\bar{d}$ = mean of d
S_d = standard deviation of
n = number of data pairs

Analysis of genetic parameters

Selection Differential   = $(X_S - X_B)$
Selection Progress/year = h^2 x (SD)/GI

Where,
h^2 = Heritability of ADG
X_S = ADG of selected sheep
X_B = ADG of population
GI   = Generation interval: mean age of dams (year) when giving births in their life time

RESULTS AND DISCUSSION

Effects of Selection on Sheep Growth Performance

Selection of 169 heads of lambs resulted in 11 heads of FG and 10 heads SG sheep. There was significant difference of growth rate between sheep of 04-12 month old and 25-36 month old. Sheep of 4-12 month old had faster growth rate which was decreased with the increasing age. Male sheep had fast growth rate and higher final weight than female sheep. This is also in accord to work done by Villarroel et al. (2008), showing sex has significant effects (P<0,05) on growth rate and final weight of sheep. This may relate to effect of sexual hormone on animal growth influencing body dimension, fat, meat and bone compostions.

The results showed that the average body weight of male lambs population was 28,06±5,20 kg, while their ADG was 98.48±43.62 g/head/day. Previous study by (Villarroel et al.,2008) found that male lambs had higher body weigh and ADG than female lambs; (for body weight, 20.70±0.7 for males and 17.60±0.5 kg for females), while, (for ADG of males and females, was 77 gr/head/day and 55 g/head/day, respectively). Higher body weight and ADG in current study might associated with: (i) the sheep used was from fattening farm that conducted selection on animals bought from farmers or traditional market; (ii) intensive management system applied in fattening program.

Table 1. The Average body weight and ADG of selected sheep

Sheep groups	Average Body weight (Mean ± SD) (kg)	ADG (Mean ± SD) (g/head/day)
FG (Fast growing)	34.57[A]±3.98	173.78[A]±26.34
SG (Slow growing)	26.58[B]±5.62	53.85[B]±15.71

Note: Different superscript capitals in the same column shows very sinificant difference (P<0,01).

The results also show significant differences (P<0.01) between body weight of FG and SG

sheep, i.e 34.57±3.98 kg and 26.58±5.62 kg, respectively for the two groups of sheep. In terms of ADG, FG sheep had significantly higher (P<0.01) (P<0.01) ADG (173.78±26.34) than SG sheep (53.85±15.71) (Table 1. and Picture 1).

Application of Selection Approach Sheep Breeding Program

The results show that the percentage of selected sheep was only 14 head (8.3%) from its of population (169 heads), indicating the growth rate performance of the population was still vary, so a continuous selection program might be needed.

Based on the data of ADG of selected FG sheep (173.78±26.34 g/head/day) and ADG population (98.48±43.62) g/head/day), selection differential was 75.3 g/head/day. By assuming heritability of ADG is 0.25 (Noor, 2008) and generation interval of sheep is 2,5 years, selection progress of sheep population in the farm could become (0.25x75.3)/2.5 or 7.53 gr/head/day of ADG per year. This indicated that, to improve ADG of 150 /head/day, within sheep population, needs aproximately (150- 98.48)/7.53 = 6.8 years, which is considered as a relatively short period of time required to obtain a long term better results. Implementation this selection approach is recommended to improve local sheep genetic quality especially for growth variable, as this method is relatively simple, cheap and sustainable.

CONCLUSIONS

Rapid selection method had been succesfully selected 8,3% fast growing sheep from its population in the fattening farm, resulted in significantly higher mean body weight (34.57±3.98 kg) and ADG (173.78±26.34 g/head/day), as compared to those in the population (28.06±5.20 kg and 98.48±43.62 g/head/day).

Selection progress was 7.53 gr/head/day of ADG per year, needs only 6,8 years of selection process to improve ADG of 150 g/head/day in sheep population.

The founding recommended a continous selection program carried out in village breeding centre to achieve a sustainably best quality of local sheep.

a. Fast growing sheep

b. Slow growing sheep

Figure 1. Photographs of Fast growing (a) and Slow Growing Sheep (b)

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