

Selection on Growth Performance of Local Crossbred Sheep in a Farmer Group, Central Java, Indonesia

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Sheep fattening agribusiness in Indonesia has recently been growing rapidly to produce better quality of sheep meat, as this is a quick yielding business, less investment and smaller land use in compared to breeding farm. This business uses good quality of local sheep and grows them under intensive management and feed quality. This business, however, could make a crucial loss of good quality of local sheep because many of them can be sold easily from the fattening farms. At present, the farmers are also getting difficulties to obtain good lambs to grow, as there is lack of the stocks. Breeding farms to produce good quality and sustainable sheep production are urgently needed in this situation. Selection to get elite flock of sheep is the first step to conduct further good breeding program. The objective was then designed to study effect of sheep selection on body weight, average daily gain (ADG) at different sex of sheep. The field experiment was conducted in 'Mantap' sheep farmer group, Batur village, Banjarnegara, Central Java. The sheep were local crossbred sheep (Texel x Merino x local sheep) that have been well adapted for decades in the area. The experimental sheep were 69 lambs aged 2 - 6 months old, consisted of 29 male and 40 female lambs. The sheep were chosen from good farmer's farms recommended by the head of the group. The sheep were then weighed every week for 4 weeks to get ADG data. The ADG were categorized as fast growing (FG) sheep for those having $ADG \geq 250$ g/head/day and as slow growing (SG) sheep when they have $ADG \leq 150$ g/head/day. Data were analyzed with T-test. The results show that in general data there were no significant differences ($p > 0.05$) of average body weight (ABW) and ADG between male and female lambs. The IBW were 25.46 ± 5.20 kg and 26.2 ± 7.47 kg in male and female lambs respectively, while ADG were 226.98 ± 75.75 and 208.33 ± 80.63 g/head/day, respectively in both sexes. It was also found that ABW of FG and SG lambs were similar (around 24 - 27 kg, $p > 0.05$), on the contrary, ADG was significantly different between FG and SG (around 290 and 140 g/head/day). These occurred either within male and female lamb group. In both FG and SG sheep, sex did not have different IBW and ADG ($p > 0.05$). It is concluded that growth rate of the local sheep varied within the experimental flock. Selection on the sheep growth is highly recommended to obtain elite flocks of lambs to produce good quality and sustainable lambs in a village breeding system.

Key Words: Selection, Lambs, Growth, Local sheep, Breeding program

INTRODUCTION

Sheep fattening agribusiness in Indonesia has recently been growing rapidly to produce better quality of sheep meat, as this is a quick yielding business, less investment and smaller land use in compared to breeding farm. Sheep fattening program is a management system to raise young sheep (6-9 month old) intensively by using good environment, including very good quality of feed, for 2-4 month, to produce high growth rate and good quality of carcass and meat of sheep. The growth rate of fattening sheep could achieve 120 gr/head/day of their average daily gain (ADG), but it ranged from 50 g/head/day to 200 g/head/day (Yamin *et al.*, 2002). The variation of sheep growth rate can make uncertain condition for the farmers, in which they can lose profit when they get the poor quality of sheep. Ironically, when the farmers can get good quality of growth rate, it can cause of a loss of genetic resource, due to the best sheep are sold and slaughtered. Moreover, at present, the farmers are also getting difficult to obtain good lambs to grow, as there is lack of the stocks. Sheep fattening and breeding commercial farms should be developed proportionally to achieve sustainability in the sheep business.

The large variation of growth performance of local sheep commonly occurs and this might relate to the large genetic variation of the sheep. One of sheep farm developed and run by the community in a village is located in Batur village, Banjarnegara Central Java. This sheep farmer group "Mantap" has successfully raised local crossbred sheep, however the sheep quality in growth tend to decrease, as intensive breeding program has not been applied. The objective of present research was then designed to study effect of sheep selection on body weight and ADG at different sex of sheep. It was hypothesized that there would be a large variation of sheep growth performance to select elite flock of fast growing sheep.

MATERIALS AND METHODS

General

This field experiment was conducted in sheep farmer group "Mantap", Batur village, Banjarnegara district, Central Java province, Indonesia, for 6 months (June-November 2009) to select elite post weaning lambs both sexes (male and female having average daily gain (ADG) ≥ 250 g/head/day) for breeding stocks. The sheep were local crossbred sheep (Texel x Merino x local sheep) that have been well adapted for decades in the area. The experimental sheep were 69 lambs aged 4-6 months old, consisted of 29 male and 40 female lambs. The sheep were purposive samples, chosen from good farmer's farms recommended by the head of the group. The sheep were then weighed every week for 4 weeks to get ADG data. The ADG were categorized as fast growing (FG) sheep for those having ADG ≥ 250 g/head/day and as slow growing (SG) sheep when they have ADG ≤ 150 g/head/day.

Statistics

Data were analyzed 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. **Note :**

d = difference between each individu or paired objects

μ_d = value of difference average **d population** form the whole paired data, usually 0

\bar{d} = average value of **d**

S_d = standard deviation of **d**

n = number of paired data

RESULTS AND DISCUSSIONS

Results show that average body weight (ABW) of selected young sheep was 25.89±6.64 kg, while average daily gain (ADG) was 216.01±78.2 g/head/day (Table 1). The selection on young sheep (lambs) was a proper approach, as growth rate of sheep is quicker than older sheep. This is according to Otoikhian *et al.* (2008) who reported significant differences of higher daily gain of 4-12 month old lambs than adult sheep of 25-36 months old. The current study found that the ABW and ADG were similar between male and female lambs, although ADG was almost 20 g/head/day, but the standard deviation was also quite large, making non-significant differences ($p>0.05$) (Table 1). On the contrary previous work reported that male sheep had higher daily gain and final weight than female sheep. This may relate to effect of sexual hormone on animal growth in body size dimension and fat, muscle and bone tissues (Otoikhian *et al.* 2008 and Villarroel *et al.* 2008). Previous work also reported that besides sex, some other determinants to growth rate and body weight included birth weight, litter size and management system especially feed. Sheep with low birth weight had slow growth rate on factor to get the milk from the mother. Male lambs have generally higher body weight than females. The difference might relate to hormonal system in which testosterone appeared in male animals can increase Cytosol bind from *m. Gluteus* which relate to protein metabolism (Galbraith dan Berry, 1994). The different results between present and previous results may relate to variation in lambs age (2 months difference) and quality of feed given by local farmers, as this work was a field study.

When the lambs were selected based on their ADG and grouped into fast growing sheep (FG) and slow growing (SG) lambs, the results show that within male or female, the ABW were similar between FG and SG lambs ($p>0.05$, Table 2), however ADG was very significantly higher at FG than SG lambs, either within male or female sheep groups ($p<0.01$, Table 2). This indicate that the sheep growth rate variation was relatively high in the sheep population and it also shows that the sheep selection was successfully achieved to get elite flocks of lambs having around 300 g/head/day in both sex groups. The selection is highly recommended for continues genetic improvement of the local crossbred sheep in the area.

Table 1 Average body weight (ABW) and average daily gain (ADG) of male and female experimental sheep

Sheep Sex	ABW (Mean±SD) (kg)	ADG (Mean±SD) (g/head/day)
Male lambs (n=29)	25.46 ^a ±5.20	226.98 ^a ±75.75
Female lambs (n=40)	26.2 ^a ±7.47	208.33 ^a ±80.63
Average (n=69)	25.89±6.64	216.01±78.62

Note: The same superskrip at the same column in each growth rate group show a non significant level (P>0.05).

Table 2 Average body weight (ABW) and average daily gain (ADG) at different sheep growth rate groups in the same lamb sex

Sheep Group	ABW (Mean ± SD) (kg)	ADG (Mean ± SD) (g/head/day)
Male FG Lambs (n=13)	24.77 ^a ±5.89	293.2 ^a ±75.75
Male SG Lambs (n=16)	25.31 ^a ±4.15	140.3 ^b ±11.79
Female FG Lambs (n=13)	27.69 ^a ±8.86	299.1 ^a ±70.3
Female SG Lambs (n=27)	24.47 ^a ±5.68	140.1 ^b ±13.8

Note: Different superskrip at the same column in each sex group show a very significant level (P<0.01).

The data was then analyzed by comparing sex within the same group of ADG. The results show that there were no significant differences in ABW and ADG between male and female lambs either in FG or SG sheep group (p>0.05) (Table 3). These results were consistent with the pooled data in table 1. The findings may indicate that in this type of sheep breed the body size and growth are similar between sexes of sheep. These facts could be an advantage for fattening sheep business which aims a good sheep growth in both sexes.

Table 2 Average body weight (ABW) and average daily gain (ADG) of different lamb sex in the same sheep growth rate

Sheep Group	ABW (Mean ± SD) (kg)	ADG (Mean ± SD) (g/head/day)
Male FG Lambs (n=13)	24.77 ^a ±5.89	293.2 ^a ±49.8
Female FG Lambs (n=13)	27.69 ^a ±8.86	299.1 ^a ±70.3
Male SG Lambs (n=16)	25.31 ^a ±4.16	140.3 ^a ±11.79
Female SG Lambs (n=27)	24.47 ^a ±5.68	140.1 ^a ±13.8

Note: The same superscript at the same column in each growth rate group show a non significant level (P>0.05).

In general, the performance of body weight and growth rate of lambs in Batur village were much higher than in other local sheep breed such as Garut, fat tailed sheep etc. This is because the sheep used in this experiment were local crossbred that have been well adapted in the area for decades. The good performance of sheep is very potential to develop breed of local meat sheep in a sustainable sheep breeding development in the area.

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CONCLUSIONS

It is concluded that body weight and growth performance of local crossbred sheep in Batur Banjarnegara Central Java were much better than other local sheep breed. hVariation of body weight and average daily gain of the sheep population were relatively large. This makes a great differences of daily gain in fast growing sheep (293.2 ± 49.8 g/head/day and 299.1 ± 70.3 g/head/day (for male and female) and in slow growing sheep (140.3 ± 11.79 and 140.1 ± 13.8 g/head/day for both sexes). Sex did not affect the parameters either in pooled data or within growth rate groups. Selection on the sheep population is highly recommended to get good performance of lambs in body weight and growth though an effective village breeding program.

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