Growth response and vital statistics of fat and thin tailed sheep with soybean husk supplements in Malang District

M Nasich1, G Ciptadi1, A Budiarto1, SB Siswijono1, Hermanto1, A Ridhowi1, Mudawamah2, DKH Widjaja1, ARI Putri1, HN Karima3, S Septian1 and AM Ramadhan1

1Faculty of Animal Husbandery, Brawijaya University, Malang, East Java, Indonesia
2Faculty of Animal Husbandery, University of Islam Malang, East Java, Indonesia
3Central Laboratory of Life Science, Brawijaya University, Malang, East Java, Indonesia

E-mail:nasich@ub.ac.id

Abstract. This study aimed to determine the pattern of body weight gain and vital statistical measures of fat sheep and thin tails and to determine the response of local sheep production to the provision of soybean meal/skin. The method used in this research is a case study and experimental. The sampling technique is done by a simple random method on vital statistical measures performed by measuring the chest (using a measuring tape) and body length (using a measuring stick). The tabulated data were first analyzed for homogeneity and normality, which were then tested by an independent sample t-test using SPSS. As for the growth response, the material used was 16 male FTS and TTS aged under one year. Daily body weight growth between Fat tail Sheep (FTS) and Thin Tail Sheep (TTS) showed very significant differences (P <0.01). Statistical analysis showed that body length between FTS and TTS had no difference (P> 0.05), chest circumference between FTS, and TTS; there was no difference (P> 0.05). Adding bodyweight FTS and TTS were respectively 93.29 ± 26.73 g / head / day and 78.18 ± 27.01 g / head / day. The FTS and TTS bodies' length was 49.81 ± 4.06 cm and 49.34 ± 4.80 cm, respectively, while the chest circumference between FTS and TTS was 63.61 ± 3.98 cm and 62, respectively. 17 ± 4.10 cm. The daily body weight gain of rams fed with additional soybean husk feed statistically results obtained significant differences (P <0.05), the results of the study showed that the Daily Weight Gain (DWG) FTS male respectively P0, P1, P2, and P3 groups respectively named: 105.07 ± 3.58; 118.08 ± 2.65; 140.38 ± 4.40; 155.01 ± 4.01 g / head/day. The results showed that the feed efficiency of male rams in each group P0, P1, P2, and P3 were: 7.84 ± 0.27; 8.25 ± 0.18; 9.27 ± 0.29; and 9.75 ± 0.32%. While for TTS also obtained a significant difference (P <0.05) DWG at P0, P1, P2, P3 is 101.02 ± 2.18; 116.9 ± 2.88; 127.82 ± 3.20; 140.31 ± 2.41 g / head / day, so that the efficiency of feed obtained for TTS is P0, P1, P2, P3 respectively 6 ± 0.19; 7.14 ± 0.11; 8.87 ± 0.22; 9.85 ± 0.12. It was concluded that the provision of soybean meal had a significant positive effect on growth and vital statistics, both for sheep with fat tails and thin tails.

1. Introduction
Sheep is one of the many livestock raised by people in Indonesia, especially in the Java region, because it is beneficial for breeders, among others, fast breeding, rapid capital turnover, easy technical implementation, and can be used as savings. The sheep population in Indonesia is increasing by looking at the data of the Directorate General of Animal Husbandry and Health [1] which states that...
the sheep population in Indonesia is 15,716,695 head in 2016, 17,142,498 head in 2017 and 17,397,696 head in 2018.

Increased body weight is one of the characteristics of the growth of a fin. The speed of growth is always different, the difference is influenced by several factors including nation, gender, hormones, environment and food [2]. Intensive maintenance of sheep can provide an average weight of 50-150 g / head / day [3], Harianto [4] adds that thin-tailed sheep have a weight gain of 90-100 g / head / day while in sheep fat tails produce weight gain of 100-120 g / head / day.

One of the sheep farming business to increase productivity is fattening. The feed is the biggest part of livestock production costs, feed affects 60-80% of the overall cost of livestock production, so that selection of feed ingredients does not only have to meet nutritional needs but also economically profitable.

In this study, we want to know the growth patterns of Fat tail Sheep (FTS) and Thin Tail Sheep (TTS) sheep through research by observing sheep weight gain, body length measurements and body levels that are maintained in the traditional system. In addition, the authors also want to know the growth response of these two types of sheep if they are treated in the form of a modified feed by adding soybean epidermis in various compositions.

2. Material and method

2.1 Research location and time
This research was conducted in Karangploso District, Malang Regency. This research was conducted from January 13 to February 12 2020.

2.2 Research material
The material used in this study were fat tailed sheep and thin tailed sheep with female sex as much as 90 heads which were divided into 2 groups, namely group 1 (grower 1) each as many as 15 tails and group 2 (grower 2) each as many as 30 tails. Whereas for the response of material growth used in this study were 32 sheep, 16 FTS sheep and 16 TTS ages of PI0

2.3 Research method
The method used in this research is a case study. Simple random sampling technique, which is a random sampling technique, where every element or member of the population has the same opportunity to be selected as a sample. And secondary data retrieval used as initial body weight of sheep. Weighing is done every 2 weeks in 1 month. On vital statistical measures performed by measuring the circumference of the chest (using a measuring tape) and body length (using a measuring stick).

Technical research as follows:
1. Each type of sheep is chosen at random,
2. Weighed sheep body weight before the sheep were given feed and vital statistical measurements,
3. Recording data in the form of ear tag numbers, body weight and vital statistical measurements,
4. Marking using animal marking crayons on the head and back
5. Two weeks later the livestock that have been marked will be measured again by weight, body.

The method used in this study is the experimental method. using a Randomized Block Design (RBD) design consisting of 4 (four) feed treatments, and 4 (four) replications. This study uses primary data obtained by weighing and weighing the feeding and remaining feed. Weighing is done once a week for 2 months in the morning before the sheep are fed. The treatments given in this study are as follows:

P0: Field grass (ad libitum) (1000 g) + Concentrate (tofu waste 1652 g, bran 146.2 g) PK 20.26% (Control)
P1: (Control) + soybean shells (100 g) PK 21.25%
P2: (Control) + soybean husk (200 g) PK 22.23%
P3: (Control) + soybean husk (300 g) PK 23.22%

3. Results and discussion

3.1. Increased Body Weight
Daily sheep body weight gain is obtained by doing twice the weighing with a distance of 10-20 days then adding body weight divided by the weighing interval. Munier [5] in his research results stated that observing the growth rate by weighing every two weeks. The results showed that the results of the FTS and TTS weighing were as shown in Table 1.

| Group         | FTS          | TTS          | Average      |
|---------------|--------------|--------------|--------------|
| Grower 1      | 74.53±22.98  | 55.20±16.54  | 64.87±21.99  |
| Grower 2      | 102.67±23.59 | 89.67±23.78  | 96.17±24.38**|
| Average       | 93.29±26.73  | 78.18±27.01  |              |

Information: ***) shows a very significant difference (P<0.01)

Based on table 1 it can be concluded that the growth of daily body weight between fat tailed sheep and thin tailed sheep in the two groups there is a very significant difference (P <0.01). This is because the body size of the fat tailed sheep is larger than the thin tailed sheep, thus causing different daily body weight gain. This is in accordance with Hafiz [6] which states that fat-tailed sheep have a higher value than thin-tailed sheep, namely in body weight and all body sizes so that shows that fat-tailed sheep have greater body parameters than thin-tailed sheep. This is different due to the different genetic responses of the two research objects towards improving the quality of animal feed, in this case, the provision of soybean husks.

3.2 Size of vital statistics
Body size measurements are carried out based on quantitative traits in each sheep. Tables 2 and 3 show the average body measurements of each herd in Karangploso.

| Group         | FTS          | TTS          | Average      |
|---------------|--------------|--------------|--------------|
| Grower 1      | 46.24±3.04   | 45.70±4.17   | 45.97±3.60   |
| Grower 2      | 51.59±3.27   | 51.16±4.02   | 51.38±3.64**|
| Average       | 49.81±4.06   | 49.34±4.80   |              |

Information: **) shows a very significant difference (P <0.01)

Body length is one body size that has a relationship with body weight. This can be likened to a cylinder whose volume is influenced by the base diameter and height as the body length. Statistical analysis showed that there was no difference in body length between fat-tailed and thin-tailed sheep (P> 0.05).

| Group         | FTS          | TTS          | Average      |
|---------------|--------------|--------------|--------------|
| Grower 1      | 63.30±5.22   | 60.95±5.75   | 62.13±5.53   |
| Grower 2      | 63.77±3.29   | 62.78±2.89   | 63.28±3.11   |
| Average       | 63.61±3.98   | 62.17±4.10   |              |
Information: **) showed no significant difference (P>0.05)

Chest circumference is the part of the body that is enlarged sideways and according to Wangchuk et al. [7] is the best measure to predict or predict the weight of a livestock's life. In table 3 it can be seen that the breast circumference between fat tailed sheep and thin tailed sheep is no difference (P>0.05) with the fat tailed sheep chest circumference is higher than thin tailed sheep. The body size statistic of the two research objects is also a natural genetic response that occurs when livestock are given increased feed quality. We can compare this response between several types of sheep and we can get the best response, so it can be seen which of the two objects is more efficient in consuming feed.

3.3 *Feed consumption*

Based on the results of this study, we obtain data on field consumption of grass + concentrate and consumption of dry matter.

**Table 4. Average consumption of field grass, concentrate (tofu pulp, bran) + soybean epidermis and consumption of FTS and TTS dry matter.**

| Sheep type | Consumption (g / head / day) | Treatment |
|------------|------------------------------|-----------|
|            | P0                           | P1        | P2        | P3        |
| FTS BK RL  | 466.54                       | 444.63    | 417.89    | 409.21    |
| BK Konsentrat | 873.21                      | 98.5      | 1097.09   | 1191.51   |
| Total      | 1339.8                       | 1431.1    | 1515      | 1600.7    |
| TTS BK RL  | 441.71                       | 434.25    | 403.416   | 386.55    |
| BK Konsentrat | 852.90                      | 917.46    | 973.96    | 1016.08   |
| Total      | 1294.61                      | 1351.71   | 1377.37   | 1402.63   |

The treatment of feed given to sheep namely field grass and tofu dregs + rice bran concentrates given additional soybean husk produced a level of feed consumption ranging from 2642.6-2808.4 g / head / day and the level of feed BK consumption ranged from 1339.8-1600, 7 g / head / day. The lowest average to highest feed consumption consecutively was P0 = 2642.6 g / head / day; P1 = 2697.8 g / head / day; P2 = 2745.4 g / head / day; P3 = 2808.4 g / head / day and the average consumption of the lowest to the highest BK food consecutively was P0 = 1339.8 g / head / day, P1 = 1431.1 g / head / day, P2 = 1515 g / head / day, P3 = 1600.7 g / head / day. These results are greater than Harianto [4] that the consumption of dry material of thin-tailed sheep fed field grass and soybean ari skin is 3.47-4.28 kg / head / week or 496-6151 g / head / day.

The results of dry matter consumption in this study ranged from 7.89 to 9.25% of the live weight of male FTS cattle (Table 1). This result is higher compared to NRC (2006), sheep in the fattening phase with initial body weight of 10-20 kg require consumption of dry matter 0.5-1 kg / head / day or about 5% of live weight. Male FTS in this study was able to consume dry matter more than 5% of body weight per treatment. However, the expected Daily Weight Gain (DWG) on the P1 and P3 treatments are not in accordance with the amount of feed, the consumption of feed that produces high DWG is P0 treatment in terms of feed price and P2 in terms of feed price and fattening time, P2 treatment can be used as a reference for sheep fattening because it has fattening time, and high DWG makes fattening can be done within 2 months.

3.4 *Daily weight gain*

The results of research on DWG FTS males from field-based grass fed and concentrate added with additional soybean skin fee.
Table 5. Average initial weight, final weight, PBB, and DWG FTS cattle.

| Treatment | Initial Weight (kg/head) | Final Weight (kg/head) | PBB (kg/head/two month) | DWG (g/head/day) |
|-----------|---------------------------|------------------------|--------------------------|------------------|
| P0        | 17.72±2.23                | 24.023±2.02            | 6.305±0.22               | 105.07 ± 3.58 a  |
| P1        | 17.43±1.78                | 24.51±1.87             | 7.085±0.16               | 118.08 ± 2.65 b  |
| P2        | 17.38±2.07                | 25.81±1.93             | 8.42±0.26                | 140.38 ± 4.40 c  |
| P3        | 17.3±2.42                 | 26.69±52.08            | 9.39±0.34                | 155.01 ± 4.01 d  |

Note: a - d Different superscripts in the same column mean that they show a real difference (P <0.05)

Table 6. Average initial weight, final weight, PBB, and DWG male TTS.

| Treatment | Initial Weight (kg/head) | Final Weight (kg/head) | PBB (kg/head/two month) | DWG (g/head/day) |
|-----------|---------------------------|------------------------|--------------------------|------------------|
| P0        | 17.32±2.02                | 22.04±2.65             | 4.72±2.01                | 78.66 ±2.3 a     |
| P1        | 17.13±1.98                | 22.92±2.17             | 5.79±2.05                | 96.5 ±2.43 b     |
| P2        | 16.88±2.02                | 24.21±2.31             | 7.33±1.6                 | 122.1 ±1.92 c    |
| P3        | 16.80±2.09                | 25.09±2.08             | 8.29±1.87                | 138.1 ±2.22 d    |

Note: a - d Different superscripts in the same column mean that they show a real difference (P <0.05)

Tables 5 and 6 show that male FTS and TTS which have a low average initial body weight ie P3 treatment (17.3 ± 2.42 kg / head) had the highest body weight gain of 9.39 ± 0.34 kg / head / two months, while FTS which has a high average initial body weight is in the P0 treatment (17.72 ± 2.23 kg / head) but has the lowest PBB that is 6.305 ± 0.22 kg, this is presumably due to the sheep weighing initial under 17.40 kg high growth rate during fattening.

The high growth rate is presumably due to livestock receiving high nutritional feed with the addition of soybean epidermis to the concentrate feed, which was previously given only livestock grass, and concentrate (tofu pulp, rice bran), this is in accordance with the opinion of Park [8] compensatory growth occurs when cattle are previously given marginal feed below the main nutrient of livestock, then get better feed ration. According to Supriyantono [9] added that growth can be seen from the increase in body weight in a young livestock that is fulfilled by the need for food and drink as well as getting a comfortable place to stay and the time needed for male cattle to reach the same body weight faster and less feed than female cattle.

Figure 1. FTS and TTS weight gain
Male FTS with initial weights between 14.81-20.8 kg with an average (P0) of 17.72 ± 1.93 kg; (P1) 17.43 ± 1.54 kg; (P2) 17.38 ± 1.79 kg; (P3) 17.3 ± 2.09 kg. The final weight of male FTS after 2 months / 8 weeks of research over 4 days obtained results between 22.17-29.03 kg with an average (P0) of 24.04 ± 1.75 kg; (P1) 24.51 ± 1.62 kg; (P2) 25.81 ± 1.67 kg; (P3) 26.69 ± 1.8 kg. The high yield of DWG in the FTS study is thought to be influenced by the sex of the sheep, namely male, sheep breed, age of FTS male PI0 (permanent inches) and low initial sheep weight has the highest DWG per treatment, Soeparno. (2009) livestock body weight will increase with age of the livestock itself.

3.5 Feed efficiency

Table 7. Average percentage (%) efficiency of male fat tailed sheep feed fed with additional FTS and TTS soybean skin

| Treatment | P0     | P1     | P2     | P3     |
|-----------|--------|--------|--------|--------|
| Feed Efficiency (%) FTS       | 7.84 ± 0.27 a | 8.25 ± 0.18 a | 9.27 ± 0.29 b | 9.75 ± 0.32 c |
| Feed Efficiency (%) TTS       | 6 ± 0.19 a   | 7.14 ± 0.11 a | 8.87 ± 0.22 b | 9.85 ± 0.12 c |

Note: a - d Different superscripts on the same line means that they show a real difference (P <0.05).

Figure 2. Response to Growth Due to treatment

The results of the efficiency of male FTS feed fed with additional soybean ari skin feed showed a statistically significant difference (P <0.05). Treatments P0 and P1 have the same feed efficiency and are significantly different from treatments P2, and P3.

4. Conclusion

The weight gain of fat tailed sheep and thin tailed sheep in Karangploso were 93.29 ± 26.73 g / head / day and 78.18 ± 27.01 g / head / day, respectively. The body length between fat-tailed sheep and thin-tailed sheep is 49.81 ± 4.06 cm and 49.34 ± 4.80 cm respectively, while in the chest circumference between fat tailed sheep and thin-tailed sheep respectively 63, 61 ± 3.98 cm and 62.17 ± 4.10 cm. From the growth response obtained FTS showed a significantly better response compared to TTS, but at P3 we got the same feed efficiency between FTS and TTS.

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