

## Body Composition of Lambs and Rams Fed Complete Feed

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### Abstract

This study was aimed to investigate the proportion of body water, protein and fat of lambs and rams. The material used in this study were 6 lambs (weighed of 15.92 kg), and 6 rams (weighed 23.31 kg). The sheep were fed a complete feed. In weeks 1, 5 and 9, the body composition (water, protein and body fat) was measured using the "urea space" method. The results showed that the proportion of water, protein and fat in the body of lambs and sheep differed significantly ( $P < 0.01$ ). The proportion of lambs' body water in weeks 1, 5 and 9 were 58.71, 58.43 and 58.43%, respectively; while those of the rams were 58.40, 58.14% and 58.14%, respectively. The proportion of body protein of lambs in weeks 1, 5 and 9 were 11.84, 11.94 and 11.99%, respectively; while those of rams were 13.01; 13.01 and 13.03%, respectively. The proportion of body fat of lambs in weeks 1, 5 and 9 were 20.51, 20.87 and 20.87%, respectively; while those of rams were 20.9, 21.26 and 21.25%, respectively. Body water of lambs and rams week decreased from week 1 to 9. On the other hand, the proportion of body protein and fat increased. It is concluded that the proportion of body water was higher while the proportions of body protein and fat were lower in lambs as compared with those in rams.

### 1. Introductions

Consumers generally want meat that contains low fat, but marketed meat tends to be rich in fat. This happens because the animals are fattened after having been fully grown. Lambs have a growth rate that tends to be faster than rams and it is estimated that lambs are still in a period of increased muscle in the body to produce meat. The growth rate is related to the development of body composition in the form of water, protein and body fat.

Nutritional composition of the diet given to the animal will greatly affect growth rate and body composition. When forage feed is fed to more livestock, livestock will be bulky, causing difficulty to digest in the body. In contrast to concentrates that tend to be more easily digested so much absorbed by the body to be able to synthesize or the formation of body tissues with a maximum of meat.

Livestock has a good growth if the nutrients provided in accordance with the needs. The amount of livestock feed should be adjusted to the body weight and age of the livestock. If the livestock is short of feed then the need of animal feed is also not fulfilled. The low weight of livestock body is related to the body composition, ie the higher the body weight percentage of water decreases, the percentage of fat increases, while the percentage of body protein is relatively constant [1].

Therefore, a study is needed to be done to find out the difference of body composition between lambs and rams as reference in the selection of meat in accordance with consumer demand.



This study was aimed to compare the body composition of the sheep of different age and body weight. The benefits of this study was to provide information about the body composition of lambs and rams, so it could be used as a reference in determining the age and weight of sheep to be slaughtered to fulfill the demand of consumers.

## 2. Materials and methods

This study used 12 thin tailed sheep consisting of 6 lambs with an average body weight of  $15.92 \pm 1.59$  kg and 6 rams with an average body weight of  $23.31 \pm 0.77$  kg. The sheep were kept in individual cages equipped with a feed and drinking water bunks. The sheep were fed complete feed with 12.07% crude protein (CP), 55.03% Total Digestible Nutrient (TDN) and 19.61% crude fiber (CP).

This study used an independent sample comparison design, namely comparing lambs and rams in proportion and changes of body water, protein and fat content. Every day the sheep were fed a complete feed at amount of 3.5% body weight, which was offered in the morning and evening. The refusals was weighed on the following morning.

In weeks 1, 5 and 9, the measurement of body water, protein and fat content was performed using urea space method. Blood plasma obtained was analysed by Berthelot method based on the principle of calorimetric enzymatic test.

The parameters observed in this study were dry matter intake (DMI), live weight gain (LWG) and body composition (covering the proportion of body water, body protein and body fat). Dry matter intake was calculated from the difference between the weight of the offer and that of the refusals. Live weight gain was measured from the difference between the final body weight and the initial body weight divided by length of maintenance. Water content, protein and body fat were calculated using [2] equation:

$$\text{Body water content} = 16,519 + 1,047 \text{ US } (\%)$$

$$\text{Body protein content} = 6,714 + 0,2082 \text{ US } (\%)$$

$$\text{Body fat content} = 23,837 - 0,2965 \text{ US } (\%)$$

## 3. Results and Discussion

There a significant difference ( $P < 0.05$ ) DMI between lambs and rams. This happened because of differences in body weight between lambs and rams. Having heavier body weight, the rams ate more than the lambs (Table 1). However, in term of the percentage of body weight, there was no significant difference ( $P > 0.05$ ) between the lamb and the ram (Table 1). This suggested that the capacity of the lamb's digestive tract was similar to that of the rams. The DMI of the rams this study was higher than the findings of [3] that DMI of sheep with 18 – 24.5 kg body weight was 817 g/day. This difference may be attributed to the quality of the diet.

**Table 1.** Dry Matter Intake and Live Weight Gain of Lambs and Rams During Week 1 - 9

Parameter	Lambs	Rams	Significations
Dry Matter Intake (g/day)	585.78	822.59	**
Dry Matter Intake (% BB)	2.91	2.61	Ns
Live Weight Gain (g/day)	18.00	1.00	*

Notes: \*) significant ( $P > 0.05$ ); \*\*) very significant ( $P > 0.01$ ); ns: not significant

There was significant difference ( $P < 0.05$ ) in LWG between the lambs and the rams. The LWG of lambs were higher than that of the rams (Table 1). The rams had a very low LWG because the majority of dietary nutrients were used for maintenance, so that only a little part could be used for

production. It is claimed by [4] that nutrients consumed by the animal are primarily used for maintenance, while the rest is used for production.

### *3.1. Proportion of Water Content, Protein and Body Fat Content in Lamb and Rams*

The results showed that there was a very significant difference ( $P < 0.01$ ) between lambs and rams in the proportion of body water, protein and fat of lambs and rams ( $P > 0.01$ ). The lambs were higher in body water content but lower in body protein and fat content as compared with the rams (Table 2). This was in agreement with opinion [1] that the high proportion of body water is affected by age, growth rate and feed consumption; the older the animal the higher the body weight, followed by a decrease in the proportion of body water.

The proportion of body water in this study was lower than the claim of [5], that body water content of an animal was 59%, and higher than the findings of [6] being 52.8%. These differences may be caused by body weight of the animals. This is in agreement with the opinion of [5] that the body's water content is affected by age, body weight and feed intake.

**Table 2.** Proportion and Changes of Body Water, Body Protein and Body Fat Content on Lambs and Rams

Parameter	Lambs	Rams	Signification
Proportion of Body Water Content (%)			
Week 1	58.71	58.40	SN
Week 5	58.43	58.14	SN
Week 9	58.43	58.14	SN
Significations	SN	SN	
Proportion of Body Protein Content (%)			
Week 1	11.84	13.01	SN
Week 5	11.94	13.01	SN
Week 9	11.99	13.03	SN
Significations	SN	SN	
Proportion of Body Fat Content (%)			
Week 1	20.51	20.91	SN
Week 5	20.87	21.26	SN
Week 9	20.87	21.25	SN
Significations	SN	SN	

Notes : SN) very significant ( $P > 0.01$ )

There was highly significant difference ( $P < 0.01$ ) in proportion of body protein between the lambs and the rams. The body protein content of the lambs was lower than that of the rams (Table 2). This suggested that the lambs used in this study is still on the accelerated growth process [7]. In that phase the sheep still mendeposisikan protein on body tissues quickly.

The proportion of body protein in this study is lower than the results of research [8] who obtained body protein levels of 16.50%. This is due to the level of fat in the body has a negative correlation with the body's water content, if the body water decreases then the fat increases but the

protein content tends to be constant. This is in accordance with the opinion [1] the percentage of body protein remains even though sheep grow older.

The proportion of body fat in the lambs was lower very significantly (Table 2) than that in the rams. This indicated that the increasing age and increase in body weight result in fat accumulation in the body. It is suggested by [1] that the increased percentage of fat in the body is associated with increased body weight.

The proportion of body fat in this study was slightly higher than that of [8] who obtained the proportion of body fat by 20.82%. One of factors that affect the fat content is the age of the animal. It stated by [7] that age, body weight, growth rate are factors that have a close relationship with body composition.

### *3.2. Changes in the proportion of body water, protein and body fat content of lambs and rams*

In week 1, 5, and 9 consecutively, the proportion of body water of lambs and rams decreased (Table 2), while the proportion of body protein and body fat increased. These phenomena were in agreement with the opinion of [5] that water and fat have a negative relationship, along with the age and weight of the body, the proportion of body fat tends to increase, while the proportion of body water decreases.

The proportion of body protein of lambs and rams in week 1.5 and 9 were still increasing (Table 2). This indicated that the animal were still growing. The increase of body protein in the lambs was higher than that in the rams, indicating that the lambs were in the accelerated growth phase, while the rams had reached the decelerated growth phase. It is stated by [9] that the livestock at the accelerated phase growth rate has the ability to synthesize proteins larger than those with slower phase growth rates.

The proportion of body fat in weeks 1, 5 and 9 increased continuously, both in lambs and in rams (Table 2). This indicated until the sheep weighed about 23 kg, the fattening process still continued. The proportion of body fat in this study was similar to that of [8], who obtained body fat content about 21%. This was so since the body weight of the sheep in the current study and that in the study of [8] were almost the same.

## **4. Conclusion**

Based on the study it can be concluded that the proportion and changes of body water, protein and fat in lambs and rams differ. The proportion of body water of lambs was higher than that of rams, while the proportion of body protein and fat in lambs was lower than that of the rams. During the study period, the proportion of body water decreased, while the proportion of protein and body fat increased, both in the lambs and in the rams.

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