

# The Effect of Dietary Protein Intake on Body Protein Growth in Thin Tailed Lambs

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## The Effect of Dietary Protein Intake on Body Protein Growth in Thin Tailed Lambs

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### Abstract

A study was carried out to examine the effect of dietary protein intake on the growth of body protein in thin tailed lambs fed diet with different protein level. The study used 12 lambs of 3-4 months old with  $15.02 \pm 2.01$  kg (CV = 16%) of body weight. The lambs were reared intensively in individual pen and fed a complete feed containing 14, 16 and 18% crude protein (CP), 60% total digestible nutrients (TDN), for 9 weeks. Protein content of the lambs' body was measured by urea space methods. The results showed that the body protein growth rate increased with dietary protein intake, up to 162 g/d protein intake. However, when the dietary protein intake was higher than that point, the body protein growth rate decreased. It is concluded that best diet to obtain the highest body protein growth rate should contain 15.4% protein.

**Keywords:** body protein, crude protein, lambs

### Introduction

Fattening lambs could give many advantages, such as shortening time of raising , reducing feed cost and reducing the total waste from livestock (Purnomoadi et al., 2016). The success of fattening could be evaluated from the increase of body weight which was caused by the changes in body composition including fat, water and protein (Restitrisnani et al., 2013). The body component that is expected to change largely is the body protein. Body protein can reflect the muscle tissue that is formed; the greater body protein content the greater muscle tissue is formed and the more meat can be produced.

The growth rate of the body protein is dominantly influenced by intake of dietary protein. The dietary protein has an important role in the metabolism process in the cell and for the formation of body tissues especially muscle tissue (Costa et al., 2013). If dietary protein intake is less than the requirement of lambs, then the process of formation of body tissue will not be reached maximally. On the other hand, if dietary protein intake is very high, the feed cost may increase; while the excessive protein cannot be utilized by livestock and wasted through feces and urine, which potentially cause of environmental pollution (Lohakare et al., 2006). Therefore, it becomes very important to pay attention to the amount of dietary protein that should be given to lambs, so that lambs growth ate can be achieved optimally and efficiently, in an environmentally friendly way.

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## Materials and Methods

This study used 12 lambs of 3-4 months of age with  $15.02 \pm 2.01$  kg (CV = 0.86%) body weight. The lambs were raised in individual cages equipped with feed and drinking bunk. They were given complete feed in form of pellet containing 14, 16, 18% crude protein (CP) and 60% total digestible nutrient (TDN). Lambs were reared intensively in individual pen for 9 weeks. The parameters observed were dietary protein intake, and changes of body composition. Body composition was measured by urea space method in accordance with Restitrisnani et al. (2013). Measurement of body composition was done in weeks 0 and week 9. Data were analyzed using regression correlation. Value of correlation based on r value, which consists of no relationship ( $r = 0.00$ ), weak ( $r \geq 0.00-0.25$ ), moderate ( $r \geq 0.25-0.50$ ), strong ( $r \geq 0.50-0.75$ ), very strong ( $r \geq 0.75-0.99$ ), perfect ( $r = 1.00$ ).

## Results and Discussion

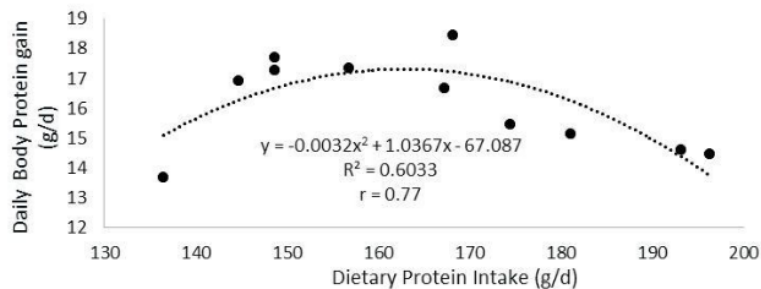
The dry matter intake, protein intake, body protein gain, daily body protein and protein conversion gain of lambs are presented in Table 1. The 9 week fattening lambs showed that dietary protein intake was ranged at 136.49 - 168.43 g/day and averaged gave 168.43 g/day. During the fattening time, the body protein gained around 860.60-1319.49 g (1063.91 g in average). Daily body protein gain was 13.66 – 18.42 g/day (16.34 g/day in average). Protein conversion was ranged at 8.39 – 13.58 (10.4 in average).

**Table 1.** Dry matter intake, protein intake, body protein gain, daily body protein and protein conversion gain of lambs.

| Parameter                | Range           | Average | Standard Deviation |
|--------------------------|-----------------|---------|--------------------|
| Dry Matter Intake (g)    | 793.8 – 1206.2  | 1053    | 103.1              |
| Protein Intake (g)       | 136.49 – 196.2  | 168.4   | 18.5               |
| Body Protein 0 weeks (g) | 932.1 – 1544.8  | 1207.5  | 189                |
| Body Protein 9 weeks (g) | 2660.3 – 1997.1 | 2255.7  | 201.8              |
| BPG (g)                  | 860.6 – 1319.4  | 1063.9  | 122.1              |
| DBPG (g/d)               | 13.6 – 18.4     | 16.3    | 1.4                |
| Protein Conversion       | 8.3 -13.5       | 10.4    | 1.7                |

BPG = Body Protein Gain, DBPG = Daily Body Protein Gain

The body protein gain and protein conversion to body protein gain in lambs was higher than the sheep as reported by Wati et al. (2015) who found that sheep consumed 133.8 g/d protein had body protein increase of 10.16 g/day with protein conversion of 12.2. Higher body protein growth of lambs in this study was attributed to the fact that the lambs were in the fast muscle growth phase (Owens et al., 1993). The correlation between body protein content and dietary protein intake is presented in Figure 1.



**Figure 1.** Correlation between body protein content and dietary protein intake

Based on Figure 1, dietary protein intake was highly correlated with body protein gain ( $r = 0.77$ ). From the equation presented in Figure 1, it is predicted that the optimal daily body protein gain of 16.87 g/day can be achieved when dietary protein intake is 162 g/d or the feed should contained 15.4% of CP. It is shown in Figure 1 that beyond such level of dietary protein intake, the body protein gain would decrease. This might be caused by the capacity of muscle to enlarge is limited, so that when the dietary protein intake was excessive, it cannot be used by the muscle to grow more than the capacity. Hood and Allen (1973) stated the muscle tissue in lambs grows with cell enlargement process (hypertrophy), the enlargement of cells have limitations to grow optimal and affected by breed, sex and age. The results of this study was lower than the results of Haddad (2001) who reported the optimal protein content in feed was 16% for fattening Awassi lambs. This difference might be caused by the breed used. This study used thin tailed lambs which a small breed, while Awassi breed is a medium breed. Bello et al. (2016) stated that the small breed needed lower protein requirement.

## Conclusion

From the current study, it can be concluded that the best dietary protein content for highest body protein growth rate was 16.87 g/d, which can be obtained by a diet containing 15.4% protein.

## Acknowledgments

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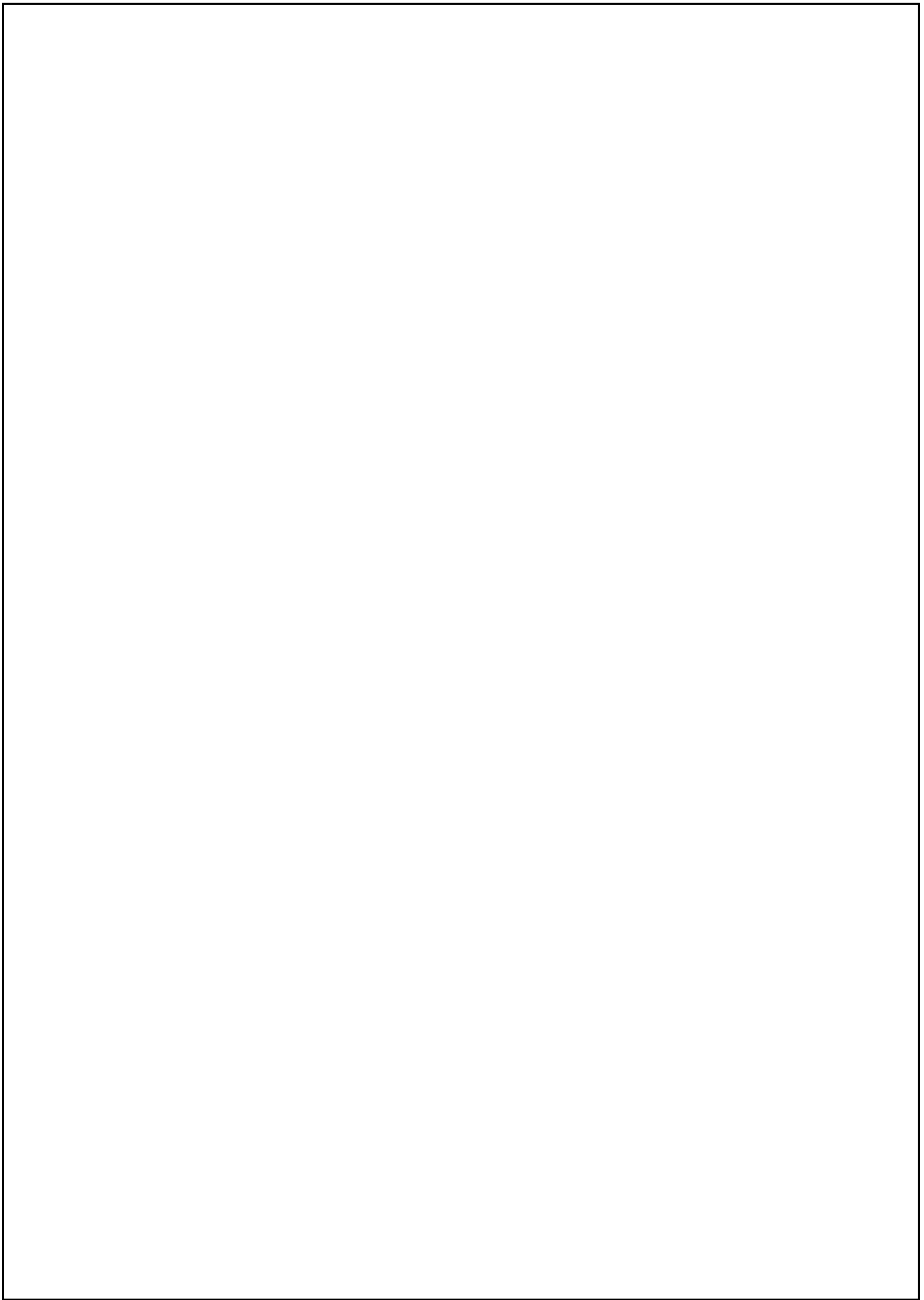
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