

Effect of Different Protein Levels on Growth Performance of Weaned Goat Kids

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Abstract: This experimental research was conducted to study about the effect of different protein levels on growth performance of weaned goat kids with specific 3 main objectives: (1) To identify daily intake of each treatment, (2) To identify daily growth rates of each treatment and (3) To identify digestibility in each treatments. Three feed types such as Mulato II grass (*Brachiaria hybrid*), rice bran and soybean meal were used for TMR mixes for this experiment with different protein levels of 12%, 14%, 16% and 18% for T1, T2, T3, and T4, respectively. Four native weaned goat kids with the same age with average live weight of 11.15±2.83 kg were used in a Latin Square experimental design (4*4). Experimental animals were put in individual cage to allow individual feeding and manure collection. There were 25 days for the data collection on feeding intake and weight gain, and last 5 days for manure collection. Result revealed that there was no significant differences among treatments P>0.05 on total intake of Dry Matter (DM) and Organic Matter (OM). DM intake was over the range 377.4 to 534.42 g/day. There were significant differences among treatments (P<0.05) for Crude Protein (CP) intake. CP intake was highest in T4 (82.2 g/day) and lowest in T1 (35.81g/d). There was no significant difference among treatments, P>0.05 on digestibility of dry matter (DDM). For the Digestibility Organic Matter (DOM), there were significant differences among treatments (P<0.05). T3 had highest digestibility OM (73.84%) among the treatments. Digestibility Crude Protein (DCP) was highest for T4 (86.93%) with significant differences among treatments, P=0.001. Digestibility Ether Extract (DEE), Neutral Detergent Fibre (DNDF), and Acid Detergent Fibre (DADF) were not significant difference among treatments, P>0.05. However, increased protein levels did not effect to daily weight gain of goat and daily weight gain was over the range from 40 to 65 g/day. The result indicated that increased protein level from 14 to 18% in goat diet had increased CP intake and CP digestibility.

Key Words: Local goat breed, rice bran, soybean meal, Mulato 2, protein levels.

Introduction

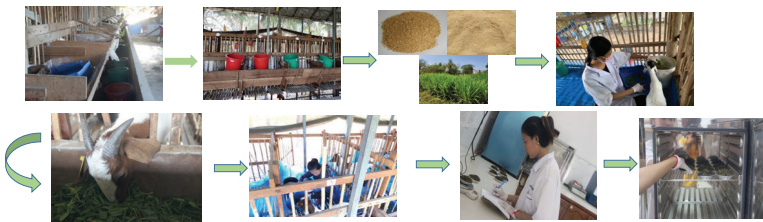
According to NIS 2015, Livestock and poultry sector contributes 1247000 millions riel to Cambodian economy during 2014. Ruminants production not only for draft but also for meat and milk. Goat is small ruminant which could produce meat using available feed and shrubs around farmer houses with minor supplementation. Goats were distributed worldwide according to high demand for their meat, in developing country, tropics, and rural (Casey et al., 2003). Protein is vital for ruminant nutrition as it is needed for weight gain, body growth, reproduction, and milk (Yacout, 2016). Mulato II grass provide high yield and protein and is resilient to drought which is suitable for Cambodian climate during dry season. Soybean meal and rice bran are by-products from food processing which are suitable as supplement for animals on their basal diets. However, soybean meal is expensive and price is fluctuated (Cherdthong et al., 2011). Thus, efficient feeding to minimize production cost with optimal growth is vital for farmers. For the reason above, this research was proposed to study about the optimal protein levels should be given to goats for maximum growth and digestibility.

Objectives

- To study on daily feed intake of each treatment.
- To study about daily weight gain of experimental units.
- To study the digestibility of each treatment.

Materials and Methods

The study was conducted at goat house at Forage Station, RUA during from February to June 2020. Four weaned male goat kids (proximately four months of age) with average weight of 11.15 kg were used in a single Latin Square Design (4x4). Experimental treatments were 12%, 14%, 16%, 18% protein level for T1, T2, T3, T4, respectively. All experimental units were provided ad libitum Mulato 2 grass harvest at 45 to 60 days (regrowth) and given 4% of live weight and supplemented with soybean meal and rice bran. For each period: there were 2 weeks for adaptation, 25 days for feeding trial and last 5 days for manure and blood collection. Body weight gain were weighed every 15 days. Feed Intake and feed residual were collected daily for weighing. For laboratory analysis, Mulato 2 grass and feed residual were sampled for DM weekly. However, proximate analysis for grass, soybean meal and rice bran was conducted monthly. Statistical analysis: all data were recorded in excel program and analyzed in Minitab software 16.0 for ANOVA (GLM).



Brief process for data collection on feed and manure

Results

Result on feed composition analysis used in this experimental research are shown in Table 1.

Table 1: Nutrient composition of feed materials

Feed ingredient	CP (%)	DM (%)	OM (%)	NDF (%)	ADF (%)	EE (%)
Mulato II	9.82	26.09	90.7	62.80	41.35	4.48
Soybean meal	47.02	91.76	92.16	16.68	6.84	1.19
Rice bran	7.65	94.33	85.19	20.65	16.85	12.65

Figure 1 showed results on daily feed intake of DM, OM and CP. There was no significant difference among treatments (P>0.05) for DM intake and Organic matter (OM) intake. DM intake was over the range from 377.4 to 534.42 g/d. Similarly, OM intake was ranged from 355.57 to 482.09 g/day. On the other hand, there were significant differences between treatments (P<0.05) for Crude Protein (CP) intake. Treatment 4 (82.2g/d) was highest among treatments while Treatment 1 (35.81g/d) was the lowest.

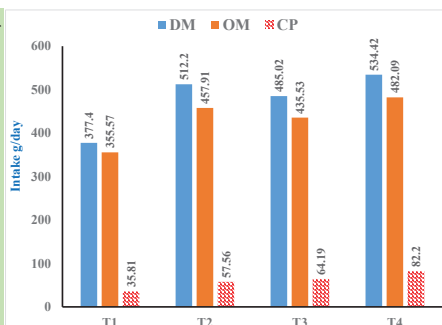


Figure 1. Increased Protein Levels on Feed intake

Figure 2 shows result of daily weigh gain of each treatment. Daily weight gain of each treatment increased from T1 to T4 according to the protein levels limited for each treatment such as 39.61 g/d, 40.18 g/d, 50.45 g/d and 65.18 g/d for T1, T2, T3, and T4, respectively.

Figure 3 shows the results of nutrients digestibility of each treatments. For Digestible Dry Mater (DDM), there were no significant differences among treatments (P=0.07) and the value ranged from 63.18 to 71.3%. For Digestibility Organic Matter (DOM), there were significant differences among treatments (P<0.05). T3 had the highest DOM (74.84%) and T1 had the lowest DOM(65.39%).

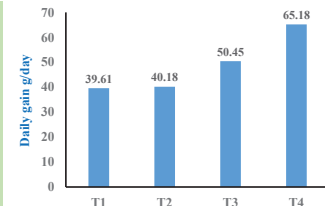


Figure 2. Increased Protein Levels on Daily weight gain

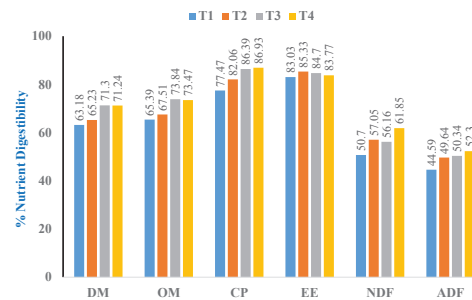


Figure 3, there was significant differences among treatments for Digestibility Crude Protein (DCP) (P=0.001) as Treatment 4 (86.93%) was the highest and Treatment 1 (35.81%) was the lowest. There were no significant differences among treatments on DEE, DNDF and DADF. DEE was ranged from 83.03% to 85.33% while DNDF and DADF were ranged from 50.7 to 61.85% and 44.59 to 52.3%, respectively.

Figure 3. Increased Protein Levels on Nutrients Digestibility

Discussion

From Figure 1, DM intake was shown highest in T4 (534.42g/d) with body weigh gain of 65.18g/d. The DM intake and weight gain were both lower compared to the results by Rahman et al., 2013 which stated that T1 had 584g/d (DM intake) gain 72.1g/d. Similarly, the study by Ngila et al., 2016 had DM intake of 513g/d and 661g/d for T1 and T2, respectively, while our study had 377.4g/d and 512.2g/d for T1 and T2, respectively, with weight gain of 39.61g/d and 40.18g/d for T1 and T2, respectively. This means that our result is similar to the two mentioned authors.

Results of Digestibility DM (Figure 3) of all treatments is similar compared to result of Min Aung et al. 2013 that used Mulato II 70% and Gliricidia 30% (70.96% DDM) and T2 used Mulato II 70%, Sesbania 30% (70.94% DDM). Moreover, our result on DDM is very similar to Marsetyo et al., 2015 which T1 used only Mulato (57.61% DDM), T2 used Mulato II and Gliricidia (62.28% DDM) and T3 used Mulato II and rice bran (63.19% DDM). The digestibility OM of the current study is bit higher than result of Min Aung et al. 2013, as they ranged from 61.37% to 63.22% DOM. In the study by Wen Zhu et al. (2020), DDM % were 56.9%, 60.5% and 61.2% for T1 (12%CP), T2 (13.4%) and T3 (14.8% CP), respectively, which were lower than result of this study. DOM of Wen Zhu et al., 2020 from 62.6% - 65.9% were a bit lower than result of this current study. Also, the result of digestible CP by Wen Zhu et al., 2020 were a bit lower than our result (64.1% to 67.5%) as they limited lower CP % in diet than our study.

Conclusion

According to the result of this experiment on 4 male goat kids using Mulato II grass and supplemented with rice bran and soybean meal, we can concluded :

- Increased protein levels did not improve DM and OM intake but improved CP intake
- Increased protein levels improved CP digestibility but did not effect to growth rate of goats

Recommendation

- Goat Farmers should consider on forage planting, especially Mulato II, as it provide good yield with high CP percentage and still grow well during dry season in Cambodia.
- Feed supplement should be provided to their animals rather than rely on only natural wild grass to optimize growth and productivity.
- Other researchers, can consider on further studies on other ruminants using different levels of protein in diets

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