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REVIEW ARTICLE

GROWTH RESPONSE OF GOAT (CAPRA HIRCUS) FED WITH LEGUMINOUS- TREE LEAVES

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ABSTRACT

The growth response of goats fed with fresh leguminous tree leaves was studied in a 30-day feeding trial. Twelve mature goats were distributed equally in four treatments: T_1 - 100% *Brachiaria mutica*+ 200g concentrate mix, T_2 - 60% *B. mutica*+ 40% *Leucaena leucocephala* leaves + 200g concentrate mix, T_3 - 60% *B. mutica* + 40% *Gliricidia sepium* leaves + 200g concentrate mix, and T_4 - 60% *B. mutica*+ 40% *Indigofera sp*. leaves + 200g concentrate mix. The study was laid-out in Completely Randomized Design and the data was analyzed using Analysis of Variance (ANOVA). At the end of the feeding trial, the final weight of the animals showed a significant difference ($p<0.05$) among treatments, in which animals fed with T_2 gained the highest at 26.67 kg; however no significant differences were noted gain in weight (4.33 kg to 5.33 kg) and computed FCR (6.19-6.94) and FCE (12.52-20.08). It is therefore concluded that the experimental animals best responded to Treatment 2 or the ration of combined *B. mutica* and *L. leucocephala.*

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INTRODUCTION

Goat raising is one of the important components of farming activity in the developing countries (Mazinani and Rude, 2020). The animal is considered as source of emergency cash and secondary income of families living in the rural areas (Monteiro et al., 2017). Although considered as rural-based livestock production, there are gaps in the management practices that often lead to low productivity. Among the identified problems include poor feeding management, uncontrolled breeding, and absence of diseases control and prevention and treatment program. These problems are associated with low input of poor-quality pastures that contribute to inadequate feeding and nutrition. Tethering is common in areas where land and forage production are limiting factors. Improving feeding and nutrition, and maximizing the use of the available feed resources should be the main target to consider when aiming to enhance goat productivity (Kumar et.al., 2014). The incorporation of leguminous tree leaves into the forage ration provided to goat has been practiced in goat producing countries (Adegun and Aye, 2013). Among the abundant leguminous trees in the Philippines are *Leucaena leucocephala, Gliricidia sepium and Indigofera. L. leucocephala* is considered as highly nutritious forage. When fed as a supplement to livestock, it can increase animal productivity that will result to a much higher meat and milk yield (Anis et al., 2020). It can also lower the amount of methane produced by the animal per kilogram of meat and milk output. It is an essential foliage crop particularly on resource-limited farms in tropical countries, that is rich in protein- for ruminants (Mangeshoet *al.,* 2017). Moreover, *Indigofera sp.* contains a relatively high crude protein. The utilization of *Indigofera* as a feed supplement or as a sole forage have been shown to give a good growth rate for goats. Lastly, *Gliricidia sepium* is known to contain high nutritional value such as crude protein and amino acids especially valine, glutamine, leucine, glycine and lysine as well as neutral dietary fiber (Smith and Staines, 2021). A feeding trial was conducted to determine the response of goat when fed with these leguminous trees.

MATERIALS AND METHODS

The study was conducted at the Production Farm of Cagayan Valley Small Ruminant Research Center, Isabela State University, Echague, Isabela, Philippines. A 30-day feeding trial was conducted to evaluate the response of 12 grower goats fed with the following grass-legume ration:

Treatment 1- pure grass *Brachiaria mutica*
Treatment 2- 60% *B. mutica* + 40% *L. leucocephala* leaves
Treatment 3- 60% *B. mutica* + 40% *G. sepium* leaves
Treatment 4- 60% *B. mutica* + 40% *Indigofera sp.* leaves

The animals were raised in an individual cage. The forage ration of 5 kgs was supplied to the animals daily. Water was

also provided to the animals. The initial, weekly and final weight of the animals, and feed consumption data were recorded. Using the data, feed conversion ratio (FCR) and feed conversion efficiency (FCE) were computed. The experiment was laid-out in Complete Randomized Design (CRD) and the data was analyzed using Analysis of Variance (ANOVA).

RESULTS

Initial, weekly and final weight of the animals: The initial weight of the experimental animals does not vary significantly among treatments. The weight of the animals' ranges from 15.00 kg to 21.33 kg. After 1 week of feeding trial, a significant difference among treatments was recorded. The heaviest weight of the experimental animals was recorded from T_2 with an average of 23.33 kilograms and the least were recorded from T_4 with an average of 16.33 kilograms. Likewise on the 2nd week of the study, a significant difference among treatments was also observed. The heaviest weight of the experimental animals was recorded from T_2 with an average of 24.50 kilograms and the least was recorded from T_3 with an average of 17.33 kilograms. However, on the 3rd week of the study, the body weight of the animals varies insignificant among the treatment mean, which ranges from 18.67 kg to 24.67 kg. On the final body weight of the goat, the record shows that there is a significant difference among treatments. The heaviest weight of the experimental animal was recorded from T_2 with an average of 26.67 kilograms and the least was recorded from T_3 with an average of 19.33 kilograms.

Gain in Weight. Table 2 shows the average gain in weight of the experimental animals fed with fresh leguminous tree leaves after 30 days of feeding trial. The gain in weight of experimental animals do not have significant differences. The animal gained weight from 4.33 kg (T_3) to 5.33 kilograms (T_2 and T_4).

Feed Conversion Ratio and Feed Conversion Efficiency. Table 3 also shows that there were no significant differences in terms of the computed FCR of the experimental animal ranges from 6.16 to 6.94. Likewise, the computed FCE of the goats fed with fresh leguminous tree leaves does not reveal significant differences. The computed FCE of the experimental animals which ranges from 12.52 to 20.08.

DISCUSSION

Among the treatments studied, animal fed with *Leucaena leucocephala* obtained the industry standard weight at 25 kgs. The utilization of *Leucaena leucocephala* has long been recommended as an alternative source or cheaper substitute for conventional protein feed supplements which are often expensive or unavailable. The data revealed that the chemical composition of *Leucaena* is superior than other leguminous feeds, primarily due to 27.5% crude protein content and lower neutral detergent fiber (NDF) at 24.4%. Furthermore, it is also known as a good source of carotene and vitamins. On the average, a goat can obtain an additional 115 g of weight daily or at least 3.4 kg/month. Optimizing forage consumption and overall goat performance and health requires balancing nutritional demands, palatability, and availability of high-quality forages. Because of the minimal expected growth, the use of high-quality forage and supplementation of concentrate is recommended. In this study, with the supplementation of different legumes and with concentrate supplementation, the animals were able to reach its potential growth. Technically, goat production heavily relies on forage, thus, provision of high-quality forage is important to maintain productivity among animals (Gurung, 2020). Animals that have lower FCR are regarded the best performing since they effectively convert feed to meat. For goat and sheep fed with high concentrate feed, the FCR can reach 4.5; while for animals fed with good quality forage, it can reach up to 5.5 (Tarigan et al., 2018).

Table 1. Initial and Weekly Body Weights of Experimental Goats (kg)

TREATMENTS	Initial (kg)	Weekly Body Weights (kg)			
		1st Week	2nd Week	3rd Week	4th Week
T_1- pure grass *Brachiaria mutica*	19.50	20.83[ab]	21.67[ab]	23.33	24.00[ab]
T_2- 60% *B. mutica* + 40% *L. leucocephala*	21.33	23.33[a]	24.50[a]	24.67	26.67[a]
T_3- 60% *B. mutica* + 40% *G. sepium*	15.00	16.50[b]	17.33[b]	18.67	19.33[b]
T_4- 60% *B. mutica* + 40% *Indigofera sp.*	15.33	16.33[b]	18.33[b]	19.83	20.67[b]

ns= not significant*=significant at 5% level *note: Means with the same letter are not significantly different using LSD.*

Table 2. Gain Weight of the Experimental Goat (kg)

TREATMENTS	Gain Weight (kg)
T_1- pure grass *Brachiaria mutica*	4.50
T_2- 60% *B. mutica* + 40% *L. leucocephala*	5.33
T_3- 60% *B. mutica* + 40% *G. sepium*	4.33
T_4- 60% *B. mutica* + 40% *Indigofera sp.*	5.33

Table 3. Feed Conversion Ratio and Feed Conversion Efficiency

TREATMENTS		FCR	FCE
T_1- pure grass *Brachiaria mutica*		6.94	12.52
T_2- 60% *B. mutica* + 40% *L. leucocephala*		6.84	13.42
T_3- 60% *B. mutica* + 40% *G. sepium*		6.16	16.25
T_4- 60% *B. mutica* + 40% *Indigofera sp.*		6.49	20.08

Although the computed FCR is not in accordance with industry standard, the study was able to present that with inclusion of high-quality forages such as grasses and legumes, the performance of the animals will improve. In general, high-quality forages are highly palatable, therefore, the higher the intake or consumption, the higher growth performance is expected.

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