

The effect of operculia turpethum on the bach thao goat's growth

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ABSTRACT

A study was conducted at Tra Vinh University to evaluate the effect of *Operculia turpethum* on increasing weight gain and feeding efficiency of this kind in feeding Bach Thao goats. The study was arranged in a completely randomized design with four treatments and three replications, using 12 Bach Thao goats with an average live weight of 13.0 ± 1.18 kg. Four treatment groups were given with varying levels of *Operculia turpethum* in the diets: 0% (OT0, control), 25% (OT25), 35% (OT35) and 45% (OT45) respectively. The ratios (25, 35 and 45%) were calculated on the basis of 5% body weight and feathered grass. The results showed that the average weight gain of goats in treatments OT0, OT25, OT35 and OT45 was 77, 104, 111, and 91 g/unit/day respectively. The greatest weight gain was seen in treatment group OT35, and was statistically significant ($P < 0.01$). Additionally, dry matter intake of goats in different treatments was statistically significant in the OT35 treatment ($P < 0.05$). The lowest feed conversion ratio was found in OT25 (7.89) and the greatest was found in OT0 (9.38). However, the difference between OT25 and OT35 indicated no statistical meaning. The OT35 treatment showed better weight gain and better economic efficiency in feeding Bach Thao goats in Tra Vinh.

Keywords: *Operculia turpethum*, *Brachiaria mutica*, Bach Thao goats and feed conversion ratio.

INTRODUCTION

In many regions of the world, small ruminants are a major source of income, contributing significantly to rural poverty reduction (Moktan et al., 2008). Sheep and goats are of particular economic importance in the developing nations of Africa and Asia (Ho and Thuy, 2015). Vietnam had more than 1.88 million individual sheep and goats (Anon, 2015).

Small ruminants have similar digestive systems, and thus literature between sheep and goats can often be compared. A study on Phan Rang sheep nutrition conducted by Vo Duy Thanh et al (2012) revealed that when measuring the nutrient content of *Operculia turpethum*, they found that crude protein (CP) and neutral detergent fibre (NDF) were 10.2% and 66.0%, respectively. However, Le (2013) found that with dry matter of 13.5%, the CP and NDF contents of *Operculia turpethum* were 14.1% and 39.7%, orderly.

It is becoming increasingly important to develop many effective techniques in farming goats since natural sources have become more limited in Vietnam. Natural feeding sources and land availability are becoming more and more scarce. Thus, reducing production costs and increasing goat productivity are essential for farmers. Investigating alternative feed sources for goats that contain high protein with fast weight gain could contribute significantly to farmer profitability in Vietnam.

Operculia turpethum is a herbaceous vine that contains high protein, and is reported by farmers to increase goat growth faster than the commonly used feather grasses (Lam et al., 2013). Replacing feather grass with *Operculia turpethum* in the goat meat diet during the growth period is an area of research with growing importance. Hence, this study was made to investigate the efficiency of feeding Bach Thao goats with varying proportions of *Operculia turpethum* and *Brachiaria mutica* to determine whether *Operculia turpethum* could contribute significantly to farmer profitability in Vietnam.

MATERIALS AND METHODS

Experimental design and chemical composition of feeds

The experiment was carried out at Experimental Farm of Tra Vinh University in Tra Vinh City and the feed samples were analyzed at the Laboratory of Tra Vinh University. The experimental time was from April 2018 to July 2018.

Experimental animals in Binh Tan district, Vinh Long province were brought to Tra Vinh to be studied. The trial was carried from six to nine months of age. The goats were identified and then all were individually weighed and the average initial live weight at six months of age was 13.0 ± 1.28 kg.

Experimental feeds: The feathered grass (*Brachiaria mutica*) was planted two months prior to harvest and the urea and organic manure (goat and cow) was applied 15 days before cutting. The feathered cuttings were first cut at 2 months of age, and then cut every 1.5 months. Cutting position was 10 cm from the ground, and the grass was put into pre-feeding sessions at 7 and 13 hours daily. Cultivars (*Operculia turpethum*) were harvested on the land in Tra Vinh, using a growing area of 20 m². Cutting position was 100 cm from the ground, with each cultivar 3-5 m in length. The specimen must be selected for green leaves, and enough volume was provided to satisfy the feed intake of 5% body weight of DM required for the experiment. The chemical composition of the feed ingredients is shown in Table 1.

Table 1. Chemical composition of the feed ingredients used in the experimental diets

Item (%)	<i>Operculia turpethum</i>	<i>Brachiaria mutica</i>	Mixed feed
DM	19.6	24.4	62.2
OM	90.1	85.5	79.9
CP	9.23	6.20	15.3
NDF	61.0	39.2	25.6
ADF	28.8	21.0	17.1
Ash	10.4	10.4	9.01

Dry matter (DM), Organic Matter (OM), Crude Protein (CP), Neutral detergent fiber (NDF), Acid Detergent Fiber (ADF), Mineral (Ash).

Experimental design and diets: A total of 12 goats at six months of age were used. The trial was a completely randomized design with five treatments as five diets and three replicates of 1 goat per experimental unit. Four treatment groups were given varying levels of *Operculia turpethum* in the diets: 0% (OT0, control), 25% (OT25), 35% (OT35) and 45% (OT45). The constrictor ratios (25, 35 and 45%) were calculated on the basis of 5% body weight and feathered grass. The experimental period was twelve weeks.

Housing and management: The goat pen roofs varied from 2.5 to 4.5 m in height, and the floors were 0.7 m in height. Each pen has an area of 1.8 m² (Nguyen et al., 2008) for convenience of feeding, gathering data, weighing each individual and cleaning of cages.

The goats were fed 5 times in a day at 7.00, 13.00, 14.00, 16.00 and 17.00h and the diets offered to the treatment was weekly adjusted by an increase from 25, 35 and 45% *Operculia turpethum* in control diet. Feeders and drinkers were cleaned daily every morning.

Measurements and analysis

At the beginning of the experiment, goats per experimental unit were weighed individually and then weekly and at the end of the experiment, to calculate daily weight gain.

Daily feed and nutrient intakes were calculated according to the total feed consumption of the goats in each experimental unit.

The feed ingredients, *Operculia turpethum*, *Brachiaria mutica*, mixed feed were analyzed for DM, OM, CP, Ash (AOAC, 1990) and NDF and ADF (Van Soest et al., 1991).

Data analysis

The data were analyzed by analysis of variance using the ANOVA of General Linear Model of Minitab Reference Manual Release 16.1.0 (Minitab 2013). The Tukey test was used to compare the means of the criteria (Minitab 2013)

RESULTS AND DISCUSSION

Daily intakes of feed and nutrients of goats

The Daily intakes of feed and nutrients of goats are shown in Table 1.

Table 2. Daily intakes of feed and nutrients of goats (g/goat/day)

Item	Treatment				SEM	P
	OT0	OT25	OT35	OT45		
<i>Food intake (kg/goat/day)</i>						
Brachiaria mutica	0.44 ^a	0.27 ^b	0.27 ^b	0.20 ^c	0.006	0.001
OT	0 ^c	0.19 ^b	0.25 ^a	0.23 ^a	0.005	0.001
Mixed food	0.21	0.21	0.21	0.21	0.002	1.000
DMI	0.66 ^b	0.69 ^b	0.75 ^a	0.66 ^b	0.01	0.001
% weight goat	4.35 ^b	4.61 ^a	4.65 ^a	4.45 ^b	0.042	0.001
<i>Nutrients consumed (g/goat/day)</i>						
CP	50.0 ^c	80.0 ^b	100 ^a	90.0 ^b	0.001	0.001
NDF	229 ^a	187 ^b	195 ^b	165 ^c	0.002	0.001
ADF	120 ^a	150 ^b	160 ^b	140 ^b	0.002	0.001
Ash	60.0 ^a	50.0 ^b	50.0 ^b	40.0 ^b	0.001	0.001

OT0, OT25, OT35, OT45 (% of amount of *Operculia turpethum* in diet) Dry Matter (DM), Crude Protein (CP), Neutral detergent fiber (NDF), ^{a, b, c} Means with different letters within the same row are significantly different at the 5 % level

The results of Table 3 show that, daily DM intake significantly (P<0.05) increased with increasing *Operculia turpethum* (OT) levels, with the highest value (750 g/goat/day) for the OT35 treatment. The result was consistent with the intake data of 3-6 % (Do and Thuy, 2015) and less than intake data of Nhung (2005) at 5, 2-6, 6% body weight.

The CP intake significantly ($P < 0.05$) increased with increasing *Operculia turpethum* (OT) levels, with the highest value (100 g/goat/day) for the OT35 treatment. The result was consistent with the intake data of 770-1030 g/goat/day (Hong, 2017). However, CP intake in our experiment was lower than the value of 127 g/goat/day fed diets that contained food mixed with spinach and the value of 140 g/goat/day added mimosa tree (Hong, 2017).

The NDF and ADF differed ($P < 0.05$) with the highest value (229 g/goat/day) for the OT0 treatment. This can be in the OT for diets containing only *Brachiaria mutica* so that the fiber content in *Brachiaria mutica* is greater than *Operculia turpethum*.

Table 3. Daily weight gain and feed conversion ratio of Bach Thao goat

Item	Treatment				SEM	P
	OT0	OT25	OT35	OT45		
Initial weight Kg/weight	13.2	12.9	12.6	12.8	1.172	0.986
Final weight Kg/weight	19.5	20.5	21.3	19.4	1.057	0.008
Daily weight gain (g/goat/day)	77.0 ^d	104 ^{ab}	111 ^a	91.0 ^c	0.001	0.001
FCR	9.38 ^a	7.89 ^b	8.91 ^a	9.19 ^a	0.019	0.004

^{a, b, c} Means with different letters within the same row are significantly different at the 5% level

The results of Table 3 showed that, effect of *Operculia turpethum* level was significant, with the highest daily weight gains (DWG) found on the OT35 treatment and the lowest on the OT0 ($P < 0.05$). The explanation is the higher DM and CP intakes of these treatments.

The results in our study were consistent with report of Hong and Quoc (2011) with the basal diet supplemented with grassy turtles was 86.9 g/goat/day and the basic diet combined with spinach was 95.4 g/goat/day. However, our results are higher than the result reported by Dang and Mui (2015) who reported a value of 61.92 g/goat/day; Bounmy Phiovankham and Trach (2011), crossbred F1 goats gained body weight of 60.02 g/goat/day.

The results in Table 3 showed that the average feed conversion ratios of treatments OT0, OT25, OT35 and OT45 were 9.38; 7.89; 8.91 and 9.19 respectively and they differed significantly ($P < 0.05$). The OT25 and OT35 feed conversion ratios were lower than that of OT0 and OT45, suggesting that replacement rates of 25% and 35%; 16% diet compared with OT0 and OT45. The replacement of the 25-25% yields in OT25 and OT35 showed that the experiment was equivalent to that of Hong (2017) using mimosa supplementation to grow goat's diet. The feed conversion ratio was 7.17 - 7.78 and Chin and Hue (2012) tannins such as Tapioca leaves, Banana leaves and jackfruit for hybrid (Bach Thao x grass) leaves with values of 8.75; 8.81 and 8.31 respectively. Difference in economic efficiency in treatments tended to favor 35% treatment replacing turmeric grass with *Operculia turpethum*.

CONCLUSIONS

From the results of this trial, it can be concluded that *Operculia turpethum*, was a cheap and abundant local feed resource and the same may be incorporated in diets for goats up to levels of 25% to 35%, without any adverse effect on daily weight gain.

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Received date: 15/11/2018

Submitted date: 24/11/2018

Acceptance date: 27/02/2019

Opponent: Assoc. Prof. Nguyen Thi Kim Dong