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Use of Cavalcade (*Centrosema pascuorum)* as Protein Source in the Rations of Meat Goats

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Eight goats of 7-9 months old and an average body weight (BW) of 14.0 ± 2.0 kg were used in duplicate 4 × 4 Latin square design. The four dietary treatments were 1) pangola hay (control), 2) pangola hay plus concentrate (1%BW), 3) pangola hay plus cavalcade silage (1%BW), and 4) pangola hay plus cavalcade hay (1%BW). The results showed that roughage and total dry matter intake (g/kgBW$^{0.75}$) of goats fed witch concentrate supplement were significantly higher ($p<0.05$) than those of goats fed with control and cavalcade silage. However, there were no significant differences among goats fed with cavalcade silage and cavalcade hay. Dry matter, organic matter and acid detergent fiber digestibility, ruminal pH, ammonia-nitrogen, total volatile fatty acids (VFA), proportions of VFA were not significantly different in terms of dietary treatments. However, crude protein digestibility, nitrogen (N) intake, and N retention (g/d, %N intake) of goats fed with concentrate supplement, cavalcade silage and cavalcade hay were significantly higher ($p<0.05$) than those of goats in the control group.

Key Words: Cavalcade, Silage, Hay, Meat goats

INTRODUCTION

Typically, the condition of livestock in the tropics found that there was a shortage of forage. In addition, if farmers fed roughage alone. May not be adequate to the needs of animals one option is for farmers. Bringing a variety of legumes or other plants the agricultural residues used as food. The application of these high-protein forage averaged 20% (Chomchai, 1988). The Cavalcade (*Centrosema pascuorum* cv. Cavalcade) is the same bean is a climbing vine good drought tolerance; propagation by seeds (Tongkongsin, 1992) seems to be a viable alternative for farmers. Therefore, the objective of present experiment was to study the effects of Cavalcade silage and Cavalcade hay in the rations of meat goats.

MATERIALS AND METHODS

Eight goats of 7-9 months old and an average body weight (BW) of 14±2.0 kg were used in duplicate 4x4 Latin square design with four periods, each period consisted of 14 days. The treatments were assigned into the four dietary treatments were 1) pangola hay (control), 2) pangola hay plus concentrate (1%BW), 3) pangola hay plus cavalcade silage (1%BW), and 4) pangola hay plus cavalcade hay (1%BW). All animals were fed *ad libitum* with Pangola hay as roughage source and twice daily at 07.00 and 17.00. Each animal was housed in an individual pen and free access to clean water all times.

Sampling and Laboratory Analysis

Diets were weekly sampled and feces samples were quantitatively collected based on total collection method during the last 7 day of each period. Concentrate, roughage and feces were analyzed of chemical composition in terms of DM, Ash, EE and CP (AoAC, 1990), NDF and ADF (Goering and Van Soest, 1970). Rumen fluid samples were collected by using stomach tube at 0, 3 and 6 h, post morning feeding. Ruminal pH was measured immediately after ruminal fluid sampling, and rumen fluid also subjected to NH_3-N (Bromner and Keeney, 1965) and VFA analyses (Samuel et al.,1970).

Statistical analyses

All data obtained from the experiment were subjected to analysis of variance (ANOVA) using (SAS,1996) treatment means were statistically compared by Duncan's New Multiple Range (Steel and Torrie, 1960).

RESULTS AND DISCUSSION

The chemical compositions of dietary treatments are shown in Table 1. The analysis showed that DM, OM, CP, NDF, ADF and EE were 98.8, 95.4, 4.9, 61.6, 36.7 and 2.1 %, respectively, the chemical composition of Pangola hays were close to those reported by Chaichaum (1988). Table 2 showed that the intake of roughage (g/day) in all treatments were not statistically significantly different ($p> 0.05$), but the animals that received T1 the intake of roughage was 526.6 gDM/d. However, reduced intake due to feed are spongier when the goats were fed cavalcade. Mertens and Defining (1995) reported the amount of fiber in the diet affects intake. Nutrient digestibility in goats fed the four experimental rations. The digestibility of DM, OM and ADF were not statistically different ($p> 0.05$) among treatments. However, the digestibility of CP was significantly increased ($p <0.05$) and the digestibility of CP in T2, T3 and T4 were higher than those reported by Mungman, 2007. The digestibility of NDF was increased ($p<0.05$).

Table 1 Analyzed chemical composition of experimental diets

Items	Treatments			
	Pangola grass hay	Concentrate	Cavalcade silage	Cavalcade hay
DM	98.8	98.1	24.2	95.2
	..... %DM.....			
OM	95.4	87.6	71.5	88.0
CP	4.9	15.0	16.3	11.5
NDF	61.6	38.0	39.8	54.7
ADF	36.7	25.2	35.2	33.0
EE	2.1	2.2	2.3	2.4

DM = dry matter, OM=organic matter, CP=crude protein, NDF= neutral detergent fiber, ADF= acid detergent fiber, EE= ether extract.

Table 2 Feed intakes by goat when fed experimental rations

Items	Treatments				SEM	p-value
	T1	T2	T3	T4		
Roughage						
gDM/d	526.6	505.5	490.5	504.7	13.72	0.34
%BW	3.2^{ab}	3.4^{a}	3.0^{b}	3.3^{ab}	0.14	0.05
g/kgBW$^{0.75}$	61.9^{b}	69.4^{a}	60.1^{b}	65.5^{ab}	2.21	0.04
Total intake						
gDM/d	526.6^{c}	664.6^{a}	615.1^{b}	628.3^{ab}	15.28	0.01
%BW	3.2^{c}	4.4^{a}	4.0^{b}	4.3^{ab}	0.12	0.02
g/kgBW$^{0.75}$	61.9^{c}	88.8^{a}	80.9^{b}	85.1^{ab}	2.33	0.04

$^{a.b.c}$Means within a row with different superscripts differ ($p<0.05$), T1=1 pangola hay (control), T2= pangola hay plus concentrate (1%BW), T3= pangola hay plus cavalcade silage (1%BW), T4= pangola hay plus cavalcade hay (1%BW)

There were statistically different ($p> 0.05$) in nitrogen intake.The N absorption increased ($p<0.05$) in T2, N retention and N retention% increased ($p<0.05$) in T3, but not different T3 and T4 in addition, Chaokaur and Sommart(Chaokaur and Sommart, 2009) the only roughage in particular, low-quality roughage. Cause the loss of nitrogen through excretion. And N retention in the body are low, making use of the protein (nitrogen) is low.

Table 3 Effect of dietary treatments on nitrogen balance

Nitrogen	Treatments				SEM	p-value
	T1	T2	T3	T4		
N intake, g/d	4.2^{c}	7.7^{a}	7.7^{a}	6.6^{b}	0.23	0.01
Feces N, g/d	2.9	2.8	2.3	2.2	0.25	0.16
Urine N, g/d	0.5	0.7	0.7	0.6	0.11	0.59
N output, g/d	3.3	3.5	2.9	2.8	0.27	0.27
N absorption, g/d	5.0^{b}	6.1^{a}	5.1^{b}	5.1^{b}	0.54	0.04
N retention, g/d	1.7^{b}	4.3^{a}	4.8^{a}	3.8^{a}	0.56	0.03
N retention,%	37.9^{b}	62.5^{a}	60.0^{a}	58.7^{a}	4.24	0.03

CONCLUSIONS

Based on the experimental data, it can be concluded that crude protein digestibility, nitrogen intake, and nitrogen retention (g/d, %N intake) of goats fed with concentrate supplement, cavalcade silage and cavalcade hay were significantly higher than those of goats in the control group. Thus, the group receiving cavalcade silage and cavalcade hay (1% BW) is performances.

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REFERENCES

AOAC.Official Methods of Analysis. 15th Revised Edition. The Association of Official Analysis Chemists. Washington, DC. 1990.

Bromner J M, Keeney D R. Steam distillation methods of determination of ammonium, nitrate and nitrite. Anal Chem 1965; 32 : 85.

Chomchai, N. The use of plants as a source of protein for poultry feed. The academic paper feed.Bangkok: Department of Livestock Development Ministry of Agriculture. 1988; 101-104.

Chaichaum W, Kantapanit C, Wanpiyarat S, Chomchai N. The grass is used in hunting as a source of roughage in cattle finishing stage. Report the results of animal research. Bangkok: Department of Livestock Development Ministry of Agriculture.1990; 165-185.

Chaokaur A, Sommart K.. Effects of Roughage Source on Intake and Nitrogen Balance in Growing Dairy Cattle. Faculty of Agriculture Annual Conference 2009. Khon Kaen University. 2009; 218-220.

Goering, H K, Van Soest P J. Forage fiber analyses (apparatus, reagents, procedures and some applications). Agric. Handbook No. 379. ARS-DA,Washington, DC. 1970.

Hadjipanayiotou M. Effect of feeding heat treated soybean meal on the performance of lactating Damascus goats. Small Ruminant Res. 1995; 18: 105.

Mertens D R. Defining Effective fiber and fiber Recommendations for Dairy cows. U.S. Dairy Forage Research Center. Available from : URL: http//www.dfrc.Wise.edu/RS95_pdf/fu2.1995.

Mungman J. Effects of levels of cavalcade (centrosema pascuorum cv. cavalcade) hay with rice straw or corn cobs as roughage sources in total mixed ration on intake, digestibility, rumen fermentation, milk production and milk composition in lactating dairy cows. Khon Kaen, Thailand. Graduate School. Khon Kaen University,2007.

Preston T R, Leng R A. Matching ruminant production systems witch available resources in the tropics and sub-tropics. Penambul Book, Armidate, Australia. 1987.

Samuel M., Sagathewan, S, Thomas J, Mathen G. An HPLC method for estimation of volatile fatty acids of ruminal fluid. Indian. J. Anim. Sci. 1970; 67: 805.

SAS. 1996. SAS User's Guide : Statistics. Version 6. 14th ed Cary, NC : SAS Inst.

Steel R G D, Torrie J H. Principles and Procedure of Statistics. McGraw Hill Book Co., New York.

Tongkongsin, K. Stylosanthes guianensis CIAT 184. Animal Gospel. Bangkok: Department of Livestock Development Ministry of Agriculture. 1992; 13-19.

Van Soest P J. Nutritional Ecology of the Ruminant. O & B Book, Inc. Corvallis, Oregon. 1982.