

CHANGES OF INTAKE AND RUMINAL TURNOVER RATES IN GOATS BY ADDING ALFALFA MEAL AND UREA TO CORN-SOYBEAN MEAL SUPPLEMENTS OF RICE STRAW-BASED DIETS

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Introduction

Rice straw does not contain enough nutrients for ruminants to grow. So, studies on supplementary diets are important in order to feed ruminants growing at high growth rates with rice straw-based diets. Preston and Leng (1984) proposed the principles of supplementation of straw based diets. They suggested that addition of green forage and urea to supplements maximize intake and digestibility of the diets. The objectives of this experiment was to examine the effect of addition of alfalfa meal and urea to supplements on feed intake and ruminal turnover rates of particulate matter in the goats fed rice straw-based diets.

Materials and Methods

Digestion trials, using eight castrated Japanese goats (average live weight 20.7 kg) in 2x2 factorial design of treatments (two goats per each treatment). Basal supplemental diet (BS-diet) consisted of 50 % (dry matter basis) ground corn, 47 % soybean meal and 3 % minerals - vitamins mixture. Goats were fed chopped rice straw ad libitum and offered either of four kind of supplements as follows; 1) 220 g/day (dry matter basis) BS-diet, 2) 220 g BS-diet plus 9 g urea, 3) 220 g BS-diet plus 78 g alfalfa meal or 4) 220 g BS-diet plus 9 g urea and 78 g alfalfa meal. Half of daily allowance of the supplements were fed at 8:30 a.m and 4:30 p.m. After 4 weeks adaptation period, goats were transferred to the metabolic cage. The trials consisted of 14 days. At 8:30 a.m on 9 day of the trial, goats were fed labelled rice straw. The labelled rice straw were prepared by spraying lanthanum (La) solution on ground rice straw as described by Hartnell and Satter (1979). Total feces were collected at 0, 12, 24, 36, 48, 60, 72, 84, 96, 108, 120, 144 and 168 hour after feeding labelled rice straw. Feed intake were measured from 8 day through 15 day of the trials. La concen-

tration of the feces samples were determined with neutron activation analysis and ruminal turnover rates and retention time of marked rice straw were determined by the method of Grovum and Williams (1973). Feed and composite fecal samples were analysed for dry matter and gross energy. Crude protein (CP) contents of the feed were determined. Organic cell wall (OCW) content of rice straw were determined by the method of Abe and Horii (1979). Intake of dry matter and digestible energy (DE) were determined. Data were analysed by analysis of variance to test the effect of alfalfa meal, urea and (alfalfa meal) x (urea) interaction.

Results

CP and OCW contents in rice straw were 3.3 % and 71.4 % (dry matter basis), respectively. Intake of total dry matter and DE were increased by adding alfalfa meal but urea addition had no effect on dry matter and DE intake (table 1). Although urea addition had no effect on ruminal turnover rates, alfalfa meal addition increased ruminal turnover rates and decreased retention time in the rumen (table 2).

Discussion

Ruminal turnover rates in ruminants fed straw-based diet is lower than that in ruminants fed high concentrates diets and good quality forages, which inhibits intake and microbial protein synthesis in the rumen. CP intake and the percentage of CP in the total dry matter intake in the goats fed only BS-diet were higher than CP requirement of the goats (table 1). The results in table 1 and 2 indicate that urea addition is not necessary for increasing intake and ruminal turnover rates when animals are offered enough nitrogen from supplements. Good quality legume forage contain materials that stimulate the activi-

TABLE 1. EFFECT OF ALFALFA MEAL AND UREA ADDITION TO CORN-SOYBEAN MEAL SUPPLEMENTS ON INTAKE OF RICE STRAW AND DIGESTIBLE NUTRIENTS IN THE GOATS FED RICE STRAW BASED DIETS

	Alfalfa meal (g/day)		Urea (g/day)	
	0	78	0	9
Number of animals	4	4	4	4
Dry matter intake (g/W ^{0.75} kg/day)				
Rice straw	31.7	32.9	32.5	32.1
Total diet	54.7	64.6 ^a	59.2	60.0
Crude protein intake (g/W ^{0.75} kg/day)	7.8	9.8 ^a	10.7	12.4 ^c
	(14.2) ^b	(19.6)	(15.4)	(18.9) ^c
Digestible energy intake (kcal/W ^{0.75} kg/day)	132.8	163.2 ^a	147.7	148.3

^aIndicates that means of alfalfa meal levels are different ($p < 0.01$).

^bValues in the parenthesis indicate percentage of crude protein in the total dry matter intake.

^cIndicates that means of urea levels are different ($p < 0.01$).

TABLE 2. EFFECT OF ALFALFA MEAL AND UREA ADDITION TO SUPPLEMENTS ON RUMINAL TURNOVER RATES AND RETENTION TIME OF PARTICULATE MATTER IN THE GOATS FED RICE STRAW-BASED DIETS

Items	Alfalfa meal, (g/day)		Urea (g/day)	
	0	78	0	9
Number of animals	4	4	4	4
Turnover rates (%/hr)	2.7	3.4 ^a	3.0	3.1
Retention time (hr)	36.8 ^a	30.0	33.6	33.2

^aIndicates that means of alfalfa meal levels are different ($p < 0.01$).

ties of rumen microorganisms and increase the digestion rates of feed in the rumen (Takahashi et al., 1963). Results in table 2 suggested that the ruminal turnover rates were increased through stimulated activities of the rumen microorganisms by feeding alfalfa meal. It was concluded that addition of alfalfa meal to the supplements is useful for increasing intake and utilization of the diets by ruminants fed rice straw-based diets.

(Key Words: Rice Straw, Supplementary Diet, Ruminal Turnover Rates)

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