

DIGESTION OF NAPIERGRASS SILAGE BY GOATS

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Introduction

Grasses in the tropics and subtropics grow rapidly during periods of heavy rainfall and high temperature, leading to mature grasses containing high levels of cell wall constituents. Napiergrass (*Pennisetum purpureum*) is a kind of popular grass in the tropics and subtropics, and its nutritional quality depends on cutting intervals. To supply napiergrass for all seasons for ruminants the grass should be stored. Yokota et al. (1987) reported that napiergrass silage including molasses was good even if high temperature was added during storage. In this experiment nutritional values of napiergrass silage was compared with those of timothy (*Phleum pratense*) hay by goats.

Materials and Methods

Rations

Napiergrass was transplanted on May 1, 1987 at our farm near Nagoya city located in central Japan, and harvested at first time on July 27. Herbage mass was 366 ton/ha at fresh matter bases (58.6 ton at dry matter (DM) bases). The forage was chopped at a length of about 3 cm, mixed with molasses (4% weight of the fresh grass) and ensiled in polyethylene bags (78x36 cm), vacuumed by an air pump, sealed and stored for 3 months until digestion trials. The silage was contained 13.82% of DM and 2.16 mgN/g of fresh material. To compare nutritional quality and biochemical responses of goats, a purchased timothy hay (86.20% of DM and 9.55 mg N of fresh material) was used.

Animals

For digestion trials three castrated Shiba goats (Japanese pigmy goats) were used. They were reared individually in metabolism cages. Feeding levels were adjusted by a level of nitrogen intake; the fresh silage was 2400 g and the hay 525 g a day. They ate the silage for 12 days and for last 5 days feces and urine were collected, and follow-

ed by the hay feeding. For each ration on the 4th day rumen fluid was taken by stomach tube and blood from jugular vein from each goat. A pH value, NH₃-N and VFA concentrations in rumen fluid and urea nitrogen, glucose and total protein in blood plasma were measured.

Results and Discussion

Silage quality of napiergrass was very good

pH value was 3.79, more than 99% of VFA was

TABLE 1. DIGESTIBILITIES OF DM AND N IN GOATS FED THE TWO KINDS OF FORAGES

	Napiergrass silage	Timothy hay
DM intake (g/day)	333	453
N intake (g/day)	5.18	5.02
DM digestibility (%)	63.5±1.2	47.1±3.2
N digestibility (%)	59.1±1.0	42.7±3.2
N retention (g/day)	1.06±0.08	-0.48±0.38
Body weight change (kg/day)	0.03±0.05	-0.14±0.02

Mean ± standard error

TABLE 2. CHARACTERISTICS OF RUMEN FLUID IN GOATS FED THE TWO KINDS OF FORAGES

Time after feeding	Napiergrass silage		Timothy hay	
	hour	hour	hour	hour
	0	4	0	4
pH	6.47	6.20	6.59	6.29
NE ₃ -N (mg/100 ml)	5.23	14.01	11.34	10.64
Total VFA (mmole/100 ml)	7.91	9.04	7.05	5.75
Acetate (%)	74.6	70.0	72.7	67.8
Propionate (%)	20.3	23.3	20.2	22.6
Butyrate (%)	4.3	4.7	5.4	8.2

acetate and $\text{NH}_3\text{-N}$ /total N ratio was 6.4%. Results of the digestion trials are shown in table 1. Digestible crude protein content of the silage (0.79%) was almost the same to raw rice straw silage (0.8%, Japanese Feeding Standard for Beef Cattle (1987)), and that of timothy hay was 2.54%. Characteristics of rumen juices are shown in table 2. Four hours after feeding pH value was lowered. $\text{NH}_3\text{-N}$ and total VFA concentrations was increased in goats fed the silage, but decreased in goats fed the hay. Volumes of drinking water in goats fed the hay was very high (2,133 ml/day), and much water in the rumen might diminish an increase of VFA and $\text{NH}_3\text{-N}$ concentration. The proportion of acetate to total VFA in rumen juices was decreased, and those of propionate and butyrate was increased. Urea nitrogen in blood plasma was increased after feeding, although total pro-

tein and glucose in blood plasma was not changed.

Digestible crude protein of napiergrass silage was relatively low

It depends on moisture content. It is necessary to control moisture content of napiergrass silage for increasing the nutritional values.

(Key Words: Napiergrass Silage, Digestibility, Goat)

Literature Cited

- Japanese Feeding Standard for Beef Cattle. 1987. (Ed. by Research Council Secretariat Agriculture, Forestry and Fisheries).
- Yokota, H., M. Ohshima and T. Nagatomo. 1987. Effect of molasses and temperature on ensiling of napiergrass.