Effect of EM on the Consumption, Nutritive Value and Digestibility of Elephant Grass Silage by Ruminant Animals

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Abstract

Two experiments were conducted to determine the effect of EM on the consumption, nutritive value and digestibility of elephant grass (*Pennisetum purpureum* Schum cv. napier) silages processed from wilted and fresh grasses. The first experiment was a feeding trial with sheep involving three treatments: fresh grass silage + 9% ground corn fed alone or inoculated with EM, and wilted grass silage inoculated with EM. Results indicated that there were no significant differences in the apparent digestibility of fresh grass silage whether inoculated with EM or uninoculated. Nevertheless, the fresh grass silage had a higher level of digestibility than the wilted grass silage. Also, the sheep that were fed EM-treated silage consumed greater amounts of silage per unit of body weight compared with untreated (no EM) silage.

The second experiment was conducted to determine the *in situ* degradability of elephant grass silages using fistulated steers. Periodic changes in the dry matter (DM) and neutral detergent fiber (NDF) levels served as indices of degradability. The degradation of DM and NDF was considerably lower for the wilted grass silage inoculated with EM compared with the fresh grass silage + ground corn, whether it was inoculated with EM or uninoculated.

Introduction

Green corn forage is an ideal material for ensiling because of its high sugar and low protein content which promotes good fermentation. Many grasses, however, have lower sugar levels and are not readily fermentable, often resulting in poor quality silage. Consequently, there is a growing interest in the use of microbial inoculants to enhance the fermentation process for grass silage. The preservation of nutrients during ensilage is largely attributable to the production of lactic acid by *Lactobacillus* spp. This allows a rapid decline in pH which helps to suppress the growth and activity of undesirable microorganisms (e.g., certain fungi) that may adversely affect silage quality and consumption by ruminant animals (Bughardi et al., 1980). Researchers have reported that microbial inoculants such as *Lactobacillus plantarum* can enhance the fermentation of silage; improve its quality; and increase animal consumption and performance (Gordon, 1989a,b; Steen et al., 1989; Andersson et al., 1989). Some have found that silages treated with microbial inoculants may exhibit certain chemical differences compared with uninoculated silages.

The purpose of this study was to determine the effect of EM on the consumption, nutritive value, apparent digestibility and *in situ* degradability of elephant grass (*Pennisetum purpureum* Schum cv. napier) silages.

Materials and Methods

Elephant grass forage was cut after 90 days of active growth with a harvester-thresher. For the fresh grass silages, harvested material was divided into two weighed portions, each spread on a concrete floor and 9% ground corn (w/w) added which increased the dry matter content to about 26%. One portion was treated with EM at a dilution of 1:100 (8 liters of water and 80 ml of EM). The other portion did not receive EM and was ensiled immediately after the ground corn was added.

To prepare the wilted grass silage, some of the harvested material was exposed to sunlight for 5 hours after cutting at which time the dry matter content was 36%. EM was applied in the same manner as for the fresh grass silage. The grass forage samples thus prepared were placed in experimental silos consisting of 100-liter capacity plastic bags which remained sealed for approximately 38 days.

Table 1. Effect of EM on the Mean Apparent Digestibility of Two Elephant Grass Silages, Processed From Wilted Grass and Fresh Grass, in Feeding Trials with Sheep.

Nutrients	Amendment Digestibility (kg/kg)		
	Wilted grass (EM)	Fresh grass + corn (EM)	Fresh grass + corn (No EM)
Dry matter	0.5445b	0.6794a	0.6834a
Crude protein	0.6892b	0.7101a	0.6960a
Crude fiber	0.6520b	0.7094a	0.7274a
Ether extract	0.5734b	0.7676a	0.7627a
Nitrogen-free extract	0.5303b	0.7247a	0.7295a
Neutral detergent fiber	0.5752b	0.6920a	0.6948a
Acid detergent fiber	0.5694b	0.6414a	0.6515a
Gross energy (MJ / MJ)	0.5244b	0.6502a	0.6507a
TDN (%)	51.69b	65.53a	65.15a

Nutrient means on a particular line having common letters are not significantly different at the 1% level of probability.

Experiment 1: Apparent Digestibility *In Vivo*.

Six sheep, maintained in individual pens, were used in the feeding trial. The animals were fed twice a day and the ration was balanced according to recommendations of the Agricultural Research Council (ARC, 1980, 1984). Following a 14-day dietary adaptation period, feces (urine not collected) were collected for 7 days and analyzed for dry matter (DM), crude protein (CP), crude fiber (CF), ether extract (EE), gross energy (GE), neutral detergent fiber (NDF) and acid detergent fiber (ADF) according to methods reported by Silva (1981). A randomized block design was utilized with three replications. Because of their homogeneity, the animals were considered as replications within the blocks.

Experiment 2: Degradability *In Situ*.

The *in situ* degradability of the grass silages and effect of EM were evaluated using three fistulated steers kept in individual pens and fed once each day with a ration of corn silage and urea diluted with water (5% solution). After a dietary adaptation period of 15 days, nylon bags containing 6 samples of each treatment were placed in the fistulas and incubated for 6, 24 and 96 hours according to methods reported by Sampaio (1988).

Results and Discussion

The effect of EM on the mean apparent digestibility of elephant grass silages is shown in Table 1. The data indicate that there were no significant differences for the nutrients in fresh grass silage prepared with 9 percent ground corn, whether the silage was inoculated with EM or not. Thus, there was no observed effect of EM on this particular silage. Interestingly, the level of digestibility for these two silages (i.e., fresh grass silage + corn, with and without EM) and all nutrients considered, was significantly higher than for the wilted grass silage inoculated with EM. It is likely that by amending the fresh grass silage with ground corn, the apparent digestibility was enhanced compared with the unamended wilted grass silage. Obviously, the experiment is biased in favor of the fresh grass silage. Nevertheless, a number of researchers have reported that the digestibility of grass silages was enhanced when treated with microbial inoculants (Rooke et al., 1988; Gordon, 1989a,b; Andersson et al., 1989; Mayne, 1990; Martinsson, 1992; and Smith et al., 1993).

The *in situ* study on degradability of the elephant grass silages showed that the degradation of DM and NDF was greater for the fresh grass silage amended with ground corn compared with the unamended wilted grass silage.

Conclusions

The apparent digestibility of nutrients in fresh grass silage amended with ground corn was not enhanced by EM inoculation compared with no EM. It is possible that the addition of ground corn

to this silage tended to negate the effect of EM on digestibility. Additional studies are needed so that valid comparisons can be made between EM-treated and untreated grass silages that are amended or unamended with an additional energy source such as ground corn.

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