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EFFECTS OF DIFFERENT ADDITIVES ON SILAGE QUALITY OF NAPIERGRASS

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Abstract

Objectives of this experiment were to determine the effects of different additives on silage quality of napiergrass (*Pennisetum purpureum*). The cultivar of TLG2 with high water soluble carbohydrates was used to making silages added with or without 5 and 10% corn meal or wheat bran, and then treated with or without enzyme. Crude protein, acid detergent fiber, neutral detergent fiber, water soluble carbohydrates and volatile fatty acid contents of silage were determined to evaluate silage quality. From the results, it showed that var.TLG2 could be making good silages without any additives but the dry matter was low. Adding 5-10% corn meal or wheat bran not only increased the dry matter and crude protein content, but also decreased ADF and NDF. Lactic acid was the main preservative organic acid in all silages. The same results were obtained from the control treated with Grasszyme . According to the quality of silages and the cost of additives, it was suggested that adding 5-10% wheat bran was the better choice.

Keywords: Napiergrass, silage, corn meal, wheat bran, enzyme, quality

Introduction

Napiergrass(*Pennisetum purpureum*) is one of the major forages grown in Taiwan. Good performance var.TLG2 has been released in recently year(Cheng et al., 1997). The problem is how to maintain the stable supply of good quality forages for ruminants in the subtropics that seasonal rainfall results in a variable supply and forages grow rapidly during the season of high rainfall and temperature, and lead to mature grasses containing high levels of cell wall constituents. Stockpilling of forage in the field is generally an ineffective method of storage because the nutritive value of forage rapidly declines. Making silage could be advantageous in napiergrass compared with making hay. However, it is not a common practice to use napiergrass to make silages in Taiwan. The reason is that napiergrass is high in water content and low in water-soluble carbohydrates, and the quality have not been identified satisfactorily. Therefore, the objectives of the present study were to investigate the ensiling characteristics of napiergrass var.TLG2 with or without additives.

Material and Methods

Napiergrass was harvested at 9 week regrowth by harvest machine and was cut in a length less than 1.5cm. The chopped forage was mixed with corn meal(Corn) or wheat bran (WB),and Grasszyme(Z). The treatments are as follows: A. TLG2+5% corn meal, B. TLG2+10% corn meal, C. TLG2+5% wheat bran, D. TLG2+10% wheat bran, E, TLG2(control). AZ. A+Grasszyme, BZ. B+Grasszyme. CZ. C+Grasszyme, DZ. D+Grasszyme, EZ. E+Grasszyme. The concentration of Grasszyme was 0.15ml/kg fresh weigh. Then the mixture was packed into a polyethylene pipe (20.5cm in diameter, 50cm in height and 0.5 cm in thickness) and were kept at ambient temperature for 1.5 month. Chemical analysis included dry matter contents (DM), crude protein (CP), acid and neutral detergent fiber (ADF, NDF), water soluble carbohydrates (WSC), pH value, lactic acid (LA)

and acetic acid (AA).

Results and Discussion

The chemical compositions of the napiergrass silage with different additives was shown in table 1. DM content of silage with corn meal or wheat bran additives was significantly increased. Crude protein was also increased, the highest one was mixed with 10% wheat bran. ADF and NDF were significantly decreased, the lowest one was mixed with 10% corn meal. The water soluble carbohydrates was higher in silages with wheat bran than in silages with corn meal. The lactic acid content in silages with wheat bran was higher than in the silages with corn meal. The main preservative organic acid was lactic acid in all silages, and acetic acid was the next one. Butyric acid content was negligible. Catchpoole and Henzell (1971) reported that fermentation of tropical forages had not resulted in production of large concentrations of lactic acid. The pH value of all of silages was below 3.9 and it was higher on silages with wheat bran than others. Woodard and Prine (1991) reported that the pH values of napiergrass silage were 3.8-4.4 and depended on harvest frequency and genotype of the forage. Hsu et al.,(1990) reported that silage quality of napiergrass could be improved by adding with corn or wheat bran, and the best one was added with 10% corn meal during ensiling . The effects of Grasszyme on the quality of silages were shown in table 2. There were not significantly different in DM content and pH. Only the control treated with Grasszyme had higher crude protein . NDF content of all treatment was decreased, there were significantly different on the silages with wheat bran or control. In ADF content, only the control treated with Grasszyme have significantly different. Silage treated with Grasszyme had better water soluble carbohydrate than non-treated, and there was significant difference on the control. As for the lactic acid, control and the silages added with wheat bran had the better results. It was shown that Grasszyme might be capable of breaking down structural

polysaccharides to enhance preservation by increasing levels of lactic acid compared with untreated silages. Silage additives (e.g., bacterial inoculants, enzymes, acids, nutrient sources) were significant roles in enhancing quality. The benefits of these additives includes stimulation of lactic acid fermentation, inhibition of microbial growth, inhibition of aerobic fermentation, and provision of nutrients.(Ojeda and Caceres,1985; Panditharathne et al.,1986; Yokota et al.,1991, 1994; Jacobs and Mcallan.1991; Jacobs et al.,1991). From the results, it showed that var.TLG2 could be making good silage without any additives, but the DM was low. Adding corn meal or wheat bran increased the DM and improved the quality, and adding Grasszyme also improved the quality of TLG2. According to the quality of silages and the cost of additives, it was suggested that adding wheat bran was the better choice.

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Table 1 - The chemical composition of silages with different additives

Treatment	DM	CP	NDF	ADF	WSC	LA	AA	pH
	----%----	----------% DM----------				---------g/kg--------		
5% Corn	24.5b*	9.55c	60.9c	40.0b	0.31c	6.43c	1.24	3.61
10% Corn	27.0a	9.54c	53.9d	33.7c	0.33bc	6.37c	1.20	3.63
5% WB	24.5b	10.54b	65.3b	41.0b	0.41a	7.65ab	1.26	3.72
10% WB	26.6a	11.74a	63.0bc	37.9b	0.40ab	8.03a	1.28	3.81
Control	21.9c	8.19d	71.2a	48.2a	0.39ab	7.22b	1.29	3.64

*Means with the same letters in the same column are not different (P > 0.05)

Table 2 - The chemical composition of silages treated with Grasszyme

Treatment	DM	CP	NDF	ADF	WSC	LA	AA	pH
	----%----	----------% DM----------				---------g/kg--------		
A	24.2	9.77	61.5	40.7	0.21b	6.38	1.24	3.62
AZ	24.8	9.34	60.4	39.2	0.41a	6.48	1.23	3.60
B	27.3	9.60	54.5	35.0	0.26	6.33	1.22	3.65
BZ	26.7	9.49	53.4	32.3	0.40	6.42	1.18	3.60
C	25.2	10.80	67.1a	40.6	0.34	7.31b	1.28	3.71
CZ	23.9	10.24	64.4b	40.4	0.49	7.98a	1.24	3.72
D	26.0	11.70	64.1a	38.1	0.27	7.87	1.29	3.81
DZ	27.2	11.78	61.9b	37.7	0.38	8.18	1.27	3.80
E	21.7	7.91b*	74.0a	52.9a	0.26b	6.87b	1.31	3.64
EZ	22.0	8.46a	69.6b	45.4b	0.51a	7.56a	1.27	3.64

*Means with the same letters within the same column are not different (P>0.05).