



Effect of Ensiled Pineapple Waste with Rice Straw as Roughage Source in Total Mixed Ration on Rumen Fermentation Products

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Introduction

By-products from canning factories, such as pineapple waste consisting of crown, core, peel, leaves and waste from flesh trimming (Fig. 1), are commonly use as roughage source. However, cattle prefer fermented waste compared to fresh waste which is high in acidity. Therefore, pineapple waste ensiled with rice straw was used as roughage source in total mixed rations to determine the change in rumen fermentation products (pH, volatile fatty acids (VFA), ammonia nitrogen ($\text{NH}_3\text{-N}$)).



Fig. 1: Fresh pineapple waste



Fig. 2: Physical characteristics of (A) ensiled pineapple waste, (B) ensiled pineapple waste with 10 % rice straw and (C) ensiled pineapple waste with 15 % rice straw

Materials and Methods

Four ruminal fistulated crossbreed (Holstein-Friesian x Native) heifer (458 ± 19 kg. BW) were randomly assigned in a Latin square design to be fed in four periods with one of the four total mixed ration containing different roughage sources i.e. Ruzi grass silage, ensiled pineapple waste, ensiled pineapple waste + 10 % rice straw, and ensiled pineapple waste with 15 % rice straw. The ratio of roughage and concentrate in the total mixed ration was 50:50. Physical characteristics of ensiled pineapple and rumen fermentation products were investigated.

Results

After ensiling process rice straw was softer with a light yellow color and had a lactic acid odor (Fig.2). Rumen pH, total VFA and $\text{NH}_3\text{-N}$ were not different among the treatments ($P > 0.05$) (Table.1). However, cattle fed with ensiled pineapple waste groups tended to had lower ruminal pH ($P > 0.05$) but higher in $\text{NH}_3\text{-N}$ ($P > 0.05$) when compare to Ruzi grass silage group. Moreover, the ratio of acetic: propionic: butyric (C2:C3:C4) were not different ($P > 0.05$) among the groups (54:24:22, 55:22:23, 52:25:23, 53:24:23).

Table 1: Rumen fermentation products

Rumen fermentation products	Roughage source			
	Ruzi grass silage	Ensiled pineapple waste	Ensiled pineapple waste with 10% rice straw	Ensiled pineapple waste with 15% rice straw
Rumen temperature	37.5	38.0	37.8	38.0
Rumen pH	7.06	6.68	6.76	6.80
$\text{NH}_3\text{-N}$ (mg%)	12.9	25.1	20.8	24.2
Acetic acid (mM/L)	206	176	198	198
Propionic acid (mM/L)	91.3	71.1	86.9	90.5
Butyric acid (mM/L)	86.6	71.9	80.2	85.8

Conclusion

Physical characteristic of rice straw was improved when ensiling with pineapple waste. Ensiled pineapple waste with 10 to 15 % rice straw could be used as roughage source in total mixed ration at the ratio of concentrate and roughage 50:50. Rumen pH, volatile fatty acids and $\text{NH}_3\text{-N}$ were not significantly different among treatments.

