PJN
ISSN 1680-5194

PAKISTAN JOURNAL OF NUTRITION

ANSInet
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Pakistan Journal of Nutrition 12 (2): 182-184, 2013
ISSN 1680-5194

Effect of Supplementation *Sacharonyces cerevisiae* and *Leucaena leucocephala* on Low Quality Roughage Feed in Beef Cattle Diet

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Abstract: The aim of this experiment was to study the effect of adding *S. cerevisiae* and leaf of *L. leucocephala* in diet rice straw-based of nutrients digestibility and body weight gain of cattle. The experiment was conducted in Ruminant Nutrition Laboratory of the Faculty of Animal Science, Andalas University, Padang. Experimental design used is a Latin Square Design (LSD) with four treatments and four periods. This experiment used 175.±10.53 kg male ongole crossbreed. The treatments were (A) grass+concentrates (B) rice straw+concentrates (C) was the treatment of B plus 0.5% *S. cerevisiae* and (D) was the treatment C+15% *L. leucocephala*. The results showed that the dry matter digestibility of treatment B (61.03%) were significantly lower than treatments A, C and D respectively (68.05, 63.01 and 68.15%) and supplementation of *S. cerevisiae* was able to improve nutrient digestibility and body weight gain of cattle but still low as compared to control (A). Addition of *L. leucocephala* in treatment D (850.7 g/day) was able to provide digestibility and body weight gain similar to the control ration (775.7 g/day). It can be concluded that the use of rice straw as a substitute for grass would give the same results with the grass when added 0.5% *S. cerevisiae* and 15% *L. leucocephala*.

Key words: Rice straw, digestibility, *S. cerevisiae*, *L. leucocephala*, bypass protein

INTRODUCTION

Rice straw is agricultural by-products that have poor nutritional value because of their low nitrogen and high fiber content (Tang *et al*., 1995). Low productivity rates of animal production are observed in cattle when they use this diet in tropical areas such of Indonesia. Direct-fed microbial products with *Saccharomyces cerevisiae* have been used to improve fiber digestibility (Zain *et al*., 2011) and animal production (Tang *et al*., 2008). The beneficial effects of these microbial compounds are associated with an increase in cellulolytic bacteria (Wallace, 1994; El-Waziry *et al*., 2000; Marghany *et al*., 2005). They have been considered as a potential feed additive to improve NDF digestion in low quality forages (Zain *et al*., 2011). Beside that protein supplementation may be an other alternative to increase beef production in the tropics. Ruminally degraded protein and escape protein are the two limiting nutrients for growing ruminants feed these type of diet (Ramos *et al*., 1998).

Therefore, the objective of our experiment was to determine whether growing steers with rice straw respond to supplemental *Sacharomyces cerevisiae* and legume (*Leucaena leucocephala)* as source bypass protein, could improve fiber digestibility, intake and animal performance.

MATERIALS AND METHODS

Four ongole cross breeds (175+10.53 kg BW) equipped were randomly distributed in a 4 x 4 Latin square design. Treatments were (A) grass+concentrates (B) rice straw+concentrates (C) the treatment of B plus 0.5% *S. cerevisiae* and (D) the treatment C+15% *L. leucocephala*. Basal diet contained (dry basis) 50% grass and rice straw and 50% concentrate . The Composition of feeds including concentrate is given in Table 1.

Digestibility trials conducted using four animals for each treatment which were separated in individual pens. Cattles were fed ad libitum during the adaptation period (15 days) and then restricted during the collection period (6 days) at 90% of the intake feed that was offered at 7:00 and 16:00 h. the last 15 days of each preliminary periods animals were equipped with bags fitted to the animals with harness for total collection. During the collection period accurate records were kept for individual feed intake. Total fecal excretion was collected once daily and 10% representative samples were dried at 60°C over night and kept in sealed bags until analysis. Feed and fecal were ground to pass through a 1-mm screen and composite. Dry matter, organic matter and nitrogen were analyzed by standard methods (AOAC, 1990). Neutral Detergent Fiber (NDF), Acids Detergent Fiber (ADF), cellulose were determined by the procedures outlined by Goering and Van Soest (1970).

Data were analyzed by ANOVA for a 4 x 4 Latin square design (Steel and Torrie, 1980) and means were compared using the Tukey test (SAS Institute Inc., 1985).

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Table 1: Ingredient composition and nutrition of experimental diet (DM)

	Diet			
Item	A	B	C	D
Rice straw	-	50	50	50
Grass	50	-	-	-
Rice brand	28	28	28	28
Corn	10	10	10	10
Coconute cake	11	11	11	11
Salt	0.5	0.5	0.5	0.5
Mineral	0.5	0.5	0.5	0.5
Total	100	100	100	100
Supplementation				
S. cerevisiae	-	-	0.5	0.5
L. leuchephala	-	-		15
Nutrition (%)				
Protein	12.59	11.37	11.87	12.02
TDN	65.33	64.83	64.83	65.48
Lemak	3.60	3.95	3.55	3.15
BETN	49.91	48.66	48.01	47.36
NDF	43,14	46,75	46,77	46,85
ADF	35,24	37,55	37,58	37,65

Table 2: Feed intake, digestibility and daily weight gain of cattle with experimental diet

	Diet			
Items	A	B	C	D
Dry matter intake (kg day^{-1})	6.50^{a}	4.05^{c}	5.22^{b}	6.75^{a}
Organic matter intake (kg day^{-1})	4.84^{a}	3.42^{b}	3.70^{b}	4.92^{a}
Dry matter digestibility (%)	68.05^{a}	61.03^{b}	63.01^{b}	68.15^{a}
Organic matter digestibility (%)	71.43^{a}	63.99^{b}	66.20^{a}	70.91^{a}
NDF digestibility (%)	63.80^{ab}	49.64^{c}	58,40^{b}	66,30^{a}
ADF digestibility (%)	51,02^{bc}	41,10^{c}	53,92^{ab}	64,17^{a}
Live weight gain (g day^{-1})	775.7^{a}	542.7^{c}	687.5^{b}	858.7^{a}

Means in the same row with different in their superscript differ (P<0.05)

RESULTS AND DISCUSSION

Effects of *S. cerevisiae* and *L. leuchephala* supplementation on feed intake, nutrient digestibility of rice straw and daily weight gain of cattle are presented in Table 2. Effects of treatments were significant (P<0.05) for nutrient intake, nutrient digestibility and daily weight gain.

Sacharomyces cerevisiae supplementation increased the nutrient intake, nutrient digestibility and daily weight gain when compared with no *S. cerevisiae* supplementation but still lower when compared with control diet. Supplementation of *L. leuchepala* in treatment D could increased the nutrient intake, nutrient digestibility the same as with control diet and could improve the animal performance. The positive effect of *S. cerevisiae* in increasing the nutrient digestibility and nutrient intake of cattle may be attributed to the increase of numbers of rumen total viable bacteria and cellulolytic bacteria as reported by Marghany *et al*. (2005). Moreover, the stabilization of ruminal environment could be the reason for increasing of numbers of rumen bacteria also may be related to pH modulation via reductions in lactic acid concentration as reported by William *et al*. (1991).

Response to protein supplementation confirm that Cattles growth in rice straw is limited by the supply of metabolizable protein to the animal (Ramos *et al*., 1998). In other studies, supplements with *L. leuchephala* improved ADG when compared to no supplements. Amino acid, balance in the escape protein mixture, is important to obtain maximum growth (Knaus *et al*., 1998).

Conclusion: According to the results of this experiment, the addition of *S. cerevisiae* and *L. leuchepala* could improve nutrient digestibility and cattle performance in low quality roughage.

ACKNOWLEDGEMENT

This work was supported by National Strategic Research Grant by Directorate General Higher Education, Department of National Education Republic of Indonesia contract no 394/SP2H/PP/PL/Dit. Litabmas/IV/2011 date 14 April 2011. The study would not have been possible without the cooperation of technical assistance of Laboratory Ruminant Nutrition of Animal Science Faculty of Andalas University.

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