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Growth Performance and Nutrient Digestibility of Savanna Brown Goat Fed Maxigrain® Enzyme Treated Rice Bran Supplemented with Shea Butter Leaves

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Abstract
This study was conducted to determine the growth and nutrient digestibility of savanna brown goats fed Maxigrain® enzyme treated rice bran. A total number of 36 billy goats were assigned to four dietary treatments in a completely randomized design. Treatments 1, 2, 3 and 4 had 0, 25, 50 and 75% level of Maxigrain® enzyme treated rice bran respectively. The experiment lasted for eight (8) weeks. Dry matter intake was higher ($p< 0.05$) in the goats fed treatment 4. Goats on treatment 1 had higher ($p<0.01$) crude protein digestibility values than the other dietary groups. Crude ether extracts of Maxigrain® enzyme treated rice bran (Treatment 1 and 2) caused significant ($p<0.05$) improvement in body weight gain in the goats which was attributed to an improvement ($p<0.05$) in dry matter and nutrients digestibility, and nitrogen metabolism. Crude fibre digestibility of goats in treatment 2 had the highest value and were significantly higher ($p<0.05$) than all the other treatments. However, the growth performance results revealed that there were no significant differences ($p>0.05$) were found for initial weight, final weight, daily weight gain, daily feed intake and feed conversion ratio which indicated that they were not influenced by the treatments. From this study, it was concluded that Maxigrain® treated rice husk could be included in the diet of savanna brown goats up to 75 % for optimum performance.

Keywords: Savanna brown goat, maxigrain, enzyme, rice bran, shea butter leaves

Introduction

The feed utilization and its efficiency is paramount in the nutrition of ruminant animals. Feeds that are of low quality are deficient in energy and protein content but may be rich in indigestible fibre.Goats are one of the main domesticated small ruminants in Nigeria with population of about 52.4 million (FMAWR, 2008). In Nigeria, goat production comprises largely of conventional nurture system characterized by deprived healthcare and insufficient feeding (Konlan*et al.,* 2012). Maxigrain® enzymes are natural product of fermentation and therefore pose no threat to animal or the consumer (Aguihe *et al*., 2016). It is a bacterial xylanase enzyme. It is a product, which helps to optimize the use of non-conventional feed ingredients and help improve feed conversion efficiency (Adegbola, 2002). It helps to reduce levels of di-calcium phosphate absorption in the feed substantially (Polchem Innovative Solution, 2013). Rice bran is a byproduct of rice obtained from the outer layer of the rice kernel during milling. It is rich in fibre, minerals, B vitamins, antioxidants and phytic acids (Holland *et al*., 1991). Hence, rice bran together with forages can serve as a vital source of nutrient requirements for ruminant Animals (Young, 2000). The objective of this study was to determine the growth performance and nutrient digestibility of Savannah brown goats fed Maxigrain® enzyme treated rice bran supplemented with shea butter leaves.

MATERIALS AND METHODS

This experiment was conducted at the livestock unit of the Teaching and Research Farm of the Department of Animal Production, Federal University of Technology Minna, Niger State. Thirty six (36) savannah brown male goats of three months of age and of comparable sizes (5.5kg) were purchased from Beji market in Minna Niger State. The goats were housed in wooden slatted floor pens (1.20 m × 0.80 m × 0.70 m) equipped with feeding and drinking facilities. Thereafter, routine management and vaccination followed. The animals were allowed*ad libitum* access to water throughout the 8 weeks experimental period. The goats were weighed, and randomly allotted to four dietary treatments of three goats per replicate in aCompletely Randomized Design (CRD). The animals were acclimatized for seven days before the experiment.

All diets were formulated to meet the nutritional requirements of growing goats based on (NRC, 2007) recommendations and animals were fed twice daily with *ad libitum* access to clean water. The proximate composition of the diets was determined following the method of (AOAC, 2000). The experimental diets consisted of rice bran treated with Maxigrain® enzyme at 0, 25, 50, and 75 % (Table 1).The balance was made up with shea butter leaves. Goats were weighed on the first day and fortnightly thereafter, during the 8 weeks feeding trial. Body weight change was estimated from the difference between two consecutive measurements. Record of daily feed intake was kept on each animal during the 5- day metabolism study. Total faecal samples were bulk together for each animal for proximate analysis according to AOAC (2000). Nutrient composition of the feed was also determined according to AOAC (2000). Feed and nutrient intake, digestibility coefficients was determined.

All data collected were subjected to one way analysis of variance (ANOVA). Significantlydifferent were separated using Duncan multiple range test (1999). All the data collected were analyzed using statistical package for social sciences (SPSS, 2006) was used for the analysis.

Table 1: Composition of the diets fed to the Goats

Proximate composition	T1 (0%)	T2 (25%)	T3 (50%)	T4 (70%)	Shea butter leaves (%)
Dry matter	91.00	85.33	92.00	92.67	93.87
Crude protein	14.12	12.06	13.38	14.13	7.00
Crude fibre	8.33	11.14	9.38	11.33	30.00
Ether extract	9.50	8.14	6.50	4.00	3.50
Ash	8.00	7.50	7.00	12.00	6.00
Nitrogen Free Extract	54.05	46.49	55.74	51.21	47.37

Results and Discussions

Table 2 showed the result of growth performance of savanna brown goats fed Maxigrain® enzyme treated rice husk. The result revealed that all the measured parameters were not significantly different ($p>0.05$). Table 3 showed the nutrient digestibility of savanna brown goats fed Maxigrain® enzyme treated rice husk and it shows that all the parameters that was measured were significantly ($p<0.05$) influenced by the treatments. The result of the dry matter composition showed that treatment 4 had the highest value while treatment 1 and treatment 3 had the lowest value. The crude protein result revealed that treatment 1 had the highest digestibility while treatment 2 and treatment 3 had the lowest. There were significant differences ($p<0.05$) forthe treatments on the crude fibre digestibility with treatment 2 having the highest value while treatment 1 had the lowest. The result of the ether extract showed that treatment 1 and treatment 2 had the highest value while treatment 4 had the lowest. The result of the ash content revealed that CF treatment 4 had the highest value and treatment 1 had the lowest value.

The result of the nitrogen free extract (NFE) revealed that treatment 4 had highest and treatment 3 had the lowest. The non significance difference ($p>0.05$) observed in the growth performance of savannah brown goats fed Maxigrain® enzyme treated rice bran, is an indication that the use of Maxigrain® enzyme treated rice bran meal diets supplemented with shea butter leaves can support goat production.The higher digestibility and ruminal fermentation activities due to feeding Maxigrain® enzyme treated rice bran probably resulted in the observed increased live-weight gain in T1 and T2 diets. Other studies on enzyme supplementation to steer diets also have shown increased gain (ZoBell *et al*., 2000), probably due to increased digestibility and energy availability for growth and production (Gado *et al*., 2011;Tricarico*et al*., 2005).Nutrient digestibility was improved by about 8%, while DM intake was not affected with the addition of Maxigrain® enzyme. Crude Proteindigestibility was improvedby about 5.7% due to Maxigrain® enzyme treated rice bran supplementation. Previous reports using other enzyme product have also shown that digestibility of DM, and particularly fiber, were increased (Gado *et al*., 2011).

Table 2: Growth performance of the Goats

Parameters	T1	T2	T3	T4	SEM	LS
Initial weight (g)	5666.63	5444.43	5500.00	5666.63	43.33	NS
Final weight (g)	9083.33	9583.33	9250.00	9000.00	442.16	NS
Daily weight gain (g)	60.67	73.67	66.67	59.00	8.00	NS
Daily feed intake (g)	33.24	25.75	26.86	29.27	1.64	NS
FCR	0.68	0.35	0.62	0.64	0.11	NS

Table 3: Nutrient digestibility of the Goats fed different diets

Parameters	T1	T2	T3	T4	SEM	LS
Dry Matter	74.80^{c}	76.26^{b}	73.73^{c}	78.28^{a}	0.54	*
Crude Protein	59.06^{a}	62.18^{c}	62.63^{c}	66.74^{b}	0.88	*
Crude Fibre	33.29^{d}	61.41^{a}	37.89^{c}	55.51^{b}	3.55	*
Ether Extract	80.52^{a}	81.27^{a}	74.19^{b}	48.52^{c}	4.03	*
Ash	50.63^{d}	57.34^{c}	62.62^{b}	72.77a	2.45	*
Nitrogen Free Extract	88.23^{b}	86.83^{c}	84.64^{d}	90.31^{a}	0.65	*

Conclusion

It is therefore, concluded that Maxigrain® enzyme treated rice husk can be included in savanna brown goat diets up to 75 % for optimum performance.

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