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Carcass and Sensory Evaluation of Savannah Brown Goats Fed Maxigrain® Enzyme Treated Rice Bran Supplemented with Shea Butter Leaves

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Abstract

This study examined the carcass characteristics and sensory evaluation of Savannah brown goats fed Maxigrain® enzyme treated rice bran supplemented with shea butter leaves. Thirty six (36) Savannah goats were randomly assigned to diets containing 0, 25, 50 and 75% Maxigrain® enzyme treated rice bran using a completely randomized design with 3 goats per replicate for eight (8) weeks experimental period. The dietary treatments showed no significant differences ($P>0.05$) on the live weight of the goats. There were significant differences ($P<0.05$) on the carcass characteristics of the goats fed different dietary treatments. There was no significant differences ($P>0.05$) on the goat's meat quality fed with different dietary treatments as was recorded by the panelist for sensory evaluation of the goat meat.

Keywords: Brown goats, savannah, Maxigrain, rice bran, shea butter leaves

Introduction

Maxigrain® enzymes are natural product of fermentation and therefore pose no threat to animal or the consumer (Aguilhe *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. It helps to reduces 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). Goat meat contributed about 24% to Nigeria meat supply (Oni, 2002). The high preference for goat meat consumption is due to its attributes such as tenderness and juiciness of the meat (Babiker *et al.*, 1990). Goats are well adapted to different environmental conditions and utilize feed efficiently to produce high protein product (Kadim *et al.*, 2003).

The objective of this study was to determine the carcass characteristics and meat quality of Savannah brown goats fed Maxigrain® enzyme treated rice bran supplemented with shea butter leaves.

Materials and Methods

The 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 savannah brown billy goats of three months of age and of comparable sizes 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 trial. The goats were weighed and randomly allotted to four dietary treatments with three replicates each in a completely randomized design (CRD). The animals were acclimatized for seven days. The animals were observed for any symptoms of disease(s).

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, 2007). The experimental diets comprised of rice bran treated with Maxigrain® enzyme included 0, 25, 50, and 75 % (Table 1). Shea butter leaves were fed to the goats to meet up the nutrient requirement. Twelve goats were slaughtered (one from each replicate) and used for carcass analysis at the end of the experimental period. The goats picked were kept off feed for 12 hours and slaughtered by severing the jugular vein at the neck region and allowed to bleed for 5 minutes after which the carcass were weighed. They were then flayed and de-skinned. After slaughter the head, fore- and hind limbs were removed at the atlanto-occipital. Carpal shoulder compactness (shoulder weight/length of shoulder) and leg compactness (leg weight/leg length) were determined as described by (Carrasco *et al.*, 2006). The live weight (g), Slaughter weight (g), Eviscerated weight (g), Carcass and internal organs and sensory evaluation were determined using the procedure described by (Meilgaard *et al.*, 2006).

All data collected were subjected to one-way analysis of variance. Significantly different means were separated using Duncan multiple range test (1999). Statistical package for social sciences (SPSS, 2006) was used.

Table 1: Composition of the diet fed to the goats

Ingredients (%)	(0%)	(25%)	(50%)	(75%)
Maize	71.5	53.55	35.70	17.97
Rice bran	0	17.85	35.70	53.93
GNC	8.00	7.50	7.50	6.50
Maize bran	19.50	19.50	20.00	20.50
*Premix	0.50	0.60	0.60	0.60
Salt	0.50	0.80	0.60	0.60
Total calculated	100	100	100	100
ME (kcal/kg)	3581.80	3074.60	3349.80	2973.6
% crude protein	14.12	12.06	13.38	14.13

Results and Discussion

The result on Table 2 shows that live weight, heart and kidney were not significantly ($P>0.05$) different. However, kill out weight eviscerated weight, dressing percentage, head, forelimb, hindlimb, thoracic, abdominal fat, liver, lungs and the intestine were significantly ($p<0.05$) different among treatment means. T_3 (10.5) had the highest slaughtered weight followed by T_2 (9.5) though similar to the control. The least was recorded in T_4 (8.50) which were similar to the control. The eviscerated weight was higher in the control and the least recorded in T_4 (2.90). The values of head and forelimb percent of live weight showed higher values in the control compared to all the other treatments, which are similar. Hind limb, thoracic, abdominal fat and the liver were all higher in the control and the least recorded in T_4 (1.67) followed by T_1 and T_2 which are similar. The least recorded was in T_3 .

Table 2: Carcass characteristics and organ proportion of the goats

Parameters	T_1	T_2	T_3	T_4	SEM	LS
Live weight(kg)	11.00	10.00	10.00	9.00	0.33	NS
Slaughter weight(kg)	9.00 ^{bc}	9.50 ^b	10.50 ^a	8.50 ^c	0.26	*
Eviscerated weight(kg)	4.50 ^a	3.70 ^c	4.30 ^b	2.90 ^d	0.19	*
Dressed percent (%)	45.00 ^a	37.00 ^c	39.10 ^b	32.20 ^d	1.40	*
Head (%)	18.50 ^a	7.00 ^b	6.82 ^b	7.78 ^b	1.48	*
Fore limb (%)	5.90 ^a	4.00 ^b	4.55 ^b	3.60 ^b	0.29	*
Hind limb (%)	12.50 ^a	5.00 ^b	5.00 ^b	3.60 ^c	1.07	*
Thoracic (%)	5.50 ^a	2.50 ^c	2.73 ^b	1.67 ^d	0.44	*
Abdominal fat (%)	5.90 ^a	3.00 ^b	1.37 ^c	1.11 ^d	0.58	*
Heart (%)	0.50	0.50	0.46	0.56	0.21	NS
Liver (%)	2.00 ^a	1.00 ^b	0.91 ^b	0.56 ^c	0.16	*
Kidney (%)	0.50	0.50	0.46	0.56	0.02	NS
Lungs (%)	1.50 ^b	1.50 ^b	1.36 ^c	1.67 ^a	0.06	*
Intestine (%)	8.50 ^a	7.00 ^b	8.18 ^a	8.89 ^a	0.25	*

Intestinal weight was higher in T_4 (8.89) though similar to T_3 (8.18), T_1 (8.50) but differ ($p<0.05$) significantly from T_2 (7.00). Sensory evaluation of cooked meat from savannah brown goats fed Maxigrain® enzyme treated rice bran (Table 3) revealed that the diets had no significant ($p>0.05$) effect on the sensory parameters as measured. The prime cut of goat is the forelimb and hind limb and there were significant ($p<0.05$) differences among the treatments. The 0 percent inclusion of Maxigrain® enzyme treated rice bran (T_1) was higher ($p<0.05$).

Table 3: Sensory evaluation of meat from the experimental goats

Parameters	T_1	T_2	T_3	T_4	SEM	LS
Colour	6.75	6.25	6.50	6.35	0.20	NS
Tenderness	7.30	6.50	6.40	6.30	0.21	NS
Juiciness	6.00	6.55	6.65	6.60	0.17	NS
Flavour	6.00	6.25	6.55	6.65	0.19	NS
Overall Acceptability	6.90	7.20	7.35	7.15	0.15	NS

While 75% inclusion had the lowest. This agrees with Carrasco *et al.* (2006), who reported that carcass of meat animals are generally, evaluated commercially in term of yield and quality of lean meat, and producing meat requires large amount of grain, which are used in fattening of livestock. The decrease in the value of carcass observed at 75% inclusion of Maxigrain enzyme treated rice bran maybe due to the increased level of rice bran, which led to increased fibre content of the diet. This agrees with the findings of Olafadehon *et al.*, (2001) who reported that increased in fibre content of diet could cause poor palatability of feed, which can lead to reduced feed intake. Poor performance of goats fed 75% inclusion of diet may be due to high fibre content. The low abdominal fat at 75% inclusion of rice bran may be because of increased level of fibre content in rice bran, because it tends to reduce as the inclusion level increases, which conforms, to studies of Ciftci and Kor (2010). The authors reported that leaner carcass might make healthier source for human nutrition when low in fat although it can be a disadvantage in terms of juiciness, flavour and tenderness.

Conclusion

It is therefore concluded that savannah brown goats can be fed 50% inclusion of enzyme treated rice bran for optimum hind shoulder meat production. However to produce lean meat with less fat than the inclusion level of the Maxigrain[®] treated rice bran should be 75%.Maxigrain[®] enzyme treated rice bran has no effect on the eating quality of goat's meat.

References

- Aguihe P.C., Kehinde A.S., Ilaboya I.I. and Ogialekhe P. (2016). Effect of dietary enzyme (Maxigrain[®]) supplementation on carcass and organ characteristics of broiler finisher chickens fed cassava peel meal based diet. *International Journal of Research in Agriculture and Forestry*, 3(6): 2394-5907.
- AOAC (2007). Official methods of analysis of the Association of Official Analytical Chemists, 18th edition. Association of Official Analytical Chemists, Washington:
- Babiker, S.A., El Khider, I.A., and Shafie, S.A. (1990). Chemical composition and quality attributes of goat meat and lamb. *Meat Science Journal*, 28: 273–277.
- Carrasco, S., Ripoll, G., Sanz, A., Álvarez-Rodríguez, J., Panea, B. and Revilla, R. (2006). Effect of feeding system on growth and carcass characteristics of Churra light lambs. *Livestock Science*, 121:56–63.
- Cifti, M.R. and Kor, A. (2010). The effects of early castration on slaughter and carcass characteristics of Norduz male kids. *Journals of Animal Veterinary Adv.*, 9:2382-2385.
- Department of Standards, Malaysia. MS1500:2009: Halal food production, preparation, handling and storage-General guidelines (second revision) Malaysia. 2009.
- Duncan, D. B. (1995). Multiple Range F-test. *Biometrics*, 9:1-42
- Holland, B., Welch, A.A., Unwin, I.D., Buss, D.H., Paul, A.A. and Southgate, D.A.T. (1991). *The composition of foods*, fifth Edition. Roy. Soc. Chem. and Maff, Cambridge.
- Meilgaard, M.C., Carr, B.T. and Civille, G.V. (2006). *Sensory Evaluation Techniques*, page 1637, 4th edition. CRC Press, Boca Raton, Florida.
- NRC (2007). National Research Council, Nutrient requirements of small ruminant. 6th edition. Washington: National Academy Press; 2007. Page 384.
- Olafadehan, O.A., Obun, O.O., Yusuf, A.M., Olayinka, O.O. and Abdullahi, B. (2009). Intake and digestibility of Red Sokoto goat fed varying proportions of *Andropogon gayanus* and *Pterocarpus erinaceus* forage *proceedings of the 14th Annual Conference Animal Science Association of Nigeria*. Ladoke Akintola University, ogbomoso, Nigeria. Pp: 572-574
- Oni, O.O. (2002). Breed and genetic improvement of small animal. Small Ruminant Trimming workshop, held at the National Animal Production Research Institute, Ahmadu Bello University, Shika, Zaria 13- 18th January.
- Polchem Innovative Solution (2013). Cocktail enzymes-Maxigrain[®]. Retrieved on January 23, 2013 at <http://polchemgroup.com/index.php>.
- SPSS (2006). Statistical package for social science. Version 16.0.
- Young, S.K. (2000). Effect of heat treatment on physiochemical properties of defatted rice husk. *Food Science Biotechnology*, 8:143-148.