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Carcass and Organ Yields of Red Sokoto Goats Fed Brewer's Dried Grains and Malted Sorghum Sprouts in Complete Diets

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Abstract
The impact of feeding brewer's dried grains (BDG) and malted sorghum sprouts (MSP) in complete diets on the carcass and organ yields of Red Sokoto (RS) goats were evaluated using twenty-four (24) bucks. The bucks were assigned to four dietary treatments (T1, T2, T3 and T4) formulated to contain varying proportions of BDG and MSP (40:10, 30:20, 20:30, 10:40) in a completely randomized design (CRD) experiment for 56 days. Six (6) bucks constituted a treatment with three (3) replicates of two (2) bucks each. At the end of the feeding trial, the bucks were slaughtered and the carcasses and organs measured. Results showed that live weights at slaughter, empty weights, warm carcass weights (kg) and dressed percentages were statistically similar ($p>0.05$) among the means. Ratios of bone to lean were affected ($p<0.05$) by the diets. Ratios of 0.28, 0.28, 0.23 and 0.26 were recorded for T1, T2, T3 and T4 respectively. Among the organs, only the liver, lungs, heart, kidney and spleen were statistically influenced ($p<0.05$) while the other proportions of the offal/organs were similar ($p>0.05$). It was concluded that T3 containing 20:30 proportions of BDG and MSP with a bone to lean ratio of 0.23 gave the best carcass and organ yields.

Keywords: carcass, organ, brewer's dried grains, malted sorghum sprouts, complete diets

Introduction

Nigeria agro-ecology has diverse vegetation, forage and crop types which result to different livestock types, population and distribution. Nevertheless, the returns from these agro-ecological zones in terms of goat production are poor in view of FAOSTAT (2008) report which puts Nigeria goat population at 53.8 million with an estimated output of 0.3 million metric tonnes of goat meat, for over 180 million people. According to FAO (2013), meat consumption (per capita meat carcass mass availability) is 8.8kgs/person in Nigeria; which is far below the values obtained in some other sub-Saharan Africa countries. The shortfall in meat production could be attributed to feed supplies since changes in weather conditions affect both the quality and quantity of forages in the tropics. Adegbola (2002) reported that poor quality roughages when fed to ruminants without supplementation caused considerable weight loss and finally death during the dry season. It is possible to sustain the gains in goat meat production through the supplementation of forages with cheaper agro-industrial by-products like BDG and MSP since cereals and the oilseed meals used as supplements have become very expensive and useful as human food. Yaakugh and Tegbe (1990) reported a crude protein and crude fiber contents in BDG as 21% and 20% respectively. According to Adebowale and Ademosun (1981), the idea of feeding BDG arose primarily from the desire to investigate cheap and alternative feeds for livestock. On the other hand, Oduguwa *et al.* (2006) and Fafiolu *et al.* (2006) reported a range of 224.3 – 226.0 g/kg crude protein representing about 22% in MSP.

This study was aimed at establishing the Carcass and organ yields of Red Sokoto (RS) goats fed brewer's dried grains and malted sorghum sprouts in complete diets.

Materials and Methods

The experiment was conducted in the Sheep and Goat Unit of the Teaching and Research Farm, Michael Okpara University of Agriculture, Umudike, Ikwuano L.G.A, Abia State, Nigeria. Twenty four (24) RS goats (bucks) were sourced from a major goat dealer at Obinze, Imo state. On arrival, they were quarantined for 21 days during which the animals were fed groundnut vines and wheat offal and gradually, components of the experimental diets were introduced. Water was also provided *ad-libitum.* They received prophylactic treatments against external and internal parasites using ivermectin and levamisole. Long-acting oxytetracycline injection was also given and later, they were vaccinated against Peste des petits ruminants (PPR). Four diets (Table 1) designated T1, T2, T3 and T4 were formulated and mixed from the following ingredients: *Andropogon tectorum* hay meal (ATHM), BDG, MSP, palm kernel meal (PKM), molasses, bone meal and common salt. 250 g of vitamin-mineral premix was added per 100kg of diet in order to take care of the micro-mineral needs of the goats. The bucks were assigned to the four treatment diets in a Completely Randomized Design (CRD) of three replicates with two (2) bucks per replicate for 8 weeks (56 days).

At the end of the 56 days feeding evaluation, the goats were starved of feed for 24 hours and weighed prior to slaughter. The slaughter techniques of Adebowale and Ademosun (1981) were employed. The animals were cut at the throat by

severing the head at its articulation with the atlas bone. After dressing, the carcasses were weighed to determine the warm carcass weight. This represented the weights of the bucks after removal of the head, skin, thoracic, abdominal and pelvic contents, and the limb distal to the joints. Dressing out percentages were established by dividing the warm carcass weight by the live weight prior to slaughter and multiplied by 100%. Other carcass components, organs, guts, and muscles were weighed as well. The empty weights were determined by subtracting the weights of the gut contents from the live weights at slaughter.

Data generated from the study were subjected to analysis of variance (ANOVA) appropriate for a CRD using SPSS base for windows. Treatment means showing statistical differences at a probability of 5 % were compared using the Duncan's multiple range procedures of the same package.

Table 1: Composition of the experimental diets

Ingredients	Diets			
	T1	T2	T3	T4
Andropogon tectorum hay meal	31	31	31	31
Brewers Dried Grains	40	30	20	10
Malted Sorghum Sprout	10	20	30	40
Palm Kernel Cake	10	10	10	10
Molasses	5	5	5	5
Bone Meal	3	3	3	3
Common Salt	1	1	1	1
Total	100	100	100	100

Results and Discussion

Table 2 depicts the carcass yields of RS goats fed BDG and MSP in complete diets. Live weights at slaughter, empty weights, warm carcass weights and dressed percentages were all statistically similar (P>0.05) for the four treatment means. The empty weights of the RS goats were slightly higher than the empty weight of 13.48kg of RS goats slaughtered at 15.75kg (Jibir *et al*., 2012). Jibir *et al*. (2013) obtained a warm carcass weight of 7.35kg in RS goats with a mean body weight of 15.75kg which compared with the range of 6.79 – 8.22kg recorded in the current study. The mean dressed percentage of 43.14% recorded in the group fed 40% BDG was lower than the value of 48.6% reported for WAD sheep and goats slaughtered at 23.1kg live weight that received 45% BDG in their diets (Adebowale and Ademosun, 1981).

Table 2: Carcass and organ yields of Red Sokoto goats fed BDG and MSP in complete diets

Parameters	Diets				SEM
	T1	T2	T3	T4	
LW @ Slaughter (kg)	15.50	15.98	16.18	16.58	0.31
Empty weight (kg)	13.51	14.02	14.21	14.49	0.20
Warm carcass weight (kg)	6.79	7.65	8.00	8.22	0.33
Dressed weight (%)	43.14	47.78	49.41	49.54	1.33
Meat cuts (expressed as % of warm carcass weight)					
Leg	20.78	20.74	21.30	21.66	0.18
Loin	19.00^{b}	19.17^{b}	20.92^{a}	21.22^{a}	0.36
Set	15.28	15.64	16.04	16.11	0.24
Shoulder	23.38^{b}	25.08^{a}	23.01^{b}	23.37^{b}	0.32
End	19.30^{a}	16.49^{ab}	16.17^{b}	16.19^{b}	0.54
Abdominal fat	1.60	1.08	1.59	1.00	0.21
Bone to Lean ratio	0.28^{a}	0.28^{a}	0.23^{b}	0.26^{ab}	0.01
Offal/organs as % of empty weight					
Head	8.86	8.53	8.87	8.84	0.55
Limbs	3.97	3.91	4.27	4.33	0.83
Skin	7.41	7.74	8.42	8.30	0.19
Tail	0.12	0.11	0.14	0.12	0.01
Liver	2.20^{a}	1.81^{b}	1.50^{b}	1.71^{b}	0.09
Lungs	1.79^{a}	1.53^{b}	1.16^{c}	1.50^{b}	0.07
Heart	0.75^{a}	0.61^{b}	0.56^{b}	0.58^{b}	0.03
Testes	0.97	0.92	0.96	0.94	0.01
Empty gut	8.70	8.36	8.02	8.33	0.15

Kidney	0.44[a]	0.44[a]	0.32[c]	0.37[b]	0.02
Spleen	0.19[a]	0.14[bc]	0.15[b]	0.12[c]	0.01

[a,b,c] means on the same row with different superscripts are significant (P<0.05); SEM: Standard error of mean

However, Ukanwoko and Ibeawuchi (2012) obtained a dressed weight percentage in WAD goats fed 10% cassava leaf meal similar to the value reported for the RS goats fed 40% BDG. The dressed percentages for the other groups were higher than the value of 46.42% in RS goats (Jibir *et al*., 2012) but below the range of 50.4 – 52.6% established in WAD goats (Ahamefule, 2005). Dressed percentages would differ depending on the weight at slaughter, breed of animals, duration of fasting, nature of diets, rate of rumen fill as well as the sizes and proportions of the offal and internal organs of the slaughtered animals.

Apart from the leg, set and abdominal fat that was similar (p>0.05), other proportions of the meat cuts expressed as percentages of the warm carcass weight differed (p<0.05). Abdominal fat content in animals is to a large extent a reflection of the nutrient composition of the feed and the extent of fat mobilization by the individual animals from the diets. The non-significant relationship in the abdominal fat contents suggests that there was no variation in the mobilization of fat from the diets fed. The shoulder in T2 indicated that the treatment favoured the growth of the fore-quarter more than the rest. Earlier observations (Okereke, 2008; Adebowale and Ademosun, 1981) ascribed over 30% of the warm or chilled carcass weight to the shoulder. These observations conflict the range of 23.01 – 25.08% of the warm carcass weight as shoulder obtained in the current study. The higher value obtained for the end in T1 showed that the treatment promoted the growth of this meat cut. Since the end comprises mostly of the rib cage, it implies that muscle deposition on this part of the animal was impaired by the treatment.

Bones to lean ratios in the current research suggest that the meat/muscle characteristics of the RS goats as meat type breed are quite outstanding though influenced by the dietary treatments. Jibir *et al.* (2012) had reported better lean, less bone, higher lean to bone ratio in RS goats than the Sahel counterpart. The offal (as % of empty weight) – the head, limbs, skin, empty gut and tail were similar (p>0.05) across the means. All the internal organs expressed as % of the empty weight except the testes and the empty gut varied (p<0.05). Depending on the physiological status of animals, the sizes of the testes and gut are usually the same for animals of similar body weights and age. The significantly lower value of some organs as the level of MSP increased from T2 – T4 is an indication that the animals were able to cope with the level of tannin and HCN isolated in the product (Oduguwa *et al*., 2006), since Ahamefule (2005) reported that organ weights are indicators of toxicity in feed. Significantly higher organ sizes in T1 were far below the values reported for WAD goats (Okereke, 2008). This also shows that there was no serious sign of toxicity of mycotoxin in the RS goats placed on 40% BDG in their diets.

Conclusion and Recommendation

The incorporation of BDG and MSP into complete diets at various proportions did not affect most of the carcass and organ yields of RS bucks as evaluated in this study. However, T3 gave the best bone to lean ratio with some vital internal organs appearing to be better in bucks for this treatment. It is recommended that goat farmers should adopt this feeding technique to improve goat meat production in Nigeria in order to increase chevon consumption by Nigerians.

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