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PERFORMANCE OF UDA LAMBS FED VARYING LEVELS OF RICE-MILLING BY-PRODUCT (RMB) IN SOKOTO, NIGERIA

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ABSTRACT

This study evaluated the feeding and body weight gain efficiencies of growing Uda lambs fed varying levels of rice milling by-product (RMB) in Sokoto, Nigeria. Twelve Uda lambs weighing 17.5 - 24.0 kg were used for this experiment. The lambs were grouped into four treatments; I, II, III and IV containing 0, 10, 20 and 30% RMB, respectively, arranged in RCBD. The lambs were fed the four treatment diets daily as concentrate and *Monecma ciliatum* hay as basal diet at 1.5 and 1.0 % of body weight respectively, for nine weeks. Data were collected on feed intake, body weight gain, feed efficiency and cost of feed per live weight gained and analyzed using Analysis of Variance (ANOVA). LSD test was used for mean separation where necessary. Results showed that the lambs had similar ($P > 0.05$) total and daily weight gains and feed efficiency in the four treatments. However, lambs on treatment IV (30% RMB) recorded higher ($P < 0.05$) daily feed intake, and total feed consumed than lambs on treatments I (0% RMB) and II (10% RMB), but these values for treatment III were similar ($P > 0.05$) to those for treatment IV. Conversely, the cost of total feed consumed was higher ($P < 0.05$) in treatment I and lower in treatment IV. Treatment IV (30% RMB) showed higher economic advantage for utilization of RMB in concentrate diet of growing Uda lambs in Sokoto, Nigeria, and is recommended for use by farmers for optimum lambs productivity in the study area.

Key words: Feed intake; Rice Milling By-product; Uda lambs; Weight gain

INTRODUCTION

In Nigeria, small ruminants are important source of animal protein in the country. They make significant contributions to the national economy; provide income and livelihood to over 70% of rural households in the country. The animals also provided other unquantifiable socio-economic, cultural and religious benefits. Sheep are particularly preferred as sacrificial animals by the Muslims; during 'Eid-el-Kabir' festival and during

child naming and marriage ceremonies (Gefu and Adu, 1984). The Federal Department of Livestock and Pest Control Services (FDLPCS, 1992) reported that the Nigeria's small ruminants are produced mainly under the smallholder enterprise and has great socio-economic potentials in the Semi-arid zone of the country. However, the major limitation to ruminant animal production in Nigerian is inadequate and low quality of the feed available during the long dry season (Ogumbosoye and Babayemi, 2010). This is especially in the semi-arid zone where the dry season is longer and most of the ruminant animals are being produced. The animals usually gain weights during the short wet season (May/June – September) when there is enough good quality pastures in the rangelands, but lose much of these weights during the long dry season each year (Adegbola, 2004; Babayemi and Bamikole, 2006; Odedire and Babayemi, 2008; Ogumbosoye and Babayemi, 2010). As a result of the annual weight losses by animals, farmers incur heavy economic losses that include loss of body condition, leading to low productivity and low price of the animal products, low resistance to diseases infection and mortality (Simbaya, 2000). Therefore, stakeholders in the ruminant livestock industry advocated the use of unconventional feed ingredients (UFI) to increase feed supply for optimum performance by the livestock, especially in the semi-arid zone where feed scarcity is very severe (Maigandi, 2001; Adegbola, 2004; Babayemi and Bamikole, 2006; Ogumbosoye and Babayemi, 2010).

According to Adegbola (2004), UFI include all kinds of by-products that contain one or more of the feed nutrients, but is not commonly use as livestock feed. However, to justify use of any UFI for livestock feeding, such ingredient should be locally available, affordable and its use as feed ingredient should improve animals' performance at comparatively lower cost. Rice Milling By-product (RMB) was reported as commonly available in the rice production areas of North-western Nigeria and can be obtained cheaply from milling stations where rough rice (Paddy) is processed to produce polish rice (Jibrin, 2006). According to AFRIS (2004), RMB contains approximately 60% hulls, 35% bran and 5% polishings. Na-Allah and Jibrin (2007) reported that RMB contains 89.0 – 92.8% DM, 4.8 – 7.7% CP, 2.9 – 7.6% EE, 27.7 – 36.6% CF, 35.0 – 45.4% NFE and 11.3 – 14.4% ash. Thus, RMB may be use advantageously as partial replacement for straw and may reduce cost of feed in high concentrate diets (Oyenuga, 1976; AFRIS, 2004).

This study was carried out to evaluate the feeding and weight gain effeciecies by growing Uda lambs fed varying levels of RMB as replacement for wheat offal in Sokoto Semi-arid zone of Nigeria. Findings from this study will provide information on the suitability or otherwise of RMB as ingredient in the concentrate diet of Uda lambs. It may also provide basis for further studies on utilization of RMB as feedstuff for other categories and livestock species to improve livestock productivity at lower cost in the study area. This will also help to solving the problem of disposal of RMB being regarded as waste product at various rice milling stations which otherwise constitute nuances to the environment.

MATERIALS AND METHODS

Study Area

The study was carried out in the livestock teaching and research farm of Department of Animal Science, Faculty of Agriculture, Usmanu Danfodiyo University (UDU) Sokoto, Nigeria. According to the Sokoto State Government (SSG, 2013), Sokoto state is located within Latitudes 12^{o} 10" - 13^{o} 05" N and Longitudes 4^{o} 08" - 6^{o} 04" E in the Sudan Savanna

vegetation zone. Arable crop farming and livestock rearing form the major economic activities of the people in Sokoto state in addition to a variety of artisan works, trading and civil service. The climate, described as semi-arid, is characterized by two distinct seasons (wet and dry). The wet season is short (June – September) with mean annual rainfall of 500 - 750 mm characterized by ample supply of pasture feed for livestock. The dry season is long and lasts from October to May characterized by scarcity of feeds for livestock in the area.

Treatments and Experimental Design

This experiment consists of four dietary treatments containing 0, 10, 20 and 30% RMB denoted as diets I, II, III and IV, respectively. A total of sixteen (16) Uda lambs aged between six and ten months (weighed 17.5 - 24.0 kg), were bought from the Sokoto livestock market (*Kara*). The animals were grouped into four weight-balanced groups of four lambs each and were randomly allocated to the four dietary treatments in randomized complete Block Design (RCBD).

Composition of Experimental Diets

Gross and calculated chemical compositions of the experimental diets are as shown in Table 1. The feed ingredients used such as wheat offal, maize, cotton seed cake, bone meal and salt were purchased from feedstuff section of the '*kara*' market while the RMB was purchased from a nearby rice miller. Cost per kg for each treatment diet, determined using the purchasing prices of the feed ingredients used was also shown in Table 1.

Experimental Animals and their Management

On their arrival to the farm, each of the experimental lambs was identified using a plastic number tag and weighed. They were then weight-balanced and allotted to four experimental groups. Prior to commencement of the experiment, each of the lamb was administered Oxytetracycline (L. A.) injection intra-muscularly to serve as antibiotic and given Abendazole caplet orally for the control of internal parasites. Diluted Crezil was also applied on the skin for control of external parasites that may be present on the animals' body. Each lamb was housed individually in a clean and well ventilated stall (1.0 x 1.5 m) and was fed experimental diets for two weeks as adjustment period and then seven weeks for data collection. Each lamb was fed the experimental diets at 1.5% of its body weight and 1% of body weight allowance of legume hay (*Monecma ciliatum*) given as free-choice daily. Clean drinking water was supplied *ad-libitum*. Feeding and watering were carried out during 8.00 to 9.00 a.m. each day and amount of feed given to each animal (both for concentrate and roughage) was adjusted weekly to cater for periodical increase in the animals' body weight.

Table 1: Gross and calculated chemical compositions of the experimental diets

Gross composition (%)	Treatments			
	I	II	III	IV
Rice milling by-product (RMB)	0	10	20	30
Wheat offal	67	57	47	37
Maize	10	10	10	10
Cotton seed cake (CSC)	20	20	20	20
Bone meal	2	2	2	2
Salt	1	1	1	1
Total	100.0	100.0	100.0	100.0
Calculated chemical composition				
Dry matter (%)	91.55	91.80	92.05	92.40
Crude protein (%)	20.30	20.10	19.80	19.60
Metabolizable energy (Kcal kg^{-1})	2124.3	2077.6	2030.3	2107.2
Calcium (%)	0.95	0.93	0.93	0.92
Phosphorus (%)	0.54	0.55	0.57	0.58
Crude fibre (%)	9.40	9.60	10.20	10.42
Ether extract (%)	4.22	4.40	4.60	4.77
Unit cost of feed (₦ kg^{-1})	170.0	157.0	144.0	131.0

Data Collection and Analysis

Daily feed intake was determined by subtracting the amount of feed left over from the amount of feed given the previous day. The experimental animals were weighed weekly in the morning prior to feeding, using hanging spring balance. Weekly body weight changes were determined by subtracting the initial weight from final weight of each animal from which daily weight changes were computed. Unit cost of feed and total cost of feed consumed per animal were also determined for each treatment. The data collected was subjected to analysis of variance (ANOVA) in the SPSS statistical package (SPSS, 1995) using randomized complete Block Design (RCBD). LSD $_{(P < 0.05)}$ test was used for separation of means where necessary.

RESULTS AND DISCUSSION

Results on mean initial and final body weights, total and daily weight gains, daily feed intake and total feed consumed, feed efficiency and cost of total feed consumed by the growing Uda lambs fed varying levels of RMB are presented in Table 2. The results showed that mean initial and final body weights, total and daily weight gains, and feed efficiency of the growing Uda lambs were statistically ($P > 0.05$) similar in the four treatments. However, values for mean daily feed intake, total feed consumed and cost of total feed consumed by the lambs differed significantly ($P < 0.05$) between the treatments. Lambs on treatment IV recorded higher ($P < 0.05$) daily feed intake and total feed consumed compared to lambs on treatments I (control) and II, but the two values for treatment III and IV were similar ($P > 0.05$). Conversely, the cost of total feed consumed by

the lambs was higher ($P < 0.05$) in treatment I (0 % RMB) and lower in treatment IV (30 % RMB).

The similar ($P > 0.05$) values for mean initial body weight of lambs in the four treatments indicated similarity of the animals in terms of body weight at the beginning of the experiment. The higher ($P < 0.05$) mean daily and total feed intakes by lambs on treatment IV compared to those on treatments I and II may be attributed to the higher content of RMB (30%) in the treatment IV compared to 0 and 10 % RMB in treatments I and II, respectively. RMB was reported to stimulate appetite (AFRIS, 2004) and this could lead to high feed intake by livestock fed higher RMB. The similar ($P > 0.05$) values for mean final body weight, total and daily weight gains by lambs in the four treatments may indicate that the four treatment diets were similar in their nutritive potentials that support similar weight gains by the lambs. This finding was further demonstrated by the similar ($P > 0.05$) values for the mean feed efficiency in the four treatments. The mean daily weight gains recorded in the present study (172.45 - 182.65 g/day/lamb) appeared to be the highest rate of gain by lambs in the study area, considering the reports by Buvanendran *et al.* (1981), Gefu and Adu (1984), Hassan (2000), Na-Allah *et al.* (2004) and Malami (2005). In addition, the lower ($P > 0.05$) cost of total feed consumed recorded for lambs on treatment IV (30 % RMB) compared to rest of the treatments may suggest further economic advantage of substituting up to 30% wheat offal with RMB in the diet of growing Uda lambs.

Table 2: Performance of growing Uda lambs fed varying levels of RMB

Parameters	Treatments				
	I	II	III	IV	LSD
Mean initial body weight (kg/lamb)	22.55	22.65	22.75	22.60	2.38
Mean daily feed intake (g/day/lamb)	562.44^{b}	565.10^{b}	577.14^{ab}	591.43^{a}	20.37
Mean total feed consumed (kg/lamb)	27.56^{b}	27.69^{b}	28.28^{ab}	28.98^{a}	1.21
Mean final body weight (kg/lamb)	31.50	31.20	31.65	31.05	1.75
Mean total weight gain (kg/lamb)	8.95	8.55	8.90	8.45	0.69
Mean daily weight gain (g/day/lamb)	182.65	174.49	181.63	172.45	10.16
Mean feed efficiency	0.32	0.31	0.31	0.29	0.03
Cost of total feed consumed (₦)	4685.20^{a}	4347.33^{bc}	4072.32^{c}	3796.38^{d}	164.74

Means in the same row followed by different superscripts differ ($P < 0.05$)

CONCLUSION

Results from this study revealed that RMB can replace Wheat offal in the concentrate diet of growing Uda lambs without compromise on the lambs' weight gain. Also the higher inclusion level of RMB in treatment IV (30%) showed higher economic advantage in utilization of this by-product in concentrate diet of growing Uda lambs in Sokoto, North-western Nigeria. Diet IV is therefore, recommended for use by farmers for optimum productivity by growing Uda lambs in the study area.

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