NECK AND CEPHALIC MEASUREMENTS OF FEEDLOT BUNAJI BULLS FED VARYING LEVELS OF AGRO INDUSTRIAL BY-PRODUCTS BASED DIET

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Abstract
A ninety -day feeding trial was conducted to determine the effect of feeding agro-industrial by-products to Bunaji bulls. Three diets were formulated to contain agro-industrial by-products at 1, 2, and 3% of the average body weight of the bulls and mixed with other ingredients to meet the nutrient need of the animals. Six Bunaji bulls were randomly allotted to the experimental diets at three animals per diet in a completely randomized design. Three bulls were allocated each diet which contained agro-industrial by-products at 1, 2 or 3% of the average body weight and labeled; A, B and C respectively. Each diet was replicated twice with each bull a replicate. Feed and water were made available free choice. Neck circumference, neck length, face length, head width and ear length did not differ significantly across the diets. It can be concluded that apart from neck length, other cephalic measurements may not necessarily depend on the quality of the diet. Therefore, for acceptable neck length, any one of the diets is recommended.
Keywords: Bunaji bulls, Agro-industrial by-products, Cephalic measurement

Introduction

A major problem plaguing the livestock sector in Nigeria is the continued increase in the cost of conventional feed ingredients and the stiff competition between man and livestock for these ingredients. Aregheore (1996) posited that their (conventional ingredients) exorbitant prices and erratic supply have made them too expensive for small scale farmers to incorporate them in livestock feeding especially in ruminant nutrition. It has become uneconomical to include grains in the diets of ruminants by humans (Jokthan, 2013) therefore, it is unarguably necessary to source for cheaper feed ingredients with little or no cost in procuring them. It is in this light, that Sokhumi *et al*. (2003) revealed that one of the method that have been utilized for some time now in alleviating these problems has been the replacement of a percent of grains and cakes in livestock diets with agro-industrial by products. For this reason, ardent nutritionist have tasked themselves with the responsibility of investigating those unconventional energy and protein feed ingredients which are free from competition between man and other industries (Anurudu and Ewuola, 2010) for the sole reason of surmounting the over dependence on these conventional feed stuffs.

Aside the seasonal variation that affects the availability and quality of feed most especially in the dry season (Ocheja, *et al*., 2014) the current menace of Fulani herdsmen farmer clashes is now a common occurrence in

Nigeria due to grazing places and this, however, have resulted in the shortage of protein supply especially from beef. Animal protein is one of the most important components of human diet and the consumption varies from country to country (Okai *et al*., 2005). Food and Agriculture Organization (FAO) (2007) revealed that many Nigerians consume less than 10g of animal protein against the minimum requirement of 54/g/person/day considered consistent with a balance diet. Meat from ruminants forms the major source of animal protein in Nigeria (Babale *et al*., 2012) and it imperative to sustain the production of cattle in Nigeria.

In other to arrest this animal protein crisis, greater emphasis on backyard cattle farming (cattle feed lot system) have been suggested and employed to address consumer concerns about the beef they eat (Fanatico *et al*., 1999).

Cattle feedlot is a system of production whereby cattle are fed in confinement. The main objective of cattle feedlot operation is to fatten young cattle with meaty potentials which could attain economic carcass slaughter weight a year or two earlier than usual (Olayiwole, 1982). Under this confinement, animals are adequately fed on rich balanced ration so that they grow rapidly and attain desired body weights within short periods of time of about 90-120 days.

A system of linear body measurements was developed by Alderson (1999) to provide an assessment on the type of beef cattle and overall value of an animal. This is useful as a measure in young animals to enable earlier assessment of breeding animals for selection and to predict mature rating. In agreement with Bawala *et al*. (2008) who reported that nutritional studies should not be limited to performance, carcass quality and protein intake alone but also on blood constituents, therefore, the effect of feed materials on body measurements is also very relevant and should be evaluated.

This study was therefore designed to investigate the neck and cephalic measurements of feedlot Bunaji bulls fed varying levels of agro-industrial by-products based diet.

MATERIALS AND METHODS

The study was conducted at the Cattle Unit of the Livestock Teaching and Research Farm of the University of Agriculture, Makurdi. Makurdi is located on latitude 7^0 14 N^1 and longitude 8^0 $31^1$and a height of 90 meters above sea level in the Southern Guinea Savannah ecological zone of Nigeria. The rainy season spans from May to October, while dry season spans from November to April with mean annual rainfall ranges from 1270 to 1397 mm. Mean temperature ranges from 22.3^{o}C to 33.41^{0}C while the mean relative humidity is 64.58% (Ahemen *et al*., 2011). The University of Agriculture is located on a land mass of 7,986.22 hectares (FGN Visitation Report, 2011) out of which less than half is occupied by buildings and crop farm, the rest is natural grassland unto which cattle are grazed.

Experimental Diet Formulation/Preparation

The feed inputs used in feed formulation were sourced from local livestock stores and the feed prepared using the formula in

table 1, while the chemical composition of the feed inputs is shown in table 2.

Experimental Animals

Six Bunaji bulls, aged two years and weighing 118 kg on the average were purchased from the Makurdi International Cattle Market and taken to the experimental site. The bulls were treated for internal and external parasites using Tridox (1ml/100kg b.w.) and pour on. The animals were quarantined for a period of 30 days after which they were weighed and allotted to the four treatments. During the 90 days experimental period, each of the bulls was housed in a pen measuring 3.6 m X 2.5 m (Length and width) constructed of wood and roofed using corrugated iron sheets. The supplement was served in troughs made from metal drums that had been cut into two along the length and fitted with metal rods to enable them remain in standing position while the drinking water was served in plastic basins.

Experimental Design/Procedure

The study was conducted using the Completely Randomized design. The six bulls were arranged into three groups of two each and each animal served as a replicate.

Data Collection

During the experimental period, the bulls were measured weekly using a carpenter's measuring tape. The Face length, ear length, neck length, neck circumference and head width were all measured. Neck length was measured as the length between the atlas vertebrae and the first thoracic vertebrae. Neck circumference was measured as the circumference of the neck at its widest point using a thread. Ear length was measured as the distance of the point of attachment of ear to the tip of the ear. Face length was measured as distance from between the horn site to the lower lip. And lastly, Head width was measured as the minimum distance between the temples.

Data Analysis

Collected data were analyzed using Analysis of Variance (ANOVA) package of (Minitab, 1991) and significant differences in means were separated using Duncan's Multiple Range Test as outlined (Steel and Torrie, 1980).

RESULTS AND DISCUSSION

The chemical composition of the agro industrial by products is shown in Table 2. The result of the laboratory analysis showed that the Dry Matter (DM) of all the agro industrial by products was similar. Crude protein (CP) of Brewer Dried Grain (BDG) and Palm Kernel Cake (PKC) 21.63 &18.23 % respectively were higher than Maize Offal (MO) 12.19 %. Nitrogen Free Extract (NFE) of BDG & PKC (53.36 & 56.71 %) respectively was lower than MO (70.95 %). Ash content of BDG (6.27 %) was higher than those for MO & PKC (3.89 & 4.78 %) respectively. BDG had similar Gross energy with MO. PKC had the highest Gross energy (4.49kcal/kg). MO had the lowest CP, EE, CF and Ash contents of 12.19, 2.10, 10.87, and 3.89 respectively. It had the highest NFE value of 70.95%. The reported CP level of BDG in this present study is within the range (19-25%) reported by (Olupona *et al*., 2002; Kwari *et al*., 1999). This agrees with the work of Oyediji (2001) who reported that there is a

wide variation in the proximate composition of the BDG depending on the brewery that produced it. The CF level also is within the range (10-22%) reported by Olupona *et al*. (2002). Gross energy level is also close to the range (3030-3170kcal/kg) reported by Olupona *et al*. (2002). The reported CP level of MO (12.19%) in this present study is higher than the 10.63% reported by Nelson (1984). Crude fibre of MO (10.87%) is higher than the value (5.55%) reported by Nelson (1984). NFE value (75.28%) reported by Nelson (1984) is similar to that reported in this present study. The Gross energy level 4.49 kcal/g reported by Olorunnisomo *et al*. (2006) is higher than the level in this present study. CP value for PKC in this present study in not in agreement with the range (12-14 %) reported by Oyenuga (1998). This may be due to the processing method employed. CP level (17.92 %) reported by Olanike *et al*. (2013) is close to the CP level in the present study. It agrees with the CP level (18.8%) reported by Aduku (2012). CF level reported in this present study is within the range (10-20.5%) reported by Oyenuga (1998). CF level of 10.66 % reported by Olanike *et al.* (2013) is lower than the CF level in the current study.

Table 3 presents the results for the neck and cephalic measurements of the experimental animals. None of the neck and cephalic measurements showed any significant ($p>0.05$) difference among the treatments. The neck length which varied from 37.50-42.20cm was higher than 36.6-37.00cm and 29.95cm reported by Sandip *et al*. (2014) for Boran and Tolenkhomba *et al*. (2012) for Manipur cows respectively. This difference can be attributed to the age and breed of the animals. Animals in the temperate regions tend to be bigger than those in the tropics owing largely to the uniqueness of the breeding systems and quality of pasture. The neck circumference values were between 85.25-92.25cm which is slightly higher than the (72.40-75.90cm) reported by Sandip *et al*. (2014) for Boran bulls and higher than 74.40cm reported by Okeh *et al*. (2014) for Sokoto Gudali cattle. The mean value for face length (43.00 – 44.50cm) agrees with the 44.09cm reported by Pundir *et al*. (2011) for Krankrej cows aged 4-8 years but is lower than the 58.88cm reported by Abdulmojeed *et al*. (2010) for bunaji cattle reared extensively. This contrasting result can be attributed to the management system employed as well as the sex of the animals involved. The mean values for ear length (19.25 – 20.00cm) reported in this study are comparable to 21.57 & 25.14cm reported by Okeh *et al*. (2014) for Sokoto Gudali and white Fulani respectively. In other studies, a lower mean value (15.24cm) for Manipur cows was reported by Tolenkhomba *et al*. (2012) and a higher mean value (31.24cm) for Kranjej cows was reported by Pundir *et al*. (2011). Head width value (18.75 – 19.75cm) reported in this present study is comparable to the 15.54 & 21.15cm reported by Abdulmojeed *et al*. (2010) for Bunaji cattle and Sokoto Gudali cattle respectively. A revelation from this present study showed that cephalic measurements are not necessarily affected by diet but by the type of breed, sex and management system.

CONCLUSION

Agro-industrial by-products abound in this Country due to massive agricultural activities going on. It is concluded that Agro- industrial by products fed to feedlot Bunaji bulls up to

3% of their body weight did not significantly affect the neck and cephalic measurements and at such did not give information on its role in assessing the nutrition/diet. Further research should be conducted with the aim of investigating other body linear measurements which could serve as useful information in correlating nutrition and body weight gain.

Table 1. Experimental feed formula

Ingredient	Percent inclusion
Brewer Dried Grain	30
Palm Kernel Cake	30
Maize Offal	36
Bone Ash	3
Table Salt	1
Nutrient Composition	
Dry matter (%)	90.41
Crude protein (%)	16.16
Crude fibre (%)	9.38
Ether Extract (%)	5.32
Nitrogen Free Extract (%)	57.96
Ash (%)	11.12
Gross energy (Kcal/kg)	3.60

Table 2. Chemical Composition of feed inputs used in supplementary feed formulation

Chemical component	Feedstuff		
	Brewer's Dried Grain	Palm Kernel Cake	Maize Offal
Dry matter (%)	90.26	91.38	90.70
Crude protein (%)	21.63	18.23	12.19
Ether extract (%)	3.84	6.58	2.10
Crude fibre (%)	14.90	13.70	10.87
Ash (%)	6.27	4.78	3.89
Nitrogen free extract (%)	53.36	56.71	70.95
Gross Energy (Kcal/ Kg)	3.22	4.49	3.57

Key: T1: Fed forage of elephant grass *ad libitum* and the supplement at 1.0% body weight, T2: Fed forage of elephant grass *ad libitum* and the supplement at 2.0% body weight, T3: Fed forage of elephant grass *ad libitum* and the supplement at 3.0% body weight.

Table 3. Neck and cephalic measurements of feed lot Bunaji bulls fed varying levels of agro industrial by products based diet.

Parameter (cm)	T1 (1%)	T2 (2%)	T3 (3%)	SEM
Neck Length	39.50	37.50	42.00	2.48NS
Neck circumference	92.25	89.50	85.25	4.16NS
Face length	44.25	43.00	44.50	1.13NS
Head width	18.75	19.50	19.75	0.54NS
Ear length	19.75	19.25	20.00	0.61NS

T1: Fed forage of elephant grass *ad libitum* and the supplement at 1.0% body weight T2: Fed forage of elephant grass *ad libitum* and the supplement at 2.0% body weight T3: Fed forage of elephant grass *ad libitum* and the supplement at 3.0% body weight, NS= Not significant.

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