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# Performance of feedlot Bunaji bulls supplemented varying levels of an agricultural industrial by- products based diet.

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***Abstract:*** *A 90 day growth performance study was carried out to evaluate the effect of feeding varying levels of an agricultural industrial by- products based diet on performance of feedlot Bunaji bulls. A total of six bulls, aged two years and weighing 118 kg on the average were allotted to three treatments (T1, T2 and T3) and fed the experimental diet at one, two and three percent of body weight daily while forages of elephant grass and water were fed ad libitum. The experimental diet was formulated using palm kernel cake, brewers dried grain, maize offal bone ash and table salt. Results obtained at the end of the study for supplement intake, forage intake, total feed intake, daily water intake and feed conversion ratio for T1,T2 and T3 were: 1.36, 1.48 and 2.62 kg; 17.15, 17.02 and 16.81 kg; 18.51, 18.51 and 19.43 kg; 0.83, 0.90 and 1.06 kg; 10.63, 11.17 and 11.16 kg, and 22.30, 20.11 and 18.33 respectively. There were significant differences (P<0.01) in the daily body weight gain, daily supplement intake, water intake and feed conversion ratio while the daily forage intake and total feed intake showed no significant differences (P>0.01). It was concluded that feeding the supplemental diet at the varying levels enhanced performance of the feedlot Bunaji bulls.*

***Keywords:*** *Bulls, Bunaji, by-products, feedlot, performance*

## I. Introduction

The general low performance of Nigeria's indigenous cattle breeds compared to others has been attributed to many factors including nutrition and management methods. It has been suggested that the nutritional limitation caused by seasonality of forages and low nutritional quality can be ameliorated by supplemental feeding of grazing animals using crop residues and agricultural industrial by-products [1] while the management system which is traditional and characterized by low in put can be improved by feedlot fattening of the animals [2]. The feedlot system of cattle fattening which involves the amassing of cattle in confinement and feeding them quality feeds to enable them put on higher body weight in comparatively shorter time [3] was started in Nigeria in the 1980's and has become widespread in the country being practised by cattle farmers in many variants. According to [2], pressure on land from urbanization and crop farming in Nigeria has made the extensive system of cattle management unattractive. This is additional to the frequent clashes between cattle rearers and crop farmers. In general, the high demand for land and labour by the extensive system of ruminant production has led to intensification, coupled with an increase in the scale of production and the use of land for other farming purposes [4]. The author also noted that in parts of Africa, cattle contribute to overgrazing and the treading and removal of plant cover in hill regions causing soil erosion. Cattle feedlot system is particularly important to reduce the cattle feeding cost without impact on the animal gain [5]. [6] reported that cattle fed corn grain at 2.0 % body weight gained faster than those fed only corn silage without additional grain. The authors also noted that feeding cattle on natural grazing does not provide adequate nutrition to enable fast growing animals to express their genetic potentials for growth. [7] reported average daily gain range of 0.74 to 1.45 kg/day for Bunaji and Friesian/Holstein crossbred yearling steers fed different crop residues and agricultural by-products diets in feedlot.

The improved performance of cattle in feedlot is reasoned to be caused by the animals saving energy which could have been used in grazing and converting it to body weight and the availability of higher quality feeds which provide nutrients as the rumen micro organisms are aided by availability of a convenient environment to work on the scabrous feeds so as to liberate the nutrients encapsulated therein [8].

Nigeria operates an agrarian economy and produces copious quantities of agricultural industrial by-products which are always available and affordable for use in livestock feeding.

The aim of the study was to evaluate the effect of feeding varying levels of an agricultural industrial by- products based diet on performance of feedlot Bunaji bulls.

## II. Methodology

### 2.1Experimental 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 1while the chemical composition of the feed inputs is shown in table 2.

**2.2Experimental 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, ivermectin 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 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.

**2.3 Data collection**

During the experimental period, the bulls were daily offered the supplemental ration from 8:00 am to 10:00 am (two hour) after which they were served the forages. Daily supplement, forage and water intakes quantity intake was determined by subtracting weight of leftover from the weight fed.

On the first day of each of the experimental weeks, live weight was recorded prior to morning feeding and was used by subtracting weight of previous week from it to know the weight change.

**2.4 Study environment**

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 $8^031^1$ 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, mean annual rainfall ranges from 1270 to 1397 mm. Mean temperature ranges from 22.3$^o$C to 33.41$^0$C; the mean relative humidity is 64.58%, [9]. The University of Agriculture is located on a land mass of 7,986.22 hectares [10] out of which less than half is occupied by buildings and crop farm, the rest is natural grassland unto which cattle are grazed.

**2.5 Experimental design/procedure**

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

**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) | 2.88 |

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

| Chemical component | Input | | |
|---|---|---|---|
| | Brewers 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 |

Treatments
The three dietary treatments were:
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

**2.5 Experimental design/procedure**

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

**2.6 Data analysis**

Collected data were analyzed using Analysis of Variance (ANOVA) package of [11]and significant differences in means were separated using Duncan's Multiple Range Test as outlined [12]

## III. Result

There was a significant difference in the mean daily body weight gain of the experimental bulls. The bulls fed the supplement at 3.0 % body weight had the highest mean daily body weight gain which was significantly higher than the other two treatments. This was followed by the bulls fed the supplement at 2.0 % body weight whose ADG was significantly better than that of bulls fed the supplement at 1.0 % body weight. The bulls fed the supplement at 3.0 % body weight recorded the highest supplement intake which was significantly different ($P<0.01$) from those of the the bulls fed the supplement and 1.0 and 2.0 % body weight and whose average daily supplement intake were similar to each other. The highest mean daily forage intake was recorded for the bulls fed the supplement at 1.0 % body weight, followed by those fed the supplement at 2.0 % body weight while the least was by the bulls fed the supplement at 3.0 % body weight, there was no significant difference ($P<0.01$) in the mean daily forage intake. The highest mean daily total feed intake was recorded by the bulls fed the supplement at 3.0 % body weight, this was followed by the bulls fed the supplement at 1.0 % body weight while the bulls fed the supplement at 2.0 % recorded the least mean daily total feed intake; there was no significant difference ($P>0.01$) in the mean daily total feed intake values. There was a significant difference ($P<0.01$) in the mean daily water intake of the experimental bulls with the bulls fed the supplement at 3.0 % body weight recording the highest water intake value which was higher than those of the other two treatments; the bulls fed the supplement at 2.0 % body weight recorded water intake value which was also higher than that of the bulls fed the supplement at 1.0 % body weight, the least. There was no significant difference ($P>0.01$) in the final body weight of the bulls; the bulls fed the supplement at 3.0 % body weight recorded the highest final body weight, followed by those fed the supplement at 2.0 % body weight while the bulls fed the supplement at 1.0 % had the least final body weight. The highest feed conversion ration was recorded for the bulls fed the supplement at 1.0 % body weight followed by that of the bulls fed the supplement at 2.0 % body weight while those fed the supplement at 3.0 % body weight recorded the lowest feed conversion ratio; there was no significant difference ($P>0.01$) in the feed conversion ratio of the different treatments.

## IV. Discussion

The average daily body weight gain (ADG) pattern suggested that there was a response to the supplement intake as the highest body weight gain corresponded to the highest supplement intake. This can be interpreted to mean that the supplement made available to the animals more nutrients which were converted to body weight. This also shows that feed utilization was better by the bulls fed the 3.0 % body weight supplement. This ADG values and significance agree with the works of [13]who reported ADG values of 0.81 to 1.34 Kg/day for foreign breeds of cattle and their crosses in feedlot in Botswana and also that of [14]who reported ADG values of 0.96, 1.00, 1.00 and 0.96 Kg/day for the Bunaji, Rahaji, Gudali and Azawak in feedlot in Nigeria. This result also compares with the ADG of 0.606 and 0.903 Kg/day for indigenous and European type cattle in feedlot under Mediterranean conditions [4]. The ADG values are in agreement with reports of [15] who reported a decrease in daily gain as the concentrate : roughage ration was decreased from 80:20 to 30:70 % and those of [16]and [5]. The significance in ADG contradicts the report of [17]who reported non significance when Western Sudan Baggara bulls were fattened in feedlot.

The average daily supplement intake, particularly by the bulls offered the 3.0 % of it in body weight shows that the greater the quantity offered, the greater the intake. The similarity in supplement intake of T1 and T2 can be explained to be caused by the feeding behaviour of the Bunaji bulls, where some animals have been reported to prefer eating concentrates while others prefer eating forages [14]

The forage intake shows that treatment had no effect on it. Despite the lack of significant difference, the picture showed that supplement and forage intake was balanced for each other i.e. the higher supplement intake resulted in lower forage intake and vice versa [14].

Total feed intake was actually a cumulative of the supplement and forage intakes and showed that the little differences in supplement intake were cancelled out by the higher quantity intake of the forages.

Average daily water intake responded to supplement intake. This may be related to the need for additional water to be used in protein metabolism because in the process of break down of protein, water is used. The low water recorded for these bulls in general could be attributed to season of the year and probably the high moisture content of the tender forages used in feeding the bulls. This is because the study was conducted between the months of June and August which records high rainfall and lower ambient temperature. In general, the water intake values were lower than those reported by [14] and the specification by [17] for growing and finishing cattle.

Increasing supplement intake improved feed conversion ratio. This may have been caused by the availability of nutrients to the rumen micro organisms which then assisted in breaking down the nutrients in the feed and making them available to the animals which then used little quantities to convert to body weight. In general, the FCR values herein are comparable to those of [16], [6] and [18].

**Table 3. Performance of feedlot Bunaji bulls supplemented varying levels of an agro industrial by-products based diet**

| Parameter | T1 | T2 | T3 | LOS |
|---|---|---|---|---|
| Initial body weight (Kg) | 118.0±16.97 | 119.0±1.41 | 119.50±10.61 | NS |
| Mean daily body weight Gain (kg/day) | $0.83^{c}$±0.03 | $0.96^{b}$±0.03 | $1.08^{a}$±0.03 | ** |
| Mean daily supplement Intake (kg/day) | $1.36^{b}$±0.20 | $1.48^{b}$±0.20 | $2.62^{a}$±0.11 | ** |
| Mean daily forage Intake (kg/day) | 17.15±0.50 | 17.02±0.56 | 16.81±0.27 | NS |
| Mean daily total feed Intake (kg/day) | 18.51±0.13 | 18.50±0.57 | 19.43±0.24 | NS |
| Mean daily water Intake (L/day) | $10.63^{c}$±0.10 | $11.17^{b}$±0.18 | $11.64^{a}$±0.23 | ** |
| Final body weight (Kg) | 192.7±9.76 | 205.4±6.93 | 216.7±9.05 | NS |
| Feed conversion ratio | 8.6±0.79 | 8.1±0.68 | 8.0±0.24 | NS |

T1= fed supplement at 1.0 % body weight T2= fed supplement at 2.0 % body weight T3= fed supplement at 3.0 % body weight ** significantly different (P<0.01) LOS= level of significance NS= Not significantly different (P>0.01)

## V. Conclusion

In this study, the possibility of feeding feedlot Bunaji bulls elephant grass ad libitum and varying quantities of an agricultural industrial by-products based diet was well demonstrated. The result of this study will serve as useful information to Nigerian cattle fatteners.

## References


[1]. P.A.Onwualu (2011). Enhancing competitiveness of the Nigerian Livestock sub sector through improved value addition on the industry value chain. Paper presented at 16th Annual Conference of Animal Science Association of Nigeria. 24pgs.

[2]. M.B. Olayiwole (1982). Cattle feedlot operation in Nigeria. In: Beef production in Nigeria. Proceedings of National Conference on Beef production.1982, 310-337

[3]. P.O'Kiely. Intake, growth and feed conversion efficiency of finishing beef cattle offered diets based on triticale, maize or grass silages, or ad libitum concentrate. Irish Journal of Agricultural and Food Research, 2011 50: 189-2011

[4]. Y. Bozkurt. Seasonal performance of different breeds of feedlot beef cattle grown under the Mediterranean conditions. Bulgarian iournal of Agricultural Science 18(3) 2012, 443-445

[5]. P.N. Angelo, O.R. Roberto, H.B. Renata, M.F.B. Sarah, A.N. Ernanai, L.S. Corvino and F.B. Gomes. Animal performance, feeding behaviour and carcass traits of feedlot cattle fed diet with agro-industrial by-products as fat source. Journal of Agricultural Science 2014, 6 (6) ISSN 1916-9752 E-ISSN 1916-970 published by Canadian Centre of Science and Education 54-65

[6]. E.A. Keith, V.F. Colenbrander, T.W. Perry and L.F. Bauman. Performance of feedlot cattle fed brown mid rib three or normal corn silage with various levels of additional corn grain. Journal of Animal Science 1981, 52 (1) 8-13

[7]. M.B. Olayiwole and S.A. Olorunju. Feedlot performance of yearling steers previously maintained on different crop residues/supplementation regimes. FAO corporate corporate document repository. Retrieved at http://www.fao.org/wairdocs/ilri/x5494e/5494e09.htm on 6/25/2015

[8]. J.Moran . Tropical dairy farming: feeding management for smallholder dairy farmers in the humid tropics. Landlinks press. 2005, 312pp.

[9]. T. Ahemen, I.I. Bitto and F.O.I.Anugwa. Sperm production rate, gonadal and extragonadal sperm reserves of West African Dwarf rams in the Southern Guinea Savannah of Nigeria. Nig. J.of Anim. Sci. 13, 2011, 29-35.

[10]. FGN Visitation Report (2011) federal Republic of Nigeria. Views of the Government of the Federal Republic of Nigeria on the Visitation pane report into the affairs of the University of Agriculture, Makurdi, 2004-2010. Printed by the Federal Government Printer, Lagos. Pp42.

[11]. Minitab Statistical Software. Minitab statistical software, Rehearse 15.0. Minitab Inc., State College, P.A. USA 1991

[12]. R.G.D. Steel and J.H. Torrie . Principles and procedures of statistics. New York, McGraw-Hill Book company. 1980, 633pp.
[13]. W.D. Norris, J.Macala, J.Makore and B.Masominyana. feedlot performance of various breed groups of cattle fed low to high levels of roughage. Livestock Research for Rural Development 14(6) 2002 retrieved at http://www.lrrd.org/lrrd14/6/norr146.htm. on 6/23/15
[14]. I.I. Madziga, C.B.I. Alawa, O.S. Lamidi, D.Y. Goska and A.A. Adesote. Feedlot assessment of four indigenous breeds of cattle in Nigerian. International Journal of Life Sciences and Medical research 2013, 3(1):35-38
[15]. N.Slabbert, J.P. Campher, K.J. Leeuw and G.P. Kuhn. The influence of dietary energy concentration and feed intake level on feedlot steers.2. Feed intake, live mass gain, gut fill, carcass gain and visual and physical carcass measurements. South African Journal of Animal Science, 2009 22:107
[16]. S.R. Garcia. Comparison of feedlot performance, carcass merit and chemical composition of crossbred cattle. Ph.D. dissertation, University of Arizona 2013
[17]. NRC (1996). Nutrient Requirements of Beef cattle. National academy of Science, USA
[18]. A.B. Izeldin, S. Mukhtar and A.K. Omer. Feedlot performance of Sudan Baggara bulls fed bagasse based diets. Australian Journal of Basic and Applied Science, 2009 3 (1): 295-300