PERFORMANCE AND QUALITY ATTRIBUTES OF MUTTON OF FATTENED INDIGENOUS SHEEP BREEDS IN NIGERIA

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ABSTRACT
Twenty four male lambs: six each of Uda rams-UDA, West African Dwarf -WAD, Balami BAL and Yankassa rams-YAK with average weight of 23.94kg were fattened for a period of 90 days in the Livestock Section of the Farming System Research Programme of the National Cereals Research Institute. Prior to the trial, the rams were giving prophylactic treatment with coccidiostat and anti-helmintics and were fed iso-calorie diets ad libidum in a confinement. The animals also had access to clean water and salt lick on free choice basis. Final Body Weight-FBW and Feed Conversion Ratio-FCR were measured using standard procedures. Three animals per breed were thereafter sacrificed to compare the relative percentage proportions of Bled Weight, Empty body Weight-EBW, Hot Carcass Weight-HCW and Dressing percentages-DP. Also evaluated were Lean-Meat yield (LMY), Meat to Bone Ratio-MBR and Total Fat Deposit-TFD in a Completely Randomised Design (CRD).The FBW (kg) of 40.08 and 38.78 for UDA and WAD were similar but significantly lower than 48.77 and 44.14 for BAL and YAk rams respectively. Also, FCR of 11.14 (UDA), 9.87 (WAD) and 11.64(YAK) were significantly higher than 8.89 (BAL). Even though all the rams elicited different Dressing percentages, no significant differences were observed across the treatments groups. However TFD of 12.63 in BAL rams was significantly higher than 10.87, 10.02 and 10.11 in UDA, YAK and WAD rams respectively. The study therefore concluded that BAL rams had faster growth, yielded more mutton and had highest TDF, suggesting that Balami rams will thrive well among the sheep breeds if fattened with 2.2Mcal/KgDM within a period of three months.
***Keywords**: Fattening, sheep breeds, dressing percentage, mutton, mutton yield*

INTRODUCTION

Meat alongside milk, egg and fish are the chief sources of animal protein but of all the four, meat is the most preferred and beef is the most accepted, Aduku *et al.* (1990). Cow meat is highly nutritious contributing most quality protein, essential minerals and trace elements with wide range of vitamins, Buckley *et al.* (1995). The high demand for protein especially meat due to the ever growing population coupled with astronomical increase in cost of livestock feeds has made its affordability expensive. This therefore calls for research findings to arrest this trend and thereby make meat less expensive. There is the need to look for alternatives that could yield more meat to meet the demand of the ever increasing population. However sheep production offers a good opportunity, (Abdel-Baset, 2009). They are said to have been contributing significantly to world economy, (FAO, 1990). There are also reports that heavier carcasses were found in rams over that of bucks especially when small ruminants were intensively managed, Monson, *et al*. (2004). They are particularly important tool in the socio development of rural economy as report has it more than 5 million families engaged in various activities in the small ruminant animal sector of livestock industry (FAO, 1990). One of the fundamental principles in increasing the meat yield of ruminant animals is fattening. The process involves feeding relatively young animals with the aim of increasing the yield of edible carcass by 30-40%. Therefore in finding solution to the less availability of meat, indigenous sheep breeds were fattened to compare their relative meat yield. Four indigenous breeds of sheep are known in Nigeria. They include West African Dwarf (WAD) sheep, Uda, Yankassa and Balami. They thrive on poor quality diets such as grass, crop residues and left over (Anurudu, 2011), and yielding good quality meat and serving as sources of cash income, (Berhanu and Aynalem, 2009). Sheep thereby becomes a possible option as it could also produce more and quality meat. However information on the relative quality evaluation of mutton across the sheep breeds in Nigeria has not been adequately documented. Therefore, the yield of mutton and its quality attributes relative to sheep breeds were evaluated.

MATERIALS AND METHODS

Location of the Experiment

The study was carried out at the Sheep and Goats Unit, Livestock Section of the Farming System Research Programme of the National Cereals Research Institute, Badeggi, Bida. Niger State, Nigeria. The rams were managed for a 90-day fattening period. They were later moved to the abattoir section for slaughter, carcass dressing and packaging. The mutton analysis was done in the Institute Laboratory. The area is located on Latitudes 9 08^0N and 6 009^0E and is characterized by humid climate, warm and partly cloudy dry season.

Animal Management

Twenty four lambs consisting of 6 each of West African dwarf rams, Uda, Yankassa and Balami averagely weighing between 23.01 kg with average age of 14-16 months were used for the study. They were purchased from Wuya market, Bida Local Government Area of Niger State. Familiar stocks were put in a pen without compromising the breed differences and influence on the other. Prior to the trial, the rams were dewormed, sprayed against ticks and other ectoparasites and vaccinated against some diseases. The animals were fed iso caloric diet of 2.20Mcal/Kg and were given improved hays once daily all in a completely randomized design (CRD). The animals were fed 5% of their respective body weights. Concentrates were fed twice with roughages in between in a ratio 60:40. Each ram was neck tagged and managed in separately equipped pens with feeding assets throughout the ninety days feeding trial. Salt lick and clean water were provided on free choice basis.

Table 1: Ingredient Composition of Concentrate Feed on % Dry Matter basis

Ingredients	Percentage (%) g /kg
Dusa*	30.88
Brewer's dried grain	29.80
Peeled cassava meal	5.69
Wheat offal	19.56
Palm Kernel Cake	10.00
Dicalcium phosphate	3.00
Common Salt	0.50
Premix mixture	0.50
Total	**100:00**
Calculated value	
Crude Protein	14.00
Crude Fiber	13.71
Ether Extract	5.30
Digestible Energy	2200

*By-product of local (gin factory) grain processing

Table 2: Chemical Composition of the Concentrate Feed and Hay

Components (g/100g)	Concentrate	Hay
Dry Matter	88.05	91.40
Crude Protein	11.95	9.15
Ether Extract	4.50	0.90
Crude Fiber	11.75	18.65
Ash	4.80	4.00
Neutral Detergent Fiber	53.50	68.70
Acid Detergent Fiber	35.20	49.01
Acid Detergent Lignin	9.89	15.20
Hemicellulose	18.30	19.69
Cellulose	25.31	53.50
Nitrogen free extract	56.95	58.70
Digestible Energy (kcal/kgDM)	3410.30	3960.10

Slaughtering Procedure

At the end of the trial, three rams from each breed were sacrificed after a 16-hour fasting period according to the animal welfare rules. Slaughtering was by severing the carotid arteries, veins, trachea, oesophagus at the base of the neck towards the spinal cord. The bled weight, hot carcass weight and weight of the other non-carcass components were collected and determined. The carcasses were thereafter spilt along the mid line and the right half carcasses were dissected into primal cuts, (the wholesale). Each of which was effectively trimmed to separate the lean meat, bone and fat. They were weighed and multiplied by two to obtain the relative proportions.

Chemical compositions

The Chemical compositions of the feed dry matter were evaluated and Nitrogen was determined using Micro Kjeldahl procedure according to AOAC (1990), the NDF, ADF and ADL of the feeds were analysed according to Van Soest *et al.,* (1994)

Statistical analysis

The data were collected and the analysis of variance using SAS (2002) package was employed to separate the means.

RESULTS AND DISCUSSION

The results of the performance of the rams across the breed showed in table 3 indicated that the relative differences ($P<0.05$) in the final body weights with the highest being Balami ram. Similarly, it exhibited higher average weight gain with 275.01 which was significantly higher than 180.00, 166.67 and 223.44 for UDA, WAD and YAK rams respectively. This variation could probably be an indication that certain breeds grow faster than the other (Anurudu, 2011). The overall performances fell within the recommendation of 200/day for tropical sheep breeds, as reported by Kawas *et al.,* (2007) and as suggested by Butterfeld, (1988). The findings from this study were however higher than that reported by Dhanda *et al.,* (1999) who gave lower values of 127g, 148g and 167g per day for offspring of Boer x Angora, Boer with Feral, and that of Saanen X Boer respectively of trial conducted at University of Queensland, Australia. The Feed Conversion Ratio, an economic trait was found to be less in all the ram breeds which is an indication that all the breeds efficiently utilized the feeds though Balami ram proved to be more efficient with 8.87 as compared with 11.13, 9.87 and 11.64 for UDA, YAK and WAD, respectively.

Evaluation of Carcass Characteristics

Presented in table 4 were carcass characteristics as observed from the study which indicated that the ram breeds had no significant differences ($P>0.05$) in relative percentage proportions of bled weights, HCW, CCW and Dressing Percentages (DP) across the treatment groups in spite of varying numerical values. However findings showed that DP ranged from 43.08% to 45.11%. This result were within the range of 46 -56% reported by Zimerman *et al*., 2008 for Creole kids but were lower than 50.01% reported by Ayanniyi, 2018 for intensively managed WAD bucks at the Teaching and Research Farm of University of Ibadan, Ibadan. Furthermore, the observed values of slaughter weights which ranged from 36.48% to 45.68% were close to 42.08% for Charollais ram managed in warm climate as reported by Momami Shaker *et al,* (1997). These findings were comparable with the submissions of Anjaneyulu *et al*., (2007); El Hag and El Shargi, (1996); Dhanda *et al*., (2003) and Mahgoud *et al*., (2004) who at one time or the other reported that growth rate, feed intake and the average weight gain were breed inherent.

Table 3. Performance characteristics of the indigenous ram breeds in Nigeria

	BREEDS					
Parameters (kg)	**UDA**	**YAK**	**WAD**	**BAL**	**SEM**	**P-value**
Initial body weight	23.98	24.01	23.77	24.00	0.0997	0.7822
Final body weight	40.08^{c}	44.11^{a}	38.78	48.77^{b}	0.0148	0.0075
Average feed intake	2004.10^{c}	2205.00^{a}	1939.01^{c}	2439.01^{b}	0.1245	0.0007
Average daily weight gain	180.00^{b}	223.44^{a}	166.67	275.01^{b}	0.0647	0.0225
Feed conversion ratio	11.13^{b}	9.87^{c}	11.64	8.89^{a}	0.1707	0.0001

^{a,b,c}: means within the same row with different superscripts row differ significantly ($p<0.05$).

WAD: West African Dwarf Ram YAK: Yankassa rams BAL: Balami rams

Table 4. Percentages proportions of slaughter characteristics to final body weight of breeds

	BREEDS					
Parameters	**UDA**	**YAK**	**WAD**	**BAL**	**SEM**	**P-value**
Bled weight (%)	94.23	94.09	94.07	94.08	0.0997	0.7822
Empty body weight (%)	59.16[c]	59.15[a]	59.20 [a]	55.65[b]	0.0148	0.0075
Hot carcass weight (%)	45.10	45.09	45.07	45.09	0.1238	0.0009
Cold carcass weight (%)	42.50	43.07	42.57	43.06	1.1201	0.7885
Chilling Loss (%)	2.60[a]	1.97[c]	2.15[b]	2.20[b]	0.1400	0.0004
Dressing percentage (%)	45.11	43.49	45.08	45.09	1.220	0.8435

[a,b,c]: means within the same row with different superscripts row differ significantly ($p<0.05$).

Distribution of tissues in carcass of rams breeds

The percentage lean and fat have positive correlation with weight in increase; the percentage bone on the other hand had an inverse relationship. This is because as they reached maturity, the ratio of bane to carcass decreases while that of muscle to bone kept on increasing, so also is the TFD. This phenomenon was in line with reports of Rao *et al*., (2005) and Ayanniyi, (2018). Furthermore the percentage increase in lean results in the decrease in bone and as observed across the different breeds evaluated as seen in report of Aziz *et al*., (1993), which were similar to findings from the present study. (62.99 % vs 35.08 %), (64.97 % as against 24.68 %) and (69.45 % compared with 19.92 %), 63.70 as opposed to 23.70% and 73.41 vs 13.04 for UDA, YAK, WAD and BAL ram respectively. On the other hand, the ratio of lean meat to fat decrease as the weight of the bucks increased as observed in table 5. Incidentally, most values observed in this work were lower than the values of 75.57% of lean meat to less than 14.44% for bone in Akinleye *et al*., (2016), this should be not be unexpected because of the increase in dietary energy level of 2.8Mcal/Kg DM offered in their study as against 2.2 Mcal/Kg DM in this work. The relatively close value of meat to bone ratio in this present work indicated a uniformly similar trend at which body tissues were developing in the animals under investigation. These simultaneous accumulations of muscle and fat and deposition of bones were in line with reports of Attah, (1997), Okubanjo *et al*., (1997) and Ayanniyi *et al.,* (2021) who reportedly affirmed proportional deposition of body tissues to the increase in weights of the animals at slaughter.

Table 5. Distribution of tissues of the ram carcasses across the ram breeds

	BREEDS					
Parameters	**UDA**	**YAK**	**WAD**	**BAL**	**SEM**	**P-value**
Lean	62.99[c]	69.45[b]	63.70[c]	73.41[a]	0.0997	0.7822
Bone	24.68[a]	19.92[b]	23.85[a]	13.04[c]	0.0148	0.0075
Fat	10.87[c]	10.02[b]	10.91[c]	12.70[a]	0.0110	0.0023
Lean : fat	5.80	6.92	5.84	5.78	0.1238	0.0009
Lean : bone	2.55	3.49[b]	2.67[c]	5.63	0.0647	0.0225
Loss (%)	1.36[b]	0.60[b]	1.52[b]	0.89[a]	0.1705	0.0001

[a,b,c]: means within the same row with different superscripts row differ significantly ($p<0.05$).

CONCLUSION

The results from the study concluded that Balami ram have better feed conversion ratio, faster growth and yielded more mutton than the other three breeds when fattened, even in a relatively warm climate.

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