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BODY CONFORMATION AND PERFORMANCE RESPONSES OF RAMS TO DIFFERENT LEVELS OF CONCENTRATE

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ABSTRACT
The experimental objective was to evaluate the effects of varying levels of concentrate supplementation and breed on liveweight and body conformation traits. A 2 x 3 factorial experimental design was utilised in which ten adult rams aged between 24 and 36 months each of Balami, Uda and Yankasa sheep and averagely weighing 34.20, 35.35 and 31.80 kg, respectively were balanced by breed and randomly allocated into 6 treatments (5 rams per treatment). Fortnight measurements of chest girth, withers height, body length, body condition score and liveweight were taken. Data were analysed in SAS (2002). Rams fed concentrate at 2% of body weight recorded the highest mean liveweight of 41.9 ± 0.7 kg. Highly significant breed interactions with concentrate levels ($P<0.05$) resulted in the heaviest (46.3 kg) and lightest (35.5 kg) average liveweights in Balami and Yankasa rams, respectively supplemented at the 2% of body weight. Body conformation and liveweight responses to concentrate supplementation significantly varied between breeds. This finding will aid sheep farmers in making informed choices about appropriate breed selection in their enterprises when supplementing with different levels of concentrates for growth improvement as a strategic pathway for the early attainment of market weights in rams. It was concluded that supplementation of concentrate at 2% of body weight resulted in increased body conformations over and above that observed in 1% of body weight. Similarly, breed influence showed that Balami rams performed better than Uda and Yankasa rams.
Key words: Concentrate, body conformation, breed, rams

INTRODUCTION

Thegrowing demandfor sheep meat, registered over the last years, propelled the increase in the lamb production for slaughter, creating a necessity of improvement in theexploration techniques (Oliveira*et al*.,2009). Productivity can be monitored using animal liveweights, body conformation and growth rates. Similarly, understanding feed intake and its conversion to meat provides information on the productivity of animals.
Feeding is one of the most important parts in animal production, and, associated with the confinement system, it is possible to maintain the same nutritional level during all the fattening period, differentfrompastures, which may present nutritional difference because of oscillations in its quality. So, the advantages of this system includefastand efficient growth, when compared to animals raised in pastures for the same period of time (Barros *et al*., 2009).Therefore, in this work, the aim was to evaluate the effect of increasing levels of concentrate digestibility, on performance and ingestive behavior in lambs.

Materials and Methods
The study was conducted at the Experimental Unit of the Small Ruminant Research Programme of the National Animal Production Research Institute, Shika – Zaria.Ten adult rams aged between 24 and 36 months each of Balami, Uda and Yankasa sheep and averagely weighing 34.20, 35.35 and 31.80 kg, respectively were used for the experiment. There were six treatments in a 2×3 factorial arrangement {con (i=1, 2), b_j = fixed effect of the jth breed (j=1, 2, 3)}, in a completely randomized design (CRD) with five

replications. The concentrate was a mixture andthe percentage of ingredients and chemicalcomposition of the dietsare shown in Tables1 and 2. Fortnightly, each lamb was individually assessed for chest girth (CG), withers height (WH), body length (BL), body condition score (BCS) and liveweight (BWT) measurements. CG was the body circumference measured at just behind the forelegs (Afolayan *et al.*, 2006). WH was the distance between the highest peak over the scapulae and the ground (Sowande and, Sobola, 2008). BL refers to the span

between the base of the neck, the vertebrae between the scapulae, to the far point of the pubic bone (Sowande and, Sobola, 2008). BCS was subjectively measured, always by the same researcher, judging fat depth on a 0–5-point scale as described by McLeod *et al*. (2010). Body conformation measurements in centimetres were taken using the same measuring tape.

Statistical analysis

All data were analysed using 'Statistical Analysis System' software (SAS Institute., 2002). Factorial ANOVA (PROC GLM) (SAS Institute., 2002) procedures were used to fit the fixed effects of Spirulina level, sire breed, sex and their second-order interactions on BWT, ADG, CG, WH, BL, BCS. Separation of mean differences using Duncan's multiple range tests was conducted at $P<0.05$ level of significance.

Results

Levels of supplementation caused significant differences in lambs' growth as detected between 1% and 2% of body weight (Table 2). Lambs supplemented with concentrate at 2% of body weight had greater BCS (3.4 ± 0.1) than their counterparts supplemented with concentrate at 1% of body weight ($P<0.05$). It was also evident that lambs receiving concentrate at 2% body weight recorded the heaviest BWT ($P<0.05$ All body measurements were influenced by breed ($P<0.05$; Table 3). Balami rams had the largest CG (99.0 ± 0.7 cm) while Yankasa rams had the smallest average WH (61.6 ± 0.4 cm). Balami and Uda rams had longer BL (67.0 ± 0.3 cm and 66.9 ± 0.3) than Yankasa rams Ram BCS and BWT followed similar trends among breeds in which Balami rams had the highest BCS (3.7 ± 0.1) and BWT (46.3 ± 0.6 kg).

Discussion

The results in this study demonstrated that supplementation of concentrate at 2% of body weight improved liveweight and body conformation measurements in rams. Moreover, supplementation levels interacted significantly with breed. To optimize growth and liveweight, lambs must have access to high quality feeds, particularly protein-rich feed supplements (Liu *et a*l., 2003; Mitchell, 2007; Karlsson and, Martinsson, 2011). The results demonstrate that the increase in liveweight and body condition score was only observed when the level of concentrate supplementation was at 2%. A possible explanation for this observation is that excessively high dietary protein intake is known to suppress optimal sheep growth.

Also, feed use efficiency is enhanced by breed as previously demonstrated (Mitchell, 2007). For instance, Lewis (2006) found that lambs whose parents were selected for high growth estimated breeding values grew larger than lambs whose lineage was selected for low growth, despite identical basal nutritional levels.

Conclusion

In conclusion, it has been demonstrated herein, that supplementation of concentrate at 2% of body weight resulted in increased body conformations over and above that observed in 1% of body weight. Similarly, breed influence showed that Balami rams performed better than Uda and Yankasa rams. This outcome strongly recommends the establishment of supplementation of concentrate at 2% of body weight in ram fattening.

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Table 1: Chemical composition (%) and cost of *B. decumbens, D. smutsii*hay, Maize, maize offal, cottonseed cake

	Ingredients				
Nutrients (%)	*B. Decumbens*	*D. Smutsii*	Maize	Maize offal	Cotton seedcake
Dry Matter	91.21	94.63	91.18	91.95	91.83
Organic Matter	81.26	83.90	86.76	81.87	89.01
Crude Protein	4.56	5.76	8.31	11.69	28.58
Ether Extract	3.85	4.05	8.03	11.03	11.05
Crude Fibre	64.08	68.89	45.21	53.92	50.21
Neutral Detergent Fibre	44.09	42.21	48.01	45.21	47.23
Acid Detergent Fibre	45.35	43.12	43.27	34.99	42.35
Ash	8.76	8.92	11.02	10.05	4.98
ME (MJ/kg DM)	10.81	11.03	10.69	10.88	11.51
Cost (₦ per kg)	33.79	33.79	75.00	28.00	35.56

The ME values of the experimental feed ingredients were calculated as per Alderman Alderman and Contril (1985) as follows: ME= (MJ/kg DM) 11.78+0.00654CP+ (0.000665EE) ^{2} – CF (0.00414EE) -0.0118A Where DM=Dry Matter, CP = Crude Protein, EE = Ether extract, CF = Crude Fibre, A= Ash, Naira =100 Kobo (₦)

Table 2: Ingredient, chemical composition and cost per kg of concentrate diet

Ingredients	(%)	Cost (₦per kg)
Maize	37.87	26.13
Maize offal	18.94	13.07
Cottonseed cake	39.19	27.04
Bone meal	2,50	1.72
Table Salt	1.50	1.03
Total	**100**	**68.99**
Chemical composition		
Dry matter	92.78	
Organic matter	81.23	
Crude protein	13.63	
Ether Extract	17.15	
Crude fibre	27.40	
Acid detergent fibre	45.95	
Neutral detergent fibre	56.27	
Ash	11.55	
ME (MJ/kg DM)	10.52	

The ME values of the experimental feed ingredients were calculated as per Alderman and Contril (1985) as follows: ME= (MJ/kg DM) 11.78+0.00654CP+ (0.000665EE) ^{2} – CF (0.00414EE) -0.0118A Where DM=Dry Matter, CP = Crude Protein, EE = Ether extract, CF = Crude Fibre, A= Ash

Table 3: Liveweight, body conformation, condition score and average daily gains of rams under feedlot production system

	Body conformation traits					
	CG (cm)	WH (cm)	BL (cm)	BCS (1-5)	BWT (kg)	ADG (kg/day)
Concentrate level						
1%	95.6	62.7	65.7	3.2	40-.6	0.12
2%	96.1	63.1	66.8	3.4	41.9	0.2
P. values	0.376	0.669	0.015	<0.001	0.018	0.759
Breed						
Balami	99.0 ± 0.7[a]	63.6 ± 0.4	66.9 ± 0.3	3.7 ± 0.1	46.3 ± 0.6	0.2 ± 0.0
Uda	95.0 ± 0.9[a]	62.8 ± 0.4	67.0 ± 0.4	3.1 ± 0.0	42.9 ± 0.5	0.2 ± 0.0
Yankasa	94.4 ± 0.7	61.6 ± 0.4	62.6 ± 0.5	3.3 ± 0.1	33.5 ± 0.4	0.1 ± 0.0
P. values	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

Column means within a fixed effect bearing different superscripts differ (P<0.05). Chest girth (CG), withers height (WH), body length (BL), body condition score (BCS), body weight BWT), and average daily weight gain (ADG)