IJAS Iranian Journal of Applied Animal Science

The Effect of Dried Poultry Droppings Levels Supplementation on Body Linear Measurements of Growing Rams Fed with Sorghum Stover

Research Article

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Received on: 11 Apr 2015
Revised on: 10 Jun 2015
Accepted on: 15 Jun 2015
Online Published on: Mar 2016

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Online version is available on: www.ijas.ir

ABSTRACT

Effect of dietary treatment levels on body linear measurements of growing Yankasa rams (*Ovis aries*) fed sorghum (*Sorghum bicolor*) Moench stover supplemented with graded levels of dried poultry dropping based diets was assessed using thirty growing Yankasa rams (*Ovis aries*) consisting of five treatments (T_1-T_5). Each treatment consisted of three replicates with two animals per replicate. T_1: were rams fed with 0% dried poultry droppings based diet (DPDBD), T_2: with 20 % DPDBD, T_3: with 40 % DPDBD, T_4: with 60 % DPDBD and T_5: with 80% DPDBD. Significant ($P<0.05$) differences were observed amongst the treatments for body length, height at wither, chest girth, fore leg length, ear length, neck length and face length. Hind leg length, horn length, poll distance, neck circumference, tail length and horn base circumference varied non-significantly. The highest correlation coefficient was observed between horn base circumference and poll distance ($r=0.990$) followed by neck circumference and height at wither ($r=0.980$). Therefore it was concluded that horn base circumference, poll distance, neck circumference and height at wither were highly influenced by the dietary treatment levels in the present study.

KEY WORDS body measurements, dried poultry droppings, rams, sorghum stover.

INTRODUCTION

Body size is a measure of growth in farm animals and is normally related to their productivity. Bigger sized animals generally yield more meat than smaller animals (Abegaz and Awgichew, 2009). Body size is a function of weight as well as measurement of variables associated with the body size such as the body linear measurements. Linear body measurements have been employed to evaluate growth performance and to characterize breeds of animals (Ozoje and Hubert, 1997; Ogungbayi *et al.* 2003). Linear body measurements give better information on performance (Riva *et al.* 2004; Janssens *et al.* 2004; Afolayan *et al.* 2006), productivity (Cam *et al.* 2010) and carcass characteristics of animals (Ige *et al.* 2006). Linear body measurements aids animal breeder to comprehend the interrelationship between body parameters and this in turns helps in predicting the genetic changes accruing from selecting one of the variables on another (Udeh *et al.* 2011). Measurements of various body conformations are also useful for assessing quantifiable distinctive meat attributes. Moreover, they are beneficial for establishing appropriate choosing yardsticks (Tesfaye, 2008). There is not much work available on body linear measurements as influenced by level of dietary treatment. The present study was aimed at assessing the effect of sorghum stover based diet, supplemented with graded levels of dried poultry droppings on the body linear measurements of growing Yankasa rams.

MATERIALS AND METHODS

Experimental area

The experiment was carried out at the Research Farm of Animal Production Department, Federal University Technology, Minna of Nigeria which is located at latitude 9˚ 45' N and 6˚ 33' E.

Experimental design

Thirty growing Yankasa rams of 12 months of age weighing 13.5 kg (average) were allocated into five treatment groups (T_1, T_2, T_3, T_4 and T_5), consisting of three replicates of which each replicate has two animals in a complete randomised design. The experimental animals were kept in individual pens.

Mandatory and routine prophylactic treatments were taken up for all the animals. Chopped sorghum stover was provided *ad libitum* for all the treatment groups. Dried poultry droppings based diet (DPDBD) was provided 0% DPDBD to T_1, 20% DPDBD to T_2, 40% DPDBD to T_3, 60 % DPDBD to T_4 and 80% DPDBD to T_5. Water and salt lick were supplied *ad libitum* throughout the experiment. The experiment was continued up to the 16th week following its initiation. Weekly data were collected for the duration of the study which lasted for a period of 16 weeks.

Data collection

Horn base circumference, tail length, face length, neck circumference, neck length, poll distance, ear length, hind leg length, fore leg length, chest girth, height at wither, body length and horn length were the parameters measured in this study. Body linear measurements were accomplished with the use of calibrated measuring tape. Body weight gain (in kg) at weekly interval was also recorded for all the treatment groups.

Statistical analysis

Data obtained in this study was analysed using one way ANOVA procedure. Correlation analysis was done to compare the relationship among the parameters measured. Significance was based on 5% probability level. Statistical analysis system (SAS, 2008) was employed for the analysis.

RESULTS AND DISCUSSION

Chemical composition and energy values of experimental feed and supplemental diets

The results of the chemical composition and energy values of experimental feeds are shown in Table 1. The dry matter value was lowest (84.20%) in maize bran and highest (94.10%) in sorghum stover.

The crude protein in dried poultry dropping (21.88%) was found to be higher than those in maize bran (7.00%) and sorghum stover (3.50%). Crude fibre value in sorghum stover (31.20%) was higher than the values observed in dried poultry dropping (20.67%) and maize bran (3.20%). Ash value of dried poultry dropping (33.00%) was higher than in sorghum stover (3.90%) and maize bran (5.50%). Ether extract values (5.00%) of maize bran were higher than the value observed in dried poultry dropping (3.30%) and sorghum stover (1.11%). Nitrogen free extract value of maize bran (63.50%) was higher than those of sorghum stover (54.39%) and dried poultry dropping (14.15%). The calculated gross energy value of maize bran (3.90 kcal/g) was higher than the energy value calculated for sorghum stover (2.02 kcal/g) and for dried poultry dropping (2.65 kcal/g).

The results of the proximate constituents and energy values of supplemental diets are presented in Table 2. The dry matter values of the supplementary diets varies between (84.20%) in T_1 to (92.80%) in T_5. The crude protein in the supplementary diet varies from (7.00%) in T_1 to (15.40%) in T_5. The crude fibre levels varied from (3.20%) in T_1 to (12.50%) in T_4. The ether extract was highest in T_2 (20.00%) and lowest in T_1 (5.00%). Ether extract was highest in T_2 (20.00%) and lowest in T_1 (5.00%). Nitrogen free extract values varied between 26.9% in T_5 to (63.50%) in T_1. The calculated gross energy values varied from (2.27 kcal/g) in T_1 to(4.23 kcal/g) in T_5.

Body weight gain

Body weight was recorded as 1.3 kg, 1.5 kg, 2.1 kg, 2.5 kg and 2.9 kg, for T_1, T_2, T_3, T_4 and T5 respectively. Significant differences existed amongst control group (T_1) and supplemented treatment groups (T_2-T_5). Similarly, significant differences were observed within the supplemented treatment groups. Highest mean weight gain was recorded for (T_2). This implies that treatment groups fed DPDBD had better weight gain. The present observation is in agreement with the earlier work of Saleh *et al*. (2002); Abdul *et al.* (2008) and Anigbogu and Nwagbara (2013).

Effect of levels of dried poultry dropping based diet on the linear body measurements of growing Yankasa rams Nitrogen

Treatment groups supplemented with graded levels of dried poultry dropping based diet (DPBD) performed better (T_2-T_5) than control group not supplemented with DPBD (T_1). Significant ($P<0.05$) differences were observed amongst the treatments for body length, height at wither, chest girth, fore leg length, ear length, neck length and face length.

Table 1 Composition of experimental feeds

Parameters	Sorghum stover	Maize bran	Dried poultry droppings
Dry matter (%)	94.10	84.20	93.00
Crude protein (%)	3.50	7.00	21.88
Crude fibre (%)	31.20	3.20	20.67
Ash (%)	3.90	5.50	33.00
Ether extract (%)	1.11	5.00	3.30
Nitrogen free extract (%)	54.39	63.50	14.15
Gross energy (kcal/g)	2.02	3.90	2.65

Table 2 Composition (% DM Basis) of supplementary diets fed to Yankasa rams

Composition	T_1	T_2	T_3	T_4	T_5
Dry matter	84.20	88.60	92.20	85.80	92.80
Crude protein	7.00	13.13	13.60	14.00	15.40
Crude fibre	3.20	6.70	9.30	12.50	8.00
Ash	5.50	12.00	12.50	16.50	25.00
Ether extract	5.00	20.00	12.50	12.50	17.50
Nitrogen free extract	63.50	36.77	44.30	30.30	26.9
Energy (kcal/g)	2.27	2.53	2.81	3.90	4.23

T_1: 0% dried poultry dropping-100% maize bran; T_2: 20% dried poultry droppings-80% maize bran; T_3: 40% dried poultry droppings-60% maize bran; T_4: 60% dried poultry droppings-40% maize bran and T_5: 80% dried poultry droppings-20% maize bran.
DM: dry matter.

Hind leg length, horn length, poll distance, neck circumference, tail length and horn base circumference varied non significantly (Table 3).

Several earlier workers reported an increase in body weight gain (Saleh *et al.* 2002; Gabr *et al.* 2003; Abdul *et al.* 2008; Mubi *et al.* 2008; Aye and Adegun, 2010; Jokthan *et al.* 2013; Anigbogu and Nwagbara, 2013; Ibrahim *et al.* 2014) and body measurements in rams fed with poultry droppings or concentrate (Aye and Adegun, 2010; Hassan, 2011; Adegun *et al.* 2011; Eghahi *et al.* 2011; Geleta *et al.* 2013; Adewumi and Ahmed, 2013; Ibrahim *et al.* 2014; Babale *et al.* 2015).

Correlation matrix of body linear measurements as influenced by treatment groups

In treatment 1, there was a significant positive relationship between neck circumference and height at wither (r=0.980); poll distance and horn length (r=0.962); horn base circumference and body length (r=0.948) (Table 4). Significant positive association was observed in treatment 2 between horn base circumference and horn length (r=0.976); neck length and body length (r=0.959); fore leg length and chest girth (r=0.947).

Fore leg length and body length (r=0.935); neck circumference and neck length (r=0.911); horn base circumference and ear length (r=0.903) and chest girth and body length (r=0.900) (Table 5). Substantial positive relationship was observed between hind leg length and height at wither (r=0.979); ear length and fore leg length (r=0.889); horn base circumference and face length (r=0.882) and significant negative association was observed between horn base circumference and tail length (r=-0.889) in treatment 3 (Table 6).

In treatment 4, significant relationship occurred between horn base circumference and poll distance (r=0.990); chest girth and body length (r=0.964); horn base circumference and horn length (r=0.961); poll distance and horn length (r=0.938) and face length and fore leg length (r=0.936) (Table 5). However, significant negative association was found between poll distance and fore leg length (r=-0.939); horn base circumference and face length (r=-0.916) and horn base circumference and fore leg length (r=-0.909) (Table 7).

Significant association between poll distance and horn length (r=0.972); tail length and chest girth (r=0.964) and between neck length and body length (r=0.962) was observed in treatment 5 (Table 8). However significant negative association between neck circumference and horn length (r=-0.730); neck circumference and poll distance (r=-0.663) and between face length and horn length (r=-0.601) was observed in this treatment (Table 8).

The correlation of the body measurement parameters within the treatment groups was significant in all the treatment groups. This implies that dietary treatment has influence on all the treatment groups. The correlation coefficient values observed for the treatment groups was higher between horn base circumference and poll distance (r=0.990); hind leg length and height at wither (r=0.979); horn base circumference and horn length (r=0.976) and poll distance and horn length (r=0.972). The higher correlation coefficient values in non-supplemented group was observed only for neck circumference and height at wither (r=0.980); poll distance and horn length (r=0.962) and horn base circumference and body length (r=0.948) respectively. This study reveals that horn base circumference and poll distance (r=0.990) were strongly influenced by the dietary treatment.

Table 3 Effect of levels of dried poultry droppings based diet on linear body measurement of growing Yankasa rams

Parameters	T_1	T_2	T_3	T_4	T_5	P-value
Body weight (kg)	1.3	2.9	1.5	2.1	2.5	*
Body length (cm)	46.6	49.7	50.0	49.8	52.3	*
Height at wither (cm)	53.2	51.8	51.8	51.7	55.4	*
Chest girth (cm)	61.6	66.3	67.5	67.5	72.3	*
Fore leg length (cm)	36.5	37.6	39.1	38.6	39.7	*
Hind leg length (cm)	43.9	44.5	44.8	44.7	45.8	NS
Ear length (cm)	10.5	11.0	11.6	11.9	12.0	*
Horn length (cm)	7.1	8.9	8.9	8.0	10.2	NS
Poll distance (cm)	17.0	23.7	20.8	19.5	23.5	NS
Neck length (cm)	10.8	12.1	12.6	12.8	13.2	*
Neck circumference (cm)	23.3	24.2	24.8	27.2	29.4	NS
Face length (cm)	15.6	16.0	16.4	16.5	17.1	*
Tail length (cm)	28.7	29.9	30.6	29.8	32.9	NS
Horn base circumference (cm)	7.3	7.9	7.6	7.3	8.7	NS

T_1: 0% dried poultry dropping-100% maize bran; T_2: 20% dried poultry droppings-80% maize bran; T_3: 40% dried poultry droppings-60% maize bran; T_4: 60% dried poultry droppings-40% maize bran and T_5: 80% dried poultry droppings-20% maize bran.
NS: non significant.
* ($P<0.05$).

Table 4 Correlation matrix of body measurements as influenced by treatment 1

	BL	HAW	CG	FLL	HLL	EL	HL	PD	NL	NC	FL	TL	HBC
BL	-	-	-	-	-	-	-	-	-	-	-	-	-
HAW	0.791**	-	-	-	-	-	-	-	-	-	-	-	-
CG	0.817**	0.855**	-	-	-	-	-	-	-	-	-	-	-
FLL	0.720**	0.306	0.636*	-	-	-	-	-	-	-	-	-	-
HLL	0.266	0.685*	0.698*	-0.064	-	-	-	-	-	-	-	-	-
EL	0.101	0.197	0.046	0.213	-0.211	-	-	-	-	-	-	-	-
HL	0.556	0.082	0.363	0.702**	-0.134	-0.086	-	-	-	-	-	-	-
PD	0.392	0.001	0.297	0.607*	-0.088	0.001	0.962**	-	-	-	-	-	-
NL	0.371	0.614*	0.744**	0.443	0.604*	0.390	-0.142	-0.115	-	-	-	-	-
NC	0.802**	0.980**	0.876**	0.413	0.626*	0.291	0.057	-0.029	0.722	-	-	-	-
FL	0.752**	0.433	0.442	0.384	0.102	-0.439	0.649*	0.462	-0.246	0.346	-	-	-
TL	0.393	0.122	-0.182	0.031	-0.502	0.126	0.273	0.122	-0.560	0.064	0.582*	-	-
HBC	0.948**	0.684*	0.738**	0.666*	0.237	-0.026	0.740**	0.604*	0.160	0.648*	0.863**	0.447	-

BL: body length; HAW: height at wither; CG: chest girth; FLL: fore leg length; HLL: hind leg length; EL: ear length; HL: horn length; PD: poll distance; NL: neck length; NC: neck circumference; FL: face length; TL: tail length and HBC: horn base circumference.
** ($P<0.05$) and * ($P<0.05$).

Table 5 Correlation matrix of body measurements as influenced by treatment 2

	BL	HAW	CG	FLL	HLL	EL	HL	PD	NL	NC	FL	TL	HBC
BL	-	-	-	-	-	-	-	-	-	-	-	-	-
HAW	0.667*	-	-	-	-	-	-	-	-	-	-	-	-
CG	0.900**	0.878**	-	-	-	-	-	-	-	-	-	-	-
FLL	0.935**	0.743**	0.947**	-	-	-	-	-	-	-	-	-	-
HLL	0.587*	-0.108	0.343	0.554	-	-	-	-	-	-	-	-	-
EL	0.635*	0.515	0.709**	0.832**	0.617*	-	-	-	-	-	-	-	-
HL	0.762**	0.498	0.677*	0.813**	0.680*	0.873**	-	-	-	-	-	-	-
PD	0.538	0.655*	0.652*	0.609*	0.297	0.713**	0.799**	-	-	-	-	-	-
NL	0.959**	0.614*	0.850**	0.832**	0.569	0.506	0.687*	0.572	-	-	-	-	-
NC	0.766**	0.360	0.605*	0.555	0.558	0.270	0.533	0.527	0.911**	-	-	-	-
FL	0.775**	0.755**	0.759**	0.836**	0.226	0.639*	0.713**	0.455	0.597*	0.253	-	-	-
TL	0.455	0.680*	0.636*	0.702**	0.191	0.875**	0.746**	0.709**	0.285	- 0.013	0.739**	-	-
HBC	0.753**	0.644*	0.761**	0.844**	0.551	0.903**	0.976**	0.879**	0.679*	0.498	0.739**	0.836**	-

BL: body length; HAW: height at wither; CG: chest girth; FLL: fore leg length; HLL: hind leg length; EL: ear length; HL: horn length; PD: poll distance; NL: neck length; NC: neck circumference; FL: face length; TL: tail length and HBC: horn base circumference.
** ($P<0.05$) and * ($P<0.05$).

Table 6 Correlation matrix of body measurements as influenced by treatment 3

	BL	HAW	CG	FLL	HLL	EL	HL	PD	NL	NC	FL	TL	HBC
BL	-	-	-	-	-	-	-	-	-	-	-	-	-
HAW	0.344	-	-	-	-	-	-	-	-	-	-	-	-
CG	0.824**	0.272	-	-	-	-	-	-	-	-	-	-	-
FLL	0.442	0.752**	0.071	-	-	-	-	-	-	-	-	-	-
HLL	0.420	0.979**	0.392	0.727**	-	-	-	-	-	-	-	-	-
EL	0.263	0.816**	0.033	0.889**	0.735**	-	-	-	-	-	-	-	-
HL	0.406	0.003	0.362	-0.083	0.139	-0.443	-	-	-	-	-	-	-
PD	0.336	-0.080	0.163	0.133	0.067	-0.321	0.869**	-	-	-	-	-	-
NL	0.670*	0.145	0.283	0.621*	0.236	0.226	0.452	0.727**	-	-	-	-	-
NC	0.498	-0.357	0.258	0.122	-0.227	-0.295	0.555	0.805**	0.849**	-	-	-	-
FL	0.554	0.168	0.476	-0.050	0.239	-0.278	0.874**	0.568	0.285	0.289	-	-	-
TL	-0.246	0.438	0.040	0.273	0.462	0.479	-0.490	-0.345	-0.215	-0.396	-0.630	-	-
HBC	0.362	-0.251	0.186	-0.250	-0.201	-0.538	0.827**	0.623	0.305	0.471	0.882**	-0.889**	-

BL: body length; HAW: height at wither; CG: chest girth; FLL: fore leg length; HLL: hind leg length; EL: ear length; HL: horn length; PD: poll distance; NL: neck length; NC: neck circumference; FL: face length; TL: tail length and HBC: horn base circumference.
** (P<0.05) and * (P<0.05).

Table 7 Correlation matrix of body measurements as influenced by treatment 4

	BL	HAW	CG	FLL	HLL	EL	HL	PD	NL	NC	FL	TL	HBC
BL	-	-	-	-	-	-	-	-	-	-	-	-	-
HAW	-0.517	-	-	-	-	-	-	-	-	-	-	-	-
CG	0.964**	-0.414	-	-	-	-	-	-	-	-	-	-	-
FLL	0.435	0.331	0.590*	-	-	-	-	-	-	-	-	-	-
HLL	0.117	0.052	0.318	0.201	-	-	-	-	-	-	-	-	-
EL	0.670*	0.002	0.823**	0.751**	0.577	-	-	-	-	-	-	-	-
HL	0.120	-0.738**	-0.089	-0.816**	-0.293	-0.523	-	-	-	-	-	-	-
PD	-0.169	-0.481	-0.369	-0.939**	-0.267	-0.704**	0.938**	-	-	-	-	-	-
NL	0.458	-0.484	0.511	0.515	-0.110	0.318	-0.133	-0.409	-	-	-	-	-
NC	-0.659	0.237	-0.605*	-0.040	-0.371	-0.335	-0.282	-0.221	0.184	-	-	-	-
FL	0.282	0.515	0.413	0.936**	0.039	0.671*	-0.867**	-0.939**	0.319	0.125	-	-	-
TL	-0.279	0.775**	-0.318	0.047	-0.131	-0.215	-0.269	-0.018	-0.676*	-0.249	0.187	-	-
HBC	-0.124	-0.545	-0.339	-0.909**	-0.368	-0.722**	0.961**	0.990**	-0.297	-0.176	-0.916	-0.079	-

BL: body length; HAW: height at wither; CG: chest girth; FLL: fore leg length; HLL: hind leg length; EL: ear length; HL: horn length; PD: poll distance; NL: neck length; NC: neck circumference; FL: face length; TL: tail length and HBC: horn base circumference.
** (P<0.05) and * (P<0.05).

Table 8 Correlation matrix of body measurements as influenced by treatment 5

	BL	HAW	CG	FLL	HLL	EL	HL	PD	NL	NC	FL	TL	HBC
BL	-	-	-	-	-	-	-	-	-	-	-	-	-
HAW	0.141	-	-	-	-	-	-	-	-	-	-	-	-
CG	0.768**	0.536	-	-	-	-	-	-	-	-	-	-	-
FLL	0.185	0.868**	0.469	-	-	-	-	-	-	-	-	-	-
HLL	-0.513	0.532	-0.014	0.598*	-	-	-	-	-	-	-	-	-
EL	-0.067	-0.246	-0.346	0.067	0.267	-	-	-	-	-	-	-	-
HL	0.164	-0.190	0.211	0.125	-0.097	-0.222	-	-	-	-	-	-	-
PD	0.264	-0.315	0.158	0.050	-0.236	-0.081	0.972**	-	-	-	-	-	-
NL	0.926**	0.136	0.807**	0.190	-0.280	0.115	0.075	0.158	-	-	-	-	-
NC	0.500	0.471	0.390	0.274	-0.049	0.204	-0.730**	-0.663*	0.541	-	-	-	-
FL	0.295	0.556	0.451	0.460	0.436	0.390	-0.601*	-0.599*	0.522	0.827**	-	-	-
TL	0.878**	0.539	0.964**	0.503	-0.134	-0.247	0.144	0.140	0.862**	0.524	0.478	-	-
HBC	0.556	-0.053	0.348	0.340	-0.242	0.089	0.807**	0.882	0.425	-0.265	-0.280	0.426	-

BL: body length; HAW: height at wither; CG: chest girth; FLL: fore leg length; HLL: hind leg length; EL: ear length; HL: horn length; PD: poll distance; NL: neck length; NC: neck circumference; FL: face length; TL: tail length and HBC: horn base circumference.
** (P<0.05) and * (P<0.05).

This finding is in contrast with the reports of Ibrahim *et al*. (2014) in red Sokoto bucks; Aye and Adegun (2010) in west African dwarf (WAD) sheep and Babale *et al*. (2015) in Red Sokoto goats.

CONCLUSION

The result of this present study indicates that linear body measurement parameters in Yankasa rams were signifi-

cantly influenced by DPBD. Horn base circumference and Poll distance were highly affected by the DPBD.

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