

RELATIONSHIP BETWEEN LIVE WEIGHTS, BODY CONDITION SCORE AND CONFORMATION TRAITS IN RED SOKOTO GOATS GRAZING IN GUINEA SAVANNAH AREA

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ABSTRACT

Data from 32 Red Sokoto goats were used to study the Relationship between Live weights; body conditions score and conformation traits in Red Sokoto goats. The data were collected from College of Agriculture and Animal Science, Mando Road, Kaduna. The traits recorded were live weight (LW), body condition score (BCS), height at wither (HAW), body length (BL), chest girth (CG), parity and age. The data were analyzed using general linear model procedure of SAS. The average LW (kg), HAW(cm), BL (cm), CG(cm) and BSC recorded were 23.85 ± 1.41 , 51.80 ± 1.07 , 57.68 ± 1.23 , 64.90 ± 1.63 and 2.70 ± 0.13 respectively. The traits were significant and positive and range between 0.47 and 0.83. There was significant effect ($p < 0.05$) of age and parity of the does on LW, HAW, BL, CG and BCS. This study discovered that live weight and conformation traits showed significant and positive correlations and the tendency to show some progress with advancing of age and parity, these characters could be improved by conditioning the environment.

Keywords: Red Sokoto goats, *Live weight (LW)*, *conformation traits*, *parity*, *savannah*.

INTRODUCTION

Goats are good producers of meat for human consumption. The animals are excellent meat producers in view of their short generation interval and the absence of religious taboos associated with their meat (Ozung *et al.*, 2011). Goats contribute significantly to the economy of third world countries. They provide meat, milk, fibre, hair, manure and a major source of income especially for rural people. Additionally, goats are useful in carrying out functions such as been slaughtered for funeral and marriage ceremonies and as a source of income and security for the resource poor farmers (Nsoso *et al.*, 2004). About 59.38% of the world goats' population are found in Africa (Skapetas and Bampidis, 2016). The goat breeds in Nigeria are mainly meat producing animals which are adapted to the various ecological zones in which they are found, and the highest concentration being found in Kano, Sokoto, Borno and Kaduna States. Amongst numerous breeds in Northern Nigeria, the most widely distributed are the Red Sokoto (Akpa *et al* 2011).

Increasing meat yield from this breed of animal requires the development of a very good model for its genetic improvement. The trait of interest in this regard is the body weight. It has been documented that body weight and linear body measurements of meat animal have been relevant in estimating body size and shape (Ojedapo *et al.*, 2012). Proper measurement of this trait on farm and on station is often very difficult. This is as a result of unavailability of weighing scale especially in the rural areas where most of the animals are located (Adeyinka and Mohammed, 2006). The possibility of obtaining accurate measurements of this trait from simple body linear measurement parameters using easily obtainable and cheaply available metric tape rule (Adeyinka and Mohammed, 2006) and body weight gain therefore arises. The objectives of this study was to to determine the relationship between the measured traits in the goats studied and also determine the live weight changes, body condition score and morphometric traits during grazing period.

MATERIALS AND METHODS

Experimental Site

The research was conducted at the teaching and research farm of the College of Agriculture and Animal Science, Division of Agricultural Colleges, Ahmadu Bello University, Mando Road, Kaduna. The College is situated on latitude $10^{\circ}35'N$ and longitude $7^{\circ}25' - 26^{\circ}41'E$. The rainfall in this area varies between 1096mm – 1544mm per annum and raining season last for 150-200 days and dry season starts from October to early April. The mean annual temperature is $34^{\circ}C$, while the hottest month being March to April ($40^{\circ}C$) while between December and January is severe harmattan (NIMET, 2014).

Animals and their Management

Thirty-two (32) Red Sokoto goats aged between 1 – 4 years and of medium sizes were used. The animals comprised of 30 of does and 2 bucks. They were identified using necklace tags (neck strap). The initial live weight (LW), body condition score (BCS), age of the animals, litter size for the females, body length (BL), chest girth (CG), height at withers (HW), parity, were all checked and recorded and used for this study.

Management Practice

The animals were given the supplementary feed in the early hours of the morning between 6:00am – 7:00am before the animals are allowed to go grazing which last for 3 hours (8:00am – 11:00am). There was no separation of the animals (based on sex). The animals were kept in pens made up of blocks and cement and roof made up of zinc. The house was open sided, for cross ventilation and free air flow. There was organized health care provision in terms of vaccination, deworming and ecto – parasite control. Also, the animals were treated when cases of ill health occurred.

Supplementary feeding was done using crop residues such as maize offal, groundnut haulms and cowpea pods. Toxin binder and salt lick (mineral blocks) was provided. Water was provided *ad lib*.

Data Collection

Prior to the commencement of the research, live body weight (LW) and body measurements / traits such as; height at withers (HAW), body length (BL), chest girth, body condition scores were recorded. These were also measured after every 2 weeks. A weighing scale was used to determine the LW, while the traits (BL) were measured using measuring tape.

Traits Measurement

Body Weight measurement: The body weight of the bucks were measured in kilograms by following the procedure as described by Akpa *et al.*, (2009) The weight of the observer were taken first, and then the body weight of each animal were be taken by carrying the animal individually and standing on a weighing scale. The difference between these weights gives the weight of the animal. Weighing was done at the beginning of the study and subsequently on weekly basis.

Body Linear Measurement: Linear conformation traits were taken on the day of measurements in centimetres (cm) using flexible tape as described by Akpa *et al* (2009). The measurements were taken at the onset of the study and subsequently on weekly basis. The traits were as follows:

Heart Girth (HG): This is the circumference of the body at a point immediately behind the fore limbs and perpendicular to the body axis.

The Height AT Wither (H)AW: This is the highest point over the scapular vertically to the ground.

Body Length (BL): This were measured from the point of shoulder to the ischium. These were done at the onset and subsequently on weekly basis.

Body Condition Scoring (BCS): This serves as a useful and easy tool to use to determine the nutritional need of a herd. This information was used to adjust feeding strategies to its optimal BCS. Since body condition greatly affects reproductive performance as well as feeding efficiency, monitoring body condition can greatly influence a producer bottom line. Body condition scoring were a very useful tools guide for breeding, selection, management and marketing decisions, the use of this tool helps producers evaluate the feeding of their animals when selling and buying. This is important to improve the efficiency of sheep and goat production and benefit of the producers. BCS is a means of evaluating an animal based upon muscles and external fat cover. BCS were useful procedures that producers can use to make management decisions regarding the health of their animals and quality and quantity of feed needed to optimize performance if animal are in poor condition, the animal may be underfed or have a disease problem, if animals are in good body condition, the amount of feed were decreased. Body condition score do fluctuate during changes in feed supply. By evaluating animal, producers can prevent drastic losses in production (Burgel, 2011).

Statistical Analysis

The population average and standard deviations was calculated based on means of SAS (2001). The variance analysis and multiple comparisons were analyzed by the general linear model (GLM) of SAS (2001). Significant differences were separated using Duncan multiple range test (DMRT) by SAS (2001). Correlation and regression were computed using SAS (2001). The data were analyzed using the following model:

$$Y_{ijkl} = A_i + p_j + l_k + W_l + E_{ijkl}$$

Y_{ijkl} = Any observation
 U = the overall mean
 A_i = effect of age of doe
 P_k = effect of parity of doe
 L_k = effect of litter size of doe
 W_l = effect of weight of doe and
 E_{ijkl} = residual error

RESULTS AND DISCUSSIONS

The phenotypic correlation among LW, HAW, BL, CG and BCS (Table 1) indicated that LW and BL recorded the highest value (0.83), followed by LW and CG (0.75), then LW and BCS (0.73), HAW and BCS (0.47). These correlations were highly significant ($P < 0.01$) and positive. This confirms the relationship of the variables on live weights of the animals. The higher and positive correlations observed between LW and BL (0.83) LW and BCS (0.73) were within the range reported by Akpa (2014).

Table 1: Phenotypic correlation among LW, HAW, BL, CG and BCS in Red Sokoto goats.

Variable	LW	HAW	BL	CG	BCS
LW	-	0.6225**	0.8286**	0.7494	0.7262**
HAW	0.6025**	-	0.6975**	0.6627**	0.4684**
BL	0.8285**	0.6975	-	0.7655**	0.6778**
CG	0.7494**	0.6627**	0.7655**	-	0.6662**
BCS	0.7263**	0.4684**	0.6778**	0.6662**	-

** $P < 0.01$, LW: live weight, HAW: height at withers, BL: body length, CG: chest girth, BCS: body condition score, BCS: body condition score.

The effect of age on LW, HAW, BL, CG and BCS (Table 2) revealed that the age of the animals significantly ($P < 0.01$) affected LW, HAW, BL, CG and BCS. These values seem to increase from age 1 up to age 5. Also age and Parity significantly affected LW, HAW, BL, CG and BCS in this study, with an increase in age and parity leading to increase in LW, HAW, BL, CG and BCS (Table 3 and 4). This confirms the relationship of the age of the animals with those variables. The finding was in consonance with the reports of Mohammed *et al.* (2010). Also Azhani *et al.* (2011) reported that live body weight and linear body measurements would increase when goats got older.

Table 2: Effect of Age on LW, HAW, BL, CG and BCS in Red Sokoto goats.

Age	LW	HAW	BL	CG	BCS
5	27.063 ^a	53.67 ^a	60.73 ^a	70.88 ^a	3.14 ^a
3	26.083 ^a	52.85 ^a	59.86 ^a	67.53 ^{ab}	3.02 ^a
4	23.833 ^{ab}	52.06 ^a	58.43 ^a	63.61 ^{bc}	2.54 ^b
2	20.633 ^b	50.43 ^a	53.80 ^b	61.50 ^c	2.43 ^b
1	16.278 ^c	45.39 ^b	49.44 ^c	53.28 ^d	1.83 ^c
S.E	1.41	1.07	1.23	1.63	0.13

^{abcd} means with different superscript differ significantly. LW: live weight, HAW: height at withers, BL: bodylength, CG: chest girth, BCS: body condition score.

The effect of parity on LW, HAW, BL, CG and BCS (Table 3) shows that parity significantly affects LW, HAW, BL, CG and BCS. LW, HAW, BL. Also, CG and BCS seemed to increase with increasing parities of the does. This is easily explained by the fact that as the age of the animal increase, then it is expected that the live weight and all other conformation traits will increase.

Table 3: Effect of Parity on LW, HAW, BL, CG and BCS in Red Sokoto goats

Parity	LW	HAW	BL	CG	BCS
6	32.50 ^a	60.50 ^a	63.50 ^a	76.32 ^a	3.75 ^a

5	32.33 ^a	49.33 ^{bc}	63.67 ^a	73.00 ^{ab}	3.42 ^{ab}
4	27.43 ^{ab}	52.38 ^b	61.41 ^a	70.14 ^{ab}	3.08 ^{bc}
3	24.32 ^b	52.77 ^b	59.42 ^a	66.40 ^{bc}	2.74 ^{dc}
2	20.40 ^{dc}	49.92 ^{bc}	53.27 ^b	59.50 ^{dc}	2.32 ^{de}
1	17.68 ^d	47.72 ^c	50.95 ^b	55.68 ^d	2.10 ^e
S.E	1.41	1.07	1.23	1.63	0.13

^{a,b,c,d,e}, means with different superscript differ significantly. LW: live weight, HAW: height at withers, BL: body length, CG: chest girth, BCS: body condition score.

CONCLUSION AND RECOMMENDATION

This study discovered that live weight and conformation traits showed significant and positive correlations. Since the body measurements had positive and high correlation with body weight which indicates that body measurements can be used for estimation of body weight in the field where scales are not usually available. These may also be used as selection criteria. The live body weight of goats could be estimated based on the linear body measurements. HW, GC and neck circumference were found to be the best parameters to use for live weight estimation at farm conditions especially under the small holder farmers. This could be used for various purposes such as marketing, breeding, growth control and marketing. It is therefore recommended that to show some progress with advancing of age and parity, these characters could be improved by conditioning the environment.

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