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KURI CATTLE OF THE LAKE CHAD REGION: RELATIONSHIP BETWEEN AGE, SEX AND BODY DIMENSIONS

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ABSTRACT
The relationship between age, sex and body dimensions of the kuri cattle was investigated. Data was collected at the Bodija and Akinyele International Livestock markets located in Oyo State of Nigeria. These include Height at withers (HTW), Heart girth (HTG), Canon circumference (CCR), Body length (BLT), Shoulder to tail drop (STD), Tail length (TL) and Head to shoulder (HTS). Sex significantly ($P<0.05$) influenced horn length and heart girth measurements while age affected all the measurements except ear length. Thus, kuri cows have wider heart girth (166.91 vs 160.88 cm) and longer horns (64.18 vs 48.83 cm) than bulls. The relationship between the body measurements were generally positive and significant ($P<0.01$). Correlation values ranged from 0.174 to 0.885 with the relationship between BL and TL consistently having the least values and, BL and STD, the highest for both gender and pooled data. The high, positive and significant ($P<0.01$) relationship between BL and STD indicates that any of them can be used in place of the other in selection for length measurements depending on the ease of measurement.

KEY WORDS: Age, Sex, Body dimensions, Kuri cattle, Nigeria

INTRODUCTION

The kuri severally known as Buduma, Bare or white Lake Chad is a rare breed of cattle unique to Africa though its origin is uncertain. It is known for its bulbous horns and tall features which makes it comparatively different from other African breeds of cattle. It is classified as a Bos Taurus like the N'dama but unlike the N'dama are trypano-susceptible. They are found mainly on the shores of the Lake Chad bordered by Nigeria, Niger, Chad and Cameroon. The climate in this region is hot, humid, tropical and tse tse fly free. The report of ILCA (1992) showed that majority of the heads of kuris are in the North Eastern part of Nigeria and Southern Chad. In Nigeria they are found mainly in Adamawa, Borno, Yobe and Bauchi states and attempts to introduce them to other agro ecological zones have failed because the kuris have acclimatized to the Lake Chad and are unable to survive elsewhere (Tawah *et al.,* 1997). They are however transported in large numbers by road from their habitat to markets in southern Nigerian where their meat command higher premium than those of other cattle breeds. They are excellent swimmers and their bulbous horns are thought to be an adaptive feature for staying afloat while swimming. The animals are dull, lethargic, temperamental and highly sensitive to heat and sunlight (Malbrant, 1947). They are considered as poor work animals but may be used at younger ages when they are more docile for drawing cart (RIM, 1992). They are also excellent producers of meat and milk. The kuris are rapidly declining in numbers and consequently a rare animal genetic resource unique to Africa is threatened by extinction (Adeniji, 1985). This could probably be due to the retreating waters of the Lake Chad and consequent shrinkage of their specialized habitat. It could also be due to increased farming activity on the shores of the lake and indiscriminate crossing of the kuri with zebus by the pastoralist to produce preferred F1 offspring which are better than their parents in meat and milk production (Queval *et al.,* 1971). These authors reported that the kuri is in the process of being absorbed by the zebus. Available information on the current status of the breed is almost nonexistent, giving the impression that the breed may have been forgotten. Since the large human populations in the region are dependent on the kuri, their extinction could pose a threat to the regions livestock production. The aim of the study was to provide information on the body conformation characteristics of the Kuri, which will be very important in characterization, conservation and improvement programmes for this breed of cattle.

MATERIALS & METHODS

The data for the experiment were collected at the Bodija and Akinyele International Livestock markets located in Oyo State of Nigeria. Oyo state is located on a forest-grass land boundary on longitude $3^{0}54^{1}$E and latitude $7^{0}23^{1}$N of the equator. It is a central cattle market for Oyo and a few neighboring states in the Southwest of Nigeria. The study areas (Bodija and Akinyele stock market) are in the derived Savanna region characterized by two well-defined seasons - wet and dry. The annual rainfall pattern is controlled by two opposing winds, the Northeast trade wind and southwest monsoon winds. The rainfall in the region is between 1000 - 1250mm and the distribution of rain is markedly bimodal with a temporary cessation in August. The rains cover the months of April to October while the dry season is between November and March.

Data on seventy seven Kuri cattle comprising 40 males and 37 females were collected between July and October.

The data include Height at withers (HTW), Heart girth (HTG), Canon circumference (CCR), Body length (BLT), Shoulder to tail drop (STD), Tail length (TLT) and Head to shoulder (HTS). All body measurements were measured with a flexible tape and calibrated measuring stick graduated in centimeters (cm). In order to ensure accuracy in taking measurements, it was ensured that the animals were standing relaxed and on level ground as much as possible to prevent anatomical distortions which can increase or reduce the measurement. The animals were aged by dentition according to the method of Macdonald and Low (1985).

The descriptions of the measurements as reported by Brown *et al.* (1984) and Mbap and Bawa (1998) are as follows:

Ear length (ELT): The distance from the tip of the ear to the base of the ear.

Horn length (HLT): The distance from the tip of the horn to the base of the horn.

Height at withers (HTW): This is the vertical distance from the floor beneath the animal to the point of the withers. It was measured with a measuring stick with a sliding arm.

Heart girth (HTG): This is the narrowest circumference immediately posterior to the front legs.

Canon circumference (CCR): This is the narrowest circumference of the canon bone.

Shoulder to taildrop (STD): This is the distance from the point of the shoulder to the pin bones.

Body length (BLT): The distance on the dorsal midline from the top of the head to the pin bones.

Tail length (TL): The distance from the pin bones of the sacrum to the base of the tail switch.

The General Linear Model of SAS (1999) was used to evaluate the effects of Sex and age on the body measurements. The mathematical model is given as

$Y_{ijk} = \mu + \alpha_I + B_j + e_{ijk}$

Where

Y_{ijk} = Individual observation on the i^{th} sex at the j^{th} age.

μ = Overall mean

α_i = Effect of the i^{th} sex

B_j = Effect of the j^{th} age

e_{ijk} = Random error term

The Pearson correlation coefficients between all pairs of variables were estimated using the correlation procedure (PROC CORR) of SAS (1999).

RESULTS & DISCUSSION

Least Square Means and standard error of the body measurements as affected by sex are presented in Table 1. Sex significantly (P<0.05) influenced only horn length and heart girth measurements while age significantly affected all the measurements except ear length. The non significant effect of sex on the all measurements except heart girth has been reported by several authors (Oni *et al*., 1990; Olutogun *et al.*, 2003).

TABLE 1. Least squares means of the effect of sex on body measurements of Kuri cattle

Measurements (cm)	Male	Female
HL	48.83 ± 2.77^{b}	64.18 ± 2.42^{a}
EL	21.07 ± 0.44^{a}	21.93 ± 0.49^{a}
HW	132.51 ± 1.54^{a}	132.04 ± 1.64^{a}
HG	160.88 ± 2.01^{b}	166.91 ± 2.21^{a}
CC	27.02 ± 0.42^{a}	26.08 ± 0.57^{a}
BL	187.07 ± 2.00^{a}	182.77 ± 2.89^{a}
STD	133.51 ± 1.54^{a}	133.24 ± 1.74^{a}
TL	109.22 ± 1.83^{a}	111.48 ± 1.82^{a}

Means within rows with different superscripts are significantly (P< 0.05) different.

EL = Ear length, HL = Horn length, HW= Height at withers, HG= Heart girth, CC=Canon circumference, BL= Body length, STD= Shoulder to tail drop, TL= Tail length.

Males did not differ significantly from females for most of the measurements. However, heart girth and horn length differed significantly between genders, with females having higher values than males. Olutogun *et al*. (2003) attributed the difference in HG measurements to larger gut fill of the males in Zebu cattle. This study however contradicts this assertion because the females had larger HG value than the male. Tawah *et al.* (1997) suggested that it could be an adaptation for mating. Brown and Shrode (1971) also reported larger heart girth values in female Angus cattle than male and associated it with higher percentage of fat and less lean and muscle in cows compared to bulls. Thus, female kuris have wider heart girth and longer horns than males and there may be breed*sex interaction in heart girth measurements in cattle. The Least Square Means of the body measurements of the Kuri cattle as influenced by age of the animal are presented on Table 2. Age significantly (P<0.05) affected all the body measurements except ear length. Brown *et al.* (1956) and Green and Carmen (1977) also reported the significant effect of age on body measurements. The body measurements consistently increased with age with age group one animals having the least value for all dimensions and age group four; the highest. However, the age group four animals did not differ significantly from group three for some dimensions namely: HW, HTG and TL indicating that a plateau in growth and development might have been reached for such dimensions at that age. This agrees with the report of Brown *et al.* (1984) who reported that HW was 50% mature at birth and skeletal growth ceases at 40 months of age in Angus cattle. Similarly, Green and Carman (1977) reported that height at hips was the earliest to maturity followed by HW, width at shoulder, HG, chest depth, body length and live weight. Ear length did not differ between the age groups indicating that optimal growth of the ear is attained early in the

animal's life. Similarly, CC differed only between group 1 and 4 with group 2 and 3 not being significantly different from 1and 4. BL (166.88 -199.61cm) and STD (115.55-137.86cm) differed significantly between the age groups indicating that growth of these dimensions did not reach a plateau at age group 3 but continued to age group 4.

TABLE 2. Least squares means of the effect of age on body measurements of Kuri cattle.

Age groups (years)	N	HL	EL	HW	HG	CC	BL	STD	TL
1 (<1)	15	27.59^{c}	20.66^{a}	122.30^{b}	141.31^{b}	23.93^{b}	166.88^{c}	115.55^{c}	97.58^{b}
2 (1-2½)	12	34.76^{c}	21.88^{a}	125.18^{b}	145.28^{b}	25.13^{ab}	174.42^{c}	123.87^{c}	103.26^{b}
3 (3-4)	12	46.32^{b}	21.75^{a}	131.05^{a}	157.21^{a}	25.50^{ab}	183.10^{b}	129.50^{b}	110.21^{a}
4 (>4)	37	58.99^{a}	23.22^{a}	134.58^{a}	165.38^{a}	26.91^{a}	191.61^{a}	133.86^{a}	110.60^{a}

Means within rows with different superscripts are significantly (P< 0.05) different.
EL = Ear length, HL = Horn length, HW= Height at withers, HG= Heart girth, CC=Canon circumference, BL= Body length, STD= Shoulder to tail drop, TL= Tail length.

This supports the view of Green and Carman (1977) that body length is among the last dimension to attain maturity. The interrelationship among body size measurements were examined by simple Pearson's correlation coefficients for each gender and a pool of the sexes are presented in Table 3. The relationship between the body measurements were high, positive and significant (P<0.01), except that between CC and BL (0.329), CC and STD (0.351), BL and TL (0.174) and STD and TL (0.210) for females and BL and TL (0.314) and STD and TL (0.361) for males. Jeffrey and Berg (1972) and Olutogun *et al.* (2003) reported high correlation coefficients in Hereford and Bunaji and Gudali breeds of cattle respectively. Brown *et al.* (1984) however reported moderate to low correlation values for Angus cattle. Correlation values ranged from 0.174 to 0.885 with the relationship between BL and TL consistently having the least values and that between BL and STD having the highest for the sexes and pooled data. The high and significant (P<0.01) relationship between HTW and HTG shows that height and circumference size were complementary as such selection for higher HTW will lead to a better frame in beef cattle while the high and significant relationship between STD, BL and HTG presupposes that the total size of an animal is a function of length, height and circumference measurements where height reflects skeletal size and circumference reflect condition. This agrees with the report of Enevoldsen and Kinsteinsen (1997) and Oheruata and Olutogun (1994). The high and significant relationship between BL and STD indicates that any of them can be used in place of the other in selection for length measurements depending on the ease of measurement.

Table 3. Pearson's correlation coefficients of body measurements for male, female and pooled population.

		HW	HG	CC	BL	STD	TL
	P		0.835**	0.781**	0.709**	0.717**	0.685**
HW	M		0.658**	0.828**	0.648**	0.528**	0.521**
	F		0.659**	0.733**	0.494**	0.538**	0.678**
	P			0.717**	0.727**	0.747**	0.612**
HG	M			0.530**	0.681**	0.647**	0.402**
	F			0.704**	0.446**	0.556**	0.607**
	P				0.558**	0.634**	0.593**
CC	M				0.584**	0.579**	0.619**
	F				0.329**	0.351**	0.441**
	P					0.837**	0.448**
HG	M					0.885**	0.314**
	F					0.873**	0.174**
	P						0.488**
CC	M						0.361**
	F						0.210**

** = P<0.01
HW= Height at withers, HG= Heart girth, CC=Canon circumference, BL= Body length, STD= Shoulder to tail drop, TL= Tail length. M= Male, F= female, P= pooled

CONCLUSION

It can be concluded that sex did not have significant effect on most body measurements of Kuri cattle except heart girth and horn length. Thus, Kuri cows have wider heart girth and longer horns than bulls. Most of the measurements except ear length were affected by age of the animal indicating that the body dimension stopped growing early in the life of the animal. The last measurement to attain maturity was body length. There was high and positive correlation between length, height and circumference measurements. Thus, selection for higher value in one, will lead to an increase in the other and consequently, animal with good beef conformation.

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