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Pelvimetry of kuri and bunaji cows in Maiduguri metropolitan slaughterhouse, northern Nigeria

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Abstract
The study was conducted on 58 indigenous cattle consisting of 33 Kuri and 25 Bunaji cows slaughtered at the Maiduguri Metropolitan Slaughter house. The internal and external pelvic dimensions in the two breeds were obtained immediately post slaughter before the animals were dressed. The Mean ± SEM for pelvic area were found to be 120.83 cm ± 3.6 and 110.1 cm ± 3.4 for Kuri (K) and Bunaji (WF) respectively. The mean ± SEM for various body measurements were 80.98 cm ± 0.5 and 74.0 cm ± 0.8 for heart girth; 149.9 cm ± 1.1 and 138 cm ± 0.7 for height at withers; 129.3 cm ± 1.04 and 117.96 ± 1.4 for height at pin bone; 141.3 cm ± 0.54 and 131.7 cm ± 1.05 for height at hook bone; 46.2 cm ± 0.42 and 42.3 cm ± 0.51 for rump length; 43.6 cm ± 0.45 and 40.8 cm ± 0.74 for rump width; 10.7 cm ± 0.2 and 9.5 cm ± 0.16 bisilliac distance and 11.85 cm ± 0.02 and 11.12 cm ± 0.18 sacropubis distance for Kuri and Bunaji respectively. There was a significant correlation ($P<0.05$) between pelvic area and sacropubis, bisilliac, height at pin bone and height at withers in both breeds. The pelvic area was significantly ($P<0.05$) correlated with height at hook bone in Kuri cows but, there was no correlation with heart girth. The Bunaji showed a significant correlation of the pelvic area with the heart girth while, there was no correlation with the height at hook bone. A significant difference ($P<0.05$) was observed in the dimensions of the traits between the breeds except in the heart girth and rump width. The study indicated that the parameters measured above may be used as good indicators of cows with large pelvic area in both breeds.

Keywords: bunaji, cows, kuri, maiduguri, pelvimetry

Introduction

Dystocia defined as delayed or difficult parturition has been reported to be the most common cause of perinatal calf loss (Bellows and Short, 1994; Noakes *et al*., 2001). The best method of dealing with calving problems is to avoid them. Calving ease, bulls and pelvimetry are some of the more recent tools to consider in a breeding program. Research has shown that the internal pelvic area is one of the best predictions of dystocia in heifers (Bellows, 1992). Recently, interest in pelvic measurements has increased considerably by beef producers, veterinarians and researchers (Deutscher, 1995). Studies have shown that causes of dystocia can be divided into two (2) components; those attributed to calf and those attributed to dam (Cook *et al.*, 1993). The size of the pelvic area was among the most important factors attributed to the dam. The pelvic area was reported to be the most important cow variable influencing calving difficulty (Johnson *et al.*, 1988). Pelvic measurements can be successfully used to identify abnormally small or abnormally shaped pelvises (Deutscher, 1995). Dams with larger pelvic area experience less calving difficulty. The difficulty involved in the direct measurement of the internal pelvic dimension in live animals implies the need for information on the association existing among internal pelvic dimensions and external body measurements that might be of value in determining dams with larger pelvic area and guide in crossbreeding. Studies on pelvimetry have been conducted in exotic cows (Rice & Wiltbank, 1970; Schwabe & Hall, 1989). There is, however a paucity of information on indigenous breeds of cattle in Nigeria. The Kuri cattle also referred to as Buduma, inhabit the Lake Chad basin and are characterized by huge, porous, bulbous horns, light colored with an average mature weight of 450 – 500 kg (Blench, 1999). They are principally used as milkers. The Bunaji cattle also called Yakanji are predominantly found in the northern part of Nigeria. They vary from 250 – 500 kg live weight and are grey-white in color with black extremities. They may have black or reddish markingsand are multipurpose breeds (Blench, 1999). The objective of this study, therefore, was to determine the relationship among intrapelvic dimensions and external body measurements in Kuri and Bunaji cows; and to investigate differences in terms of these body measurements between the two breeds.

Materials and methods

The study was conducted on 58 indigenous cattle consisting of 33 Kuri cows and 25 Bunaji cows, during the months of January and March (2008). The cows were obtained from Maiduguri metropolitan slaughterhouse. The study area is located 11°5" north and longitude 13° 5" east at an altitude of 354m above sea levels, falls within the Sahel savanna zone. The climate is characterized by two distinct seasons, yearly with a unimodal rainfall pattern, a long dry seasons of about 8-9 months. The dry seasons start from November to April while the rainy season is from May to October. The climate is generally hot with mean annual rainfall of between 200-250mm. The hottest months in the study area are March and April with a mean temperature of 37°C to 43°C (Carter, 1994). The animals were apparently healthy and sexually mature with ages varying between 4 to 6 years. The management record and breeding history of the animals prior to slaughter were not known.

The external body size dimensions and the internal pelvic measurements were taken immediately after slaughter, before the animals were dressed. They were placed on lateral recumbency with the limbs fully extended.

The external body measurements were obtained using Freeman's measuring tape (Tailor's tape). These included, height at hook bone being the linear distance from the rear hoof to the highest point of the tuber coxae; height at withers, the linear distance from the fore hoof to the highest point of the withers; rump length, the linear distance between the anterior surface of the wing of the ilium and posterior surface of the ischium; rump width, the linear distance between the two dorsolateral ischial tuberosities; and the heart girth being the smallest circumference behind the shoulder.

The internal pelvic dimensions were obtained by the use of a modified pelvimeter (Rice & Wiltbank, 1972). The pelvimeter (Plate 1) was inserted *per rectum*, through which the internal pelvic measurements were read on a scale. Pelvic height was the vertical distance between the sacral vertebrae and pubic symphysis; and pelvic width was the horizontal distance between the shaft of the ilium at the widest part (Coburn *et al.*, 1997). The internal dimensions taken were sacropubis (pelvic height) and bisilliac (pelvic width). The pelvic area was calculated as the product of the vertical diameter and the transverse diameter of pelvis as described by Rice & Wiltbank (1972).

The pelvic and the body measurements were subjected to Analysis of variance (ANOVA), (Steel & Terrie, 1960). And simple correlation was done using a GraphPad Instat statistical computer package (GraphPad software, 2000).

Results

The mean ± SEM of the pelvic area and various body measurements in Kuri and Bunaji and their comparism (using ANOVA) are presented in Table 1. The correlation co-efficient (r) of pelvic area and the various body measurements in the two breeds of cows is shown in Table 2.

A high correlation was obtained between pelvic area and sacropubis and bisilliac, height at pin bone and height at withers in both Kuri and Bunaji cows. There was a significant correlation P<0.05) between pelvic area and heart girth in the Bunaji cows. However, pelvic area and heart girth were not significantly correlated (P>0.05) in Kuri cows. Similarly, there was a significant correlation (P<0.05) of pelvic area and height at hook bone in Kuri cows, while, the pelvic area and height at hook bone were not significantly correlated (P>0.05) in the Bunaji cows.

There was a significant difference (P<0.05) in the mean dimensions of pelvic area, height at withers, height at pin bone, bisilliac and sacropubis between the two breeds of cows. However, there was no significant difference (P>0.05) between Kuri and Bunaji cows in the mean dimensions of heart girth and rump width.

Plate 1: Modified Pelvimeter

Table 1: Mean ± SEM and comparisons of various pelvic and body measurements for Kuri (n = 33) and Bunaji (n = 25) cows.

Traits	Kuri	Bunaji
Pelvic area (cm^2)	120.8 ± 3.0	110.1 ± 2.4 *
Heart girth (cm)	80.98 ± 0.5	74.0 ± 0.8
Height at withers (cm)	149.9 ± 1.1	138.8 ± 0.7 *
Height at pin bone (cm)	129.3 ± 1.04	117.96 ± 1.4*
Height at hook bone (cm)	141.3 ± 0.54	131.7 ± 1.05 *
Rump length (cm)	46.2 ± 0.42	42.3 ± 0.54*
Rump width (cm)	43.6 ± 0.45	41.8 ± 0.74
Bisilliac (cm)	10.7 ± 0.2	9.5 ± 0.16*
Sacropubis (cm)	11.85 ± 0.2	11.12 ± 0.18*

*Statistically significant (P<0.05)

Table 2: Correlation coefficient of the pelvic area with various body measurements for kuri (n – 33) and Bunaji (n – 25) cows

Traits (cm)	Kuri	Bunaji
Sacropubis	0.95*	0.75*
Bisilliac	0.94*	0.72*
Height at withers	0.56*	0.58*
Height at pin bone	0.38*	0.43
Height at hook bone	0.43*	0.35
Rump length	0.34	0.04
Rump width	0.32	0.04
Heart girth	2.35	0.45*

*Statistically significant (P<0.05)

Discussion

In exotic breeds of cows, the pelvic area was reported to be the most important variable influencing calving difficult and can be successfully used to identify abnormally small or abnormally shaped pelvises (Johnson *et al*., 1988, Deutscher 2011).To the best of our knowledge this is the first comparative account of the pelvic dimensions in relation to external body measurements of Kuri and Bunaji breeds of cattle and the differences among the two breeds in Nigeria. However, similar observation has been reported in some breeds of sheep (Rabalosilva & Noakes, 1984) and in exotic cattle (Schwabe & Hall, 1989). The values obtained in this study were lower than those reported by Bellows *et al*., (1971); Rice and Wilbank (1972); Johnson *et al*., (1988) and Oliveira *et al.*, (2003) for the exotic breeds of cattle. This may be attributed to breed variation and the fact that measurements in the present study were taken post-slaughter.

The high positive correlation observed between the pelvic area and the sacropubis, bisilliac measures and the height at withers is similar to the earlier reports of Johnson *et al*., (1988). Deutscher (2011) and Bellows *et al.*, (1994). In this study, the pelvic area was significantly (P<0.05) correlated to the height at pin bone and height at hook bone for Kuri cows and the heart girth for the Bunaji cows and these peculiar variations may be attributed to breed differences (Schwabe & Hall, 1989).

The Kuri cows were taller and have larger pelvic area than the Bunaji cows. This observation is not in agreement with Neville *et al*., (1978) who reported that taller breeds of cattle have smaller pelvic area. According to Boyles, (2000) pelvic height is more heritable than pelvic width. The Kuri may, therefore be more suitable for crossbreeding with larger (exotic) breeds.

The sacropubis and bisilliac dimensions possessed the highest correlation with the pelvic area in both breeds which disagrees with Bello (1987) who observed hip width and height at pin bone as having the highest significant association with the pelvic area of unspecified breed of Nigerian cows.

In conclusion, it was evident that the measurements (sacropubis, bisilliac, height at pin bone and height at withers) may be used as good indicators of cows with large pelvic area in both breeds. Further work on the relationship of the pelvic area and incidence of dystocia in these two breeds is highly desired.

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