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A study of the biometric of the reproductive tract of the one-humped camel (*Camelus dromedarius*) in northern Nigeria

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ABSTRACT

A Biometric study was conducted on the female reproductive tract of Eight-five (85) one-humped adult non-pregnant camel collected from the Sokoto metropolitan abattoir, over a period of two months. A pair of scissors, a scalpel and a blade was used to incise, excise, separate or debride various segments of the reproductive tract for measurements. The mean dimension of the left and right ovaries in the adult non-pregnant animal is $3.18 \pm 0.78\text{cm}$ and $2.96 \pm 0.61\text{cm}$ length, $2.23 + 0.50\text{cm}$ and $1.89 \pm 0.35\text{cm}$ breadths, $1.12 \pm 0.19\text{cm}$ and $0.94 \pm 0.18\text{cm}$ thicknesses and $4.13 \pm 0.63\text{g}$ and $3.00 \pm 0.61\text{g}$ weight respectively. The mean dimension of the left and right uterine horn is $9.86 \pm 1.38\text{cm}$ and $6.56 \pm 0.9\text{cm}$ length and $4.43 \pm 2.48\text{cm}$ and $3.39 \pm 0.7\text{cm}$ diameter respectively. The mean dimensions of corpus uteri are $9.59 \pm 2.27\text{cm}$ in length and $4.94 \pm 0.56\text{cm}$ width. The mean dimension of the cervix ranging from the external os to the internal os is $4.92 \pm 1.06\text{cm}$; and that of the vagina is $27.5 \pm 5.30\text{cm}$ in is length and $1.35 \pm 1.37\text{cm}$ diameter. It was concluded that the mean values obtained in this study were essentially in agreement with a considerable number of similar studies. However, a number of differences have also been observed which was attributed to specie and ecotype differences.

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1. Introduction

The biometric study of the anatomical structure of the female reproductive tract provides a very useful tool in the understanding of several physiological and reproductive phenomena in an animal. Such a study provides the scientific basis for the proper understanding and identification of any abnormality in the reproductive tract of the camel (Bello *et al.*, 2012a). Congenital abnormalities can also be easily recognized with the aid of the knowledge of the biometry of these organs. Research work on the morphology, physiology, pathology, gross and developmental anatomy of various organs and system of dromedarian camel (Bustinza, 1979, Asari *et al.*, 1985, Wilson, *et al.*, 1995, Recce, 1997, Franco, *et al.*, 2004, Sonfada, 2008, Bello *et al.*, 2012b; Hena *et al.*, 2012) has been reported in different countries by many researchers on adult camel. The present study was planned to establish a base-line data on the normal dimensions of different segments of the reproductive tract of dromedarian camel in Nigeria breed.

2. Materials and methods

Eight-five (85) reproductive tract of adult non-pregnant dromedarian camel were collected from Sokoto metropolitan abattoir and transported to Department of Veterinary Anatomy Laboratory Usmanu Danfodiyo University for the study. On arrival to the laboratory, the entire samples were weighed using compression spring balance (AT-1422), size C-1, sensitivity of 20kg X 50g) in Kilogram. A pair of scissors, a scalpel and a blade was used to incise, excise, separate or debride various segments of the reproductive tract for measurements. A plastic measuring tape was used to measure lengths along the tract. Smaller length such as length, breadth and thickness of the ovaries were measured using a Draper (No.VC6-Vernier caliper), the length and breadth of the internal and external os were also measured with this instrument. The weights were measured using a mettle (digital) electrical weighing balance (P.M.16-K).

2.1. Ovarian measurements

The length, breadth and thickness of the left and right ovaries of all the organs were taken in centimeters. The length of an ovary was taken as the distance between the anterior and posterior poles of the ovary. The thickness as the distance between the medial and lateral surfaces of the ovary and the breadth as the distance between the attached and the free border of the ovary.

2.2. Uterine horns measurement

The length and breadth of the right and left horns were taken. The length being the distance from the middle of the point of bifurcation to the tip of the uterine cornua. The breadth of the lumen is the distance between the two walls of the uterine horn at its mid point.

2.3. Uterine body

The uterine body was measured for length and breadth. Length is the distance from the tip of the internal os of the cervix, to the point of bifurcation. Breadth is the distance of the middle (wide) part from the left to the right.

2.4. Cervix

Length was measured. The length was taken as the distance between the tip of the cervical folds of the external os and those of the internal os.

2.5. External and Internal os of cervix

The length and the diameters of both were taken. The length is the distance between the tips of the cervical fold on either side to the T point of the cervical canal. The diameter of the lumen of the internal os and external os was also taken.

2.6. Vagina

The length is the distance from the opening of the external os to the tip of the ventral commissure of the vulva. Breadth is the distance between the right and the left wall of the vaginal wall.

3. Results and discussion

In the normal position, in vivo, the reproductive tract is impossible to measure. In order to present a more accurate picture of the relative lengths of the various parts, the tract was extended to full length. It is possible that some slight inaccuracies might occur unless care is taken so that the tract does not become stretched during measurement. Means and standard error of means (SEM) of the recorded measurements and weights is shown in Table 1. The ovaries are flattened, lobulated and reddish brown in colours, and each is enclosed in an ovarian bursa. The left ovary in the adult non-pregnant animal is 3.18 ± 0.78 cm in length, 2.23 ± 0.50 cm in breadth, 1.12 ± 0.19 cm in thickness and 4.13 ± 0.63 g in weight. While the right ovary was found to be 2.96 ± 0.61 cm in length, 1.89 ± 0.35 cm in breadth, 0.94 ± 0.18 cm in thickness and 3.00 ± 0.61 g in weight (Table 1). The above findings are in agreement with the measurements conducted by Ribadu, (1988), which recorded higher values for the left than the right ovaries. Though several researchers (Musa and Abu Sineina, 1976, Joshi *et al.*, 1978, Smut and Bezuidenhout, 1987, Chen and Yuen, 1984) reported that in the female camel, the left ovaries appear to be much more active than the right. It is also observed to bear more follicles and corpora lutea than the right. According to Shalash, 1965 and Musa Abu Sineina, 1976 about 99% of the pregnancies are from left horn.

Table 1

Mean dimensions of the various segments of the reproductive tract of 150 non-pregnant camels

Dimensions	Left(cm) \pm SEM	Right(cm) \pm SEM
Ovary	Left	Right
Length (cm)	2.96 ± 0.61	3.18 ± 0.78
Breadth (cm)	1.89 ± 0.35	2.23 ± 0.50
Thickness (cm)	0.94 ± 0.18	1.12 ± 0.19
Weight (g)	3.00 ± 0.61	4.13 ± 0.63
Uterine horn		
Length (cm)	9.56 ± 0.9	9.86 ± 1.38
Diameter (cm)	3.39 ± 0.7	4.43 ± 2.48
Uterine Body		
Length (cm)	9.59 ± 2.27	
Diameter (cm)	4.94 ± 0.56	
Cervix	External os	Internal os
Length (cm)	4.92 ± 1.06	2.10 ± 0.34
Diameter (cm)	0.91 ± 0.40	0.62 ± 0.20
Vagina		
Length (cm)	7.1 ± 0.99	
Diameter (cm)	8.79 ± 1.30	

The left uterine horn in this study was found to have a dimension 9.86 ± 1.38 cm in length and diameter of 4.43 ± 2.48 cm, while the right uterine horn have a length of 6.5 ± 0.9 cm and a diameter of 3.39 ± 0.70 cm (Table 1). These values are lower when compared with those of Ribadu, (1988) and Shalash, (1965). These differences may be due to breed differences and physiological states of the animals. The uterine horn diameter at the base of the horn as reported by Ribadu, (1988) is 4.64 ± 1.23 cm for the left horn and 3.79 ± 0.98 cm for the right and are in consonance with values obtained in this study and also agrees with the result obtained by Shalash, (1965), who reported that the left and right uterine horns diameter as 4.29 ± 0.90 cm and 3.73 ± 0.63 cm respectively.

Mean value obtained in this study for the length and width of the uterine body (Table 1) are higher than the values reported by Ribadu, (1988) and Shalash, (1965). The uterine diameter recorded in the present study are 4.99 ± 0.01 cm and 3.73 ± 0.63 cm for the left and right horns respectively. The differences may be due to breed differences, for differences do exist between the breeds of camels slaughtered in the Kano area and those slaughtered around Sokoto basin. Those slaughtered around the Kano area where Ribadu, (1988) conducted his study are mostly heavier breeds light brown to white in colour while those slaughtered in the Sokoto metropolitan abattoir are lighter, taller and mostly brown in colour.

From the table, the length of the cervix is 4.92 ± 1.06 cm, the length of the external OS is 1.95 ± 1.50 cm, the diameter of the external os is 2.10 ± 0.34 cm, the length of the internal OS is 0.91 ± 0.40 cm and the diameter of the internal os is 0.62 ± 0.20 cm. The mean dimensions of non-pregnant corpus uteri are 9.59 ± 2.27 cm for length and 4.94 ± 0.56 cm for width. The pregnant uterine has a length of 43.90 ± 9.03 cm and a width of 18.13 ± 5.88 cm (Table 1). The vagina in the non-pregnant camel has a length of 27.5 ± 5.30 cm and a diameter of 1.35 ± 1.37 cm (Table 1). Mean dimensions of the non-pregnant camel cervix in this study, (Table 3:5) agrees with earlier reported measurements by Ribadu (1988), Shalash, (1965), and Mukasa Mugerwa, (1981). Only slight variation exists between the values for cervical diameter. No measurements were taken for weight because of apparent difficulty in neatly separating various structures of the reproductive tract.

The vagina was found to have mean length and diameter of 27.5 ± 5.30 cm and 1.35 ± 1.37 cm respectively. These figures are slightly higher than those of Ribadu, (1988), but in close agreement with values given by Nur, (1984) and slightly lower than values recorded by Tayeb, (1953).

4. Conclusion

It is concluded that the mean values obtained in this study were essentially in agreement with a considerable number of similar studies. However, a number of differences have also been observed, this can be attributed to species and ecotype difference. Peculiar measurements can be seen with the ecotypes of camels slaughtered in the Sokoto basin area.

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