

Ultrasonographic Biometry of the Ovaries of Pregnant Buffaloes

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Abstract: The studies were carried out during the year 2012 to examine the echoic characteristics of ovaries of pregnant buffaloes, recording the health, body condition score; and comparing the accuracy of measurement of ovaries on the basis of ultrasonography and morpho-biometry of left and right ovaries. The results showed that age of pregnant buffaloes was 3.93 ± 0.06 years, and the differences in age between experimental buffaloes were non-significant ($P > 0.05$). Ultrasonographic biometry of ovaries of pregnant buffaloes indicated that the length of right ovary was slightly greater (34.68 ± 23.46 mm) than the length of left ovary (34.62 ± 25.72 mm). Similarly, the width of left ovary was significantly ($P < 0.05$) greater (18.97 ± 13.10 mm) than the width of right ovary (12.96 ± 2.74 mm); while circumference of left ovary was remarkably ($P < 0.05$) higher (65.40 ± 17.02 mm) than the circumference of right ovary (54.45 ± 23.86 mm). Likewise, the volume of left ovary was markedly ($P < 0.05$) higher (3.07 ± 1.34 cm²) than the volume of right ovary (2.63 ± 1.25 cm²). However, the thickness of right ovary was slightly greater (4.67 ± 0.74 mm) than the thickness of left ovary (4.42 ± 0.99 mm). Morpho biometry of ovaries of buffaloes revealed that the length of left ovary was slightly ($P > 0.05$) higher (3.79 ± 2.50 cm) than the length of right ovary (3.49 ± 2.58 cm). However, the width of left ovary was also slightly greater (1.48 ± 0.32 cm) than the width of right ovary (1.34 ± 0.30 cm). Similarly, the circumference of left ovary was also significantly ($P < 0.05$) greater (6.62 ± 1.81 cm) than the circumference of right ovary (6.16 ± 1.44 cm). Likewise, the thickness of right ovary was slightly ($P < 0.05$) higher (0.47 ± 0.07 cm) than the thickness of left ovary (0.44 ± 0.07 cm). However, volume of right ovary was slightly ($P < 0.05$) higher (0.27 ± 0.13 cm) than the volume of left ovary (0.25 ± 0.09 cm). It was observed that thickness and volume of right ovary of pregnant buffalo were greater than the left ovary; while length, width and circumference were greater in left ovaries than the right ovaries when measured manually. Ultrasonographic biometry of follicles of pregnant buffaloes showed that the number of primary follicles of left ovary of pregnant buffalo was significantly ($P < 0.05$) higher (3.28 ± 1.60) than the primary follicles of right ovaries of buffalo (2.85 ± 1.06). Result showed secondary follicles of right ovary of pregnant buffalo was slightly ($P > 0.05$) higher (6.00 ± 1.52) than the secondary follicles of left ovaries of buffalo (5.71 ± 1.49). Similarly, the number of tertiary follicles of left ovary of pregnant buffalo was significantly ($P < 0.05$) higher (7.85 ± 2.85) than the tertiary follicles of right ovaries of buffalo (7.28 ± 0.95).

Keywords: Ultrasonographic, right and left ovary, pregnant buffalo, Follicles. Ovaries.

I. Introduction

Ultrasonography is a simple, reliable and non-invasive imaging technique without secondary effects. Application of real time ultrasonography in veterinary practice has developed to become the most efficient diagnostic tool for managing reproduction. The uses and utility of ultrasonography for the pregnant buffalo evaluation of physiological and pathological conditions and for the application of assisted reproductive technologies. Assessment of pregnancy status and fetal viability early postbreeding to identify cows that fail to conceive improves reproductive efficiency by decreasing the interval between artificial insemination services and increasing artificial insemination service rate. Ovarian and uterine pathologies, not accurately detected via rectal palpation, can easily be visualized by ultrasound and appropriate therapies can be implemented. Determination of fetal sex in utero is useful when coupled with a management decision that justifies the expense of fetal sexing. Development of integrated reproductive management systems that combine ultrasound with new and existing reproductive technologies will further enhance the practical applications of ultrasonography. Development of extension education programs to train practitioners to use ultrasound for routine reproductive examinations is a critical step toward rapid implementation of this technology into the dairy industry.

II. Materials And Methods

The present study was conducted on 16 ovaries (08 left and 08 right ovaries) of buffalo collected from slaughter house and transported to the Department of Veterinary Surgery and Obstetrics for ultrasonography and biometry examinations. Ovaries were kept in water filled tray and ultrasound examination was performed by ultrasound machine (HS-2000, Honda Electronics CO. Ltd., Japan). Comparisons were made between ovaries measured by ultrasound machine and actual length recorded after dissection. Length and width of the ovaries were measured as pole to pole, surface to surface, respectively with the help of ultrasound machine and manually. Linear measurements of the ovaries were made with inch tape using the average of three measurements as per Bhattacharya and Luktuke (1960). The following measurements were done using ultrasound machine and manually. Length: The length of the ovary was taken as the distance from the anterior pole to the posterior pole along an axis parallel to the ovarian mesenterial attachment (base). Width: Width of the ovary was taken as the greater distance from the medial to the lateral surfaces or border. Thickness: Thickness of the ovary was recorded as the greatest distance along an axis vertical to the longitudinal axis (base) at its center or distance from attached to the free borders expressed in cm. Weight: Weight of the ovaries was taken through on the electronic (digital) mono pan balance and expressed in g. Circumference: Circumference of the ovaries was taken using ultrasound machine and manually by using inch tape. Follicles on each ovary were counted as only those clearly visible on the ovarian surface were studied with the help of ultrasound machine. The visible follicles were identified and counted on each ovary.

Statistical analysis

The data collected were analyzed by using Microsoft excel and standard procedures described by Snedecor and Cochran (1967). Values were presented as mean ± SE.

III. Results

The echoic characteristics of ovaries of pregnant buffaloes were examined and recorded health, and body condition score (BCS) during slaughtering. The study also entails the comparison of accuracy of measurement of ovaries on the basis of ultrasonography and morpho biometry in pregnant buffaloes. The data in regards to health and body condition score, ultrasonographic biometry of ovaries, morpho-biometry of ovaries and ultrasonographic measurement of follicles are presented in Tables 1 to 4, and the interpretation of the results are given in the following pages under related sub- headings.

Health and body condition score of buffalo

The experimental buffalos were subjected to health and body condition score and parameters such as age, body weight and body condition score were recorded; and the results on these parameters are presented in Table-1. The results indicated that the average age of pregnant buffalos was 3.93±0.06 years, and the differences in age between experimental buffalos were non-significant (P>0.05). Similarly, the body weight was non-significantly (P>0.05) different between buffalos and on average the weight of animals was 371.5±0.92 kg; while the average body condition score was 3.56±0.01 with non-significant differences (P>0.05) for this characteristic between animals.

Table-1 Health and body condition score of buffalo.

Parameters	Mean ± SD	P-value	Significance
Age (Years)	3.93±0.06	0.0692	NS
BCS	3.56±0.01	0.0782	NS
Body Weight(Kg)	371.5±0.92	0.0954	NS

NS = non significant

Ultrasonographic biometry of ovaries of pregnant buffaloes Ultrasonographic biometry of ovaries of pregnant buffaloes was carried out and the data (Table-2) indicated that the length of right ovary was slightly greater (34.68±23.46 mm) than the length of left ovary (34.62±25.72 mm). Similarly, the width of left ovary was significantly (P<0.05) greater (18.97±13.10 mm) than the width of right ovary (12.96±2.74 mm); while circumference of left ovary was remarkably (P<0.05) higher (65.40±17.02 mm) than the circumference of right ovary (54.45±23.86 mm). Likewise, the volume of left ovary was markedly (P<0.05) higher (3.07±1.34 cm²) than the volume of right ovary (2.63±1.25 cm²). However, the thickness of right ovary was slightly greater

(4.67±0.74 mm) than the thickness of left ovary (4.42±0.99 mm). The results indicated that width, circumference and volume of left ovary of pregnant buffalo was greater than the right ovary; while length and thickness of right ovary was slightly greater than the left ovary.

Table-2 Ultrasonographic biometry of ovaries of buffaloes.

Measurements	Left ovary	Right ovary	P-value	Significance
	Mean + SD	Mean + SD		
Length (mm)	34.62±25.72	34.68±23.46	0.0932	NS
Width (mm)	18.97±13.10	12.96±2.74	0.004	**
Circumference (mm)	65.40±17.02	54.45±23.86	0.0021	**
Volume (cm ³)	3.07±1.34	2.63±1.25	0.0364	*
Thickness (mm)	4.42±0.99	4.67±0.74	0.0741	NS

* = significant
 ** = highly significant
 NS = non significant

Morpho biometry of ovaries of pregnant buffaloes

Morpho biometry of ovaries of pregnant buffaloes was examined and the results in Table-3 revealed that the length of left ovary was slightly (P>0.05) higher (3.79±2.50 cm) than the length of right ovary (3.49±2.58 cm). However, the width of left ovary was also slightly greater (1.48±0.32 cm) than the width of right ovary (1.34±0.30 cm). Similarly, the circumference of left ovary was also significantly (P<0.05) greater (6.62±1.81 cm) than the circumference of right ovary (6.16±1.44 cm). Likewise, the thickness of right ovary was slightly (P<0.05) higher (0.47±0.07 cm) than the thickness of left ovary (0.44±0.07 cm). However, volume of right ovary was slightly (P<0.05) higher (0.27±0.13 cm) than the weight of left ovary (0.25±0.09 cm). It was observed that thickness and volume of right ovary of pregnant buffalo were greater than the left ovary; while length, width and circumference were greater in left ovaries than the right ovaries.

Table-3 Morpho biometry of ovaries of buffaloes.

Measurements	Left ovary	Right ovary	P-value	Significance
	Mean + SD	Mean + SD		
Length (cm)	3.79±2.50	3.49±2.58	0.0832	NS
Width (cm)	1.48±0.32	1.34±0.30	0.0772	NS
Circumference (cm)	6.62±1.81	6.16±1.44	0.0932	*
Volume (cm)	0.25±0.09	0.27±0.13	0.0932	*
Thickness (cm)	0.44±0.07	0.47±0.07	0.0852	*

NS = non significant
 * = significant

Ultrasonographic biometry of follicles of pregnant buffaloes Ultrasonographic biometry of follicles of pregnant buffaloes was studied and the data (Table-4) showed that the number of primary follicles of left ovary of pregnant buffalo was significantly ($P<0.05$) higher (3.28 ± 1.60) than the primary follicles of right ovaries of buffalo (2.85 ± 1.06). The number of secondary follicles of right ovary of pregnant buffalo was slightly ($P>0.05$) higher (6.00 ± 1.52) than the secondary follicles of left ovaries of buffalo (5.71 ± 1.49). Similarly, the number of tertiary follicles of left ovary of pregnant buffalo was significantly ($P<0.05$) higher (7.85 ± 2.85) than the tertiary follicles of right ovaries of buffalo (7.28 ± 0.95). It was observed that primary and tertiary follicles on left ovary of pregnant buffalo was higher than right ovaries; while the number of secondary follicles was higher on right ovary than the left ovary of pregnant buffalo.

Table-4 Ultrasonographic biometry of follicles of buffaloes.

Measurements	Follicle on Left ovary Mean + SD	Follicle on Right ovary Mean + SD	P-value	Significance
Primary follicles (Nos.)	3.28±1.60	2.85±1.06	0.0236	*
Secondary follicles (Nos.)	5.71±1.49	6.00±1.52	0.0842	NS
Tertiary follicles (Nos.)	7.85±2.85	7.28±0.95	0.0239	*

* = significant
 ** = highly significant
 NS = non significant

Right ovary



Left Ovary



The importance of studies on the echoic characteristics of ovaries of buffaloes is well recognized and in such studies the animal health, body condition score is recorded. Moreover, for studying the accuracy in left and right ovaries and the number of primary, secondary and tertiary follicles, the ultrasonography and morpho-biometry examinations are conducted.

The present study showed that body weight was non-significantly ($P>0.05$) different between buffaloes and on average the weight of animals was 371.5 ± 0.92 kg; while the average body condition score was 3.56 ± 0.01 with non-significant differences ($P>0.05$) for this characteristic between animals. Width,

circumference and volume of left ovary of pregnant buffalo were greater than the right ovary; while length and thickness of right ovary was slightly greater than the left ovary when examined through ultrasound. Thickness and volume of right ovary of pregnant buffalo were greater than the right ovary; while length, circumference and width were greater in left ovaries than the right ovaries when measured manually. Number of primary and tertiary follicles on left ovary of pregnant buffalo was higher than right ovaries; while the number of secondary follicles was higher on right ovary than the left ovary of pregnant buffalo. These results are further confirmed by many research workers who carried out similar studies in different parts of the world in different buffalo breeds. Adnan et al., (2012) found that there was marked variation in the left and right ovaries of pregnant buffaloes and the differences in follicles were also observed on right and left 18 ovaries. Kachiwal et al., (2012) found significant increase in the weight, length and width of ovaries as pregnancy advances than non-pregnant buffaloes. A greater number of ovarian structure (follicles) was found at the time of oestrus than anoestrus period. Razzaque et al., (2009) studied biometry and follicular population on ovaries of pregnant buffalo procured from the Civil Slaughter house, Akola. The dimensions were recorded. The visible follicles were counted. In the present study, the average weights of ovaries in cycling and non cycling pregnant buffalo differed significantly ($P<0.01\%$) and the number of follicles on left ovary were greater than right ovary. Terzano et al., (2009)

Concluded that development of integrated reproductive management systems that combine ultrasound with new and existing reproductive technologies will further enhance the practical applications of ultrasonography. Development of extension education programs to train practitioners to use ultrasound for routine reproductive examinations is a critical step toward rapid implementation of this technology into the dairy industry. Buduwara et al., (2008) found the diameter and thickness of the right ovary showed extremely significant increase ($p<0.001$) during the 14-20 weeks of gestation. It causes extremely significant increases in the thickness of the right ovary during the 14-20 weeks of gestation. The thickness of the right ovary is extremely significantly more than those of the left at the 14-20 weeks of gestation.

IV. Conclusions

- Body weight was non-significantly ($P>0.05$) different between buffalos and on average the weight of animals was 371.5 ± 0.92 kg; while the average body condition score was 3.56 ± 0.01 with non-significant differences ($P>0.05$) for this characteristic between animals.
- Width, circumference and volume of left ovary of pregnant buffalo was greater than the right ovary; while length and thickness of right ovary was slightly greater than the left ovary when examined ultrasonographically.
- Thickness and volume of right ovary of pregnant buffalo were greater than the left ovary; while length, circumference and width was greater in left ovaries than the right ovaries when measured manually.
- Number of primary and tertiary follicles on left ovary of pregnant buffalo was higher than right ovaries; while the number of secondary follicles was higher on right ovary than the left ovary of pregnant buffalo.

Suggestions

It is suggested that the animals may be got examined time to time for any disorder in the ovaries and may be treated accordingly. Ultrasonographic biometry of the ovaries of pregnant buffaloes is helpful for better understanding of reproduction. Through ultrasound one can get more accurate and sophisticated results.

Literature Cited

- [1]. Adnan, N., G. Nabi, L.A. Lodhi, S. Ali, N. Ahmad, S. U. Rahman and M. Akhtar. 2012. Histological studies of the pregnant buffalo adenohypophysis with reference to phases of estrus cycle. *Journal of Animal Science*. 22 (3) :181-188.
- [2]. Kachiwal, A.B., B. A. Sheikh, S. A. Sheikh, T. A. Qureshi and M. A. Memon. 2012. Ultrasonographic Biometry of the Ovaries of Pregnant Kundhi Buffaloes. *Journal of animal Science*. 44 (3) 105-109.
- [3]. Razzaque, W.A.A., S.K. Sahatpure, C.H. Pawshe and S.V. Kuralkar. 2009. Biometry of ovaries and follicular count in cycling and non-cycling pregnant buffalo. *Journal of Animal Science*. 78 (4) : 222-226.
- [4]. Snedecor, G. W. and W.G. Cochran 1967. *Statistical methods applied to experiments in agriculture and biology*. 5th ed. Ames, Iowa: Iowa State University Press, 1956.
- [5]. Terzano, L., G. Maria and I. Giuseppina. 2009. Ultrasonography and Reproduction in Pregnant buffalo. *Journal of Meat Production*. 32 (4) : 105-109.