

IMPACT OF FREQUENCY OF TRANSVAGINAL OOCYTE RECOVERY ON OVARIAN BIOMETRY AND OOCYTE YIELD IN CROSSBRED CATTLE OF KERALA

Abhilash R.S^{1*}, Metilda Joseph¹, M.O. Kurien¹, Hiron M. Harshan¹,
T.V. Aravindakshan², K.S. Anil³ and Gleeja V.L⁴

¹Department of Animal Reproduction, Gynaecology and Obstetrics, ²Centre for Advanced
Studies in Animal Genetics and Breeding, ³Department of Livestock Production and
Management, ⁴Department of Statistics,
College of Veterinary & Animal Sciences, Mannuthy, Thrissur, Kerala
E-mail: abhilash@kvasu.ac.in (*Corresponding Author)

Abstract: The present study was carried out on 12 reproductively healthy crossbred cows, having parity between one and six, belonging to University Livestock Farm and Fodder Research Development Scheme, Mannuthy. The selected animals were divided into two groups with six animals each. The animals of group I were subjected to transvaginal oocyte recovery (TVOR) at once weekly while that of group II were subjected to TVOR at twice weekly interval. The ovarian biometry viz., dorso - ventral and medio - lateral diameter, area and circumference of both the ovaries were recorded before performing TVOR. Follicles were categorized as small (<5mm), medium (5-9mm) and large (> 9mm). A significantly higher dorso - ventral diameter (24.70 ± 0.84 and 22.22 ± 1.05 mm, respectively) and medio - lateral diameter (24.8 ± 0.98 vs 23.11 ± 1.05 mm, respectively) of right ovary was noticed when compared to left ovary. Area (4.44 ± 0.20 vs 4.14 ± 0.21 cm², respectively) and circumference (76.18 ± 2.04 vs 72.66 ± 2.04 mm, respectively) of right ovary was significantly higher than left ovary. However, there was no significant difference in dorso - ventral and medio - lateral diameter, area and circumference between ovaries subjected to once weekly and twice weekly TVOR. The follicles aspirated from twice weekly collections were significantly higher in number when compared to once weekly collection (5.15 ± 0.1 vs 4.65 ± 0.15 , respectively). The mean yield of oocytes per session was also significantly higher than once weekly collection (3.14 ± 0.11 vs 2.87 ± 0.11).

Keywords: Biometry, Transvaginal oocyte recovery, TVOR.

Introduction

Livestock rearing plays an important role in Indian economy. High reproductive efficiency is an important facet for achieving maximum returns from cattle rearing. One of the major reasons for limiting the cattle rearing is the reduced reproductive performance of cattle. The knowledge of biometry of ovary and follicular status may give an idea about the fertility of crossbred cattle. Most of the studies related to biometry of ovary and follicle are from slaughter ovaries. In view of the above facts, the present study was designed to investigate

biometry of ovary in live animals by using transvaginal ultrasound and to study the impact of TVOR on biometry of the ovaries and follicular development.

Materials and methods

The present study was carried out in 12 reproductively healthy crossbred cows, having a parity between one and six, belonging to University Livestock Farm and Fodder Research Development Scheme, Mannuthy under Kerala Veterinary and Animal Sciences University, Pookode. The study period was from September 2015 to March 2017. The animals selected for the study were without any history of breeding problems. Selected animals were divided into two groups with six animals in each group. Before performing transvaginal oocyte recovery (TVOR) dorso ventral and medio – lateral diameter, area and circumference of both the ovaries were recorded and biometry of right and left ovary was also compared. Diameter of all the follicles above 2 mm were recorded and were categorized as small (<5mm), medium (5-9mm) and large (>9mm). Transvaginal oocyte recovery was carried out for a period of two months at once weekly (each animal eight times) or twice weekly intervals (each animal 16 times) as per standard procedures (Sakhong *et al.*, 2012) using a transvaginal probe of 5 MHz frequency (Honda HS-2100, Honda Electronics Co., Ltd, Japan). Number of follicles available for puncture and oocytes retrieved were studied.

Result and discussion

Table 1. Biometry of ovary (Mean \pm S.E) following once weekly and twice weekly oocyte aspiration

Frequency of TVOR	Dorso - ventral diameter (mm)		Medio-lateral diameter (mm)		Area of ovaries (cm ²)		Circumference of ovaries (mm)	
	Rt. ovary	Lt ovary	Rt. ovary	Lt ovary	Rt. ovary	Lt ovary	Rt. Ovary	Lt ovary
Once weekly	24.72 \pm 1.19 ^a	22.32 \pm 1.49 ^b	26.25 \pm 1.38 ^a	24.00 \pm 1.49 ^b	4.55 \pm 0.28 ^a	4.32 \pm 0.29 ^b	77.61 \pm 2.88 ^a	75.66 \pm 2.88 ^b
Twice weekly	24.68 \pm 1.19 ^a	22.11 \pm 1.49 ^b	23.42 \pm 1.38 ^a	22.21 \pm 1.49 ^b	4.32 \pm 0.28 ^a	3.96 \pm 0.29 ^b	74.76 \pm 2.88 ^a	69.66 \pm 2.88 ^b
Overall	24.70 \pm 0.84 ^a	22.22 \pm 1.05 ^b	24.8 \pm 0.98 ^a	23.11 \pm 1.05 ^b	4.44 \pm 0.20 ^a	4.14 \pm 0.21 ^b	76.18 \pm 2.04 ^a	72.66 \pm 2.04 ^b

For each parameter means with different superscript a-b in rows differ significantly

* Significance at 5% level

In the present study there was a significantly higher ($P < 0.05$) dorso-ventral diameter of right ovary when compared to left ovary (24.70 ± 0.84 and 22.22 ± 1.05 mm, respectively). Also medio-lateral diameter of right ovary was significantly higher than left ovary (24.8 ± 0.98 vs 23.11 ± 1.05 mm, respectively). Area (4.44 ± 0.20 vs 4.14 ± 0.21 cm², respectively) and circumference (76.18 ± 2.04 vs 72.66 ± 2.04 mm, respectively) of right ovary was significantly higher than left ovary. However, there was no significant difference in dorso-ventral and medio-lateral diameter, area and circumference between once weekly and twice weekly TVOR.

The dorso-ventral and medio-lateral diameter of right and left ovary obtained in the present study were in agreement with the findings of Priscilla (2001) who studied the biometry of ovaries of crossbred cattle from slaughter house and reported that the average length, width and thickness of the ovary in crossbred cows of Kerala as 2.47 ± 0.03 , 1.81 ± 0.03 and 1.42 ± 0.03 cm. However the ovarian size reported by Monteiro *et al.* (2008) in Nellore cattle was much higher, length, width and thickness of ovaries of cows and heifers was 3.15, 2.82 cm and 2.30, and 2.08 cm, 1.69 and 1.56 cm, respectively.. This increased surface area of ovaries in such animals may be the reason for high yield of oocytes during aspiration session in Nellore cattle.

In the present study the right ovary is more active than left ovary, similar findings were reported by Karamishabankareh *et al.* (2015) who studied *in vivo* and *in vitro* function of the right and left bovine ovaries and reported that right ovary is more active and more number CL on right ovary than left ovary (60.9% vs. 39.1%, respectively) and more per cent of cleavage and blastocyst production from oocytes derived of right ovary.

Table 2. Effect of frequency of TVOR on follicular size and number of oocytes retrieved in crossbred cattle

Frequency of TVOR (Number of sessions/animal)	Number of Follicles (Mean \pm S.E.)			No of follicles aspirated /session	Oocyte yield per session (Mean \pm S.E)
	Small	Medium	Large		
Once weekly (8)	2.42 ± 0.12^A	1.1 ± 0.11^A	1.02 ± 0.07^A	4.65 ± 0.15^A	2.87 ± 0.11^A
Weekly twice (16)	2.81 ± 0.12^B	1.8 ± 0.11^B	0.52 ± 0.07^B	5.15 ± 0.15^B	3.14 ± 0.11^A
Overall	2.62 ± 0.09	1.47 ± 0.08	0.77 ± 0.05	4.90 ± 0.1	3.00 ± 0.08

For each parameter means with different superscript (a-b in rows and A-B in columns) differ significantly

* Significance at 5% level

Significantly higher ($p \leq 0.05$) number of small (2.81 ± 0.12 vs 2.42 ± 0.12) and medium follicles (1.81 ± 0.11 vs 1.13 ± 0.11), and lower number ($p \leq 0.05$) of larger follicles (0.52 ± 0.07 vs 1.02 ± 0.07) were observed per session in weekly twice collections when compared to cows subjected to once weekly retrieval schedule. It can corroborate with the findings of Garcia and Salaheddine (1998) who observed that heifers subjected to aspirations twice-weekly yielded a higher number of oocytes collected per session. Twice-weekly aspiration schedule leads to prevention of the development of a dominant follicle that makes relatively homogeneous population of small follicles available for puncture.

The present study also revealed that significantly higher number of follicles could be aspirated from twice weekly collection when compared to once weekly collection (5.15 ± 0.1 vs 4.65 ± 0.15 , respectively). The mean yield of oocytes per session was also significantly higher than once weekly collection (3.14 ± 0.11 vs 2.87 ± 0.11). The total number of follicles available for puncture per session in Karan Fries (an Indian breed of cattle) cattle was higher than our finding 6.8 ± 0.7 (Maniket *al.*, 2003). Also the figures were lower than the values of Holstein heifers 12.4 ± 6.1 (Garcia and Salaheddine, 1998) and Simmental heifers 14.7 ± 2.27 (Goodhandet *al.*, 1999). This increased number of follicles available for puncture in exotic breeds highlights the influence of breed differences, agro climatic condition and nutrition on the follicular populations of various size categories and the resultant oocyte yields possible. It indicates that the potential of crossbred cattle of Kerala to act as oocyte donors is lower than that of exotic breeds of cattle.

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