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Ovarian Pre-Ovulatory Follicular Diameter in Relation to Parity and Body Weight in Crossbred Cattle

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ABSTRACT

Based on the hypothesis that parity and body weight (BW) status of crossbred cows have an influence on the size of their pre-ovulatory follicle (POF), the present study was aimed at documenting the correlation between the diameter of POF with parity and BW of crossbred cattle. A total of 104 crossbred cattle which were diagnosed as oestrus were selected and categorized into three groups *viz.,* Group I: Heifers (n = 22); Group II: Primiparous (n = 28) and Group III: Pluriparous (n = 54). The BWs of all the animals were assessed by indirect method and diameter of POF was measured using ultrasonographic examination on the day of oestrus. The mean diameter of POF ranged between 10.53 - 11.47 mm, which was found to be much smaller than *Bos taurus* cattle (15 – 18 mm). Even though, the POF diameter increased sequentially with parity, there were no significant differences between the groups. Statistical analysis revealed no significant correlation between the BW of the animal and the POF diameter. Hence, it could be concluded that POF diameter might be related to genetic makeup, nutrition, metabolic status, climate etc., rather than the parity and size of the body.

Key Words: Body weight, Crossbred cattle, Parity, Preovulatory follicle.

INTRODUCTION

Ovarian follicle is considered to be the gateway for the fertility of the animal as it contributes for the gamete production and corpus luteum formation, the major events for the establishment of pregnancy. Success of fertility management lies on better understanding of functional anatomy and physiology of ovarian structures of individual species. Most of the time findings are related with biometrical standards set for *Bos taurus* cattle being maintained under different agro-climatic and managemental conditions. It was reported that biometrical standards will alter based on climate, nutrition, genetic makeup (breed), metabolism etc., (Keskin *et al,* 2016). Likewise, morphology of pre-ovulatory follicular (POF) in terms of the diameter and endocrine function affect the ovulation, luteal development and pregnancy outcomein cows (Atkins *et al,* 2010; Yoshiama *et al,* 2021). There are very scanty reports on the factors affecting the follicular size in dairy cattle, and the available literature mostly deals about the relation between under-nutrition and negative energy balance on follicular diameter (Rhodes *et al,* 1995; Beam and Butler, 1999). Since body weight (BW) parameter is related to age and nutritional status, it was hypothesized that parity and BW status of crossbred cows have an influence on the size of theirpre-ovulatory follicle (POF). Hence the present study was aimed at documenting the correlation between the diameter of POF with parity and BW of crossbred cows.

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Table 1. Mean ± SE of body weight and diameter of pre-ovulatory follicle of crossbred cows.

Sr. No	Group	Body weight (kg)	POF diameter (mm)	r value
1	Group I: Heifers	266.95 ± 13.04[a]	10.53 ± 0.60	0.24
2	Group II: Primiparous	313.84 ± 17.12[b]	11.37 ± 0.62	- 0.49
3	Group III: Pluriparous	355.34 ± 12.09[c]	11.47 ± 0.44	0.22
	Significance	*	NS	

* P<0.05 values with different superscripts within the column differ significantly

NS- Not significant

MATERIALS AND METHODS

Crossbred cattle brought for insemination in the Gynaecology Unit of Veterinary Clinical Complex, Veterinary College and Research Institute (TANUVAS), Orathanadu were utilised for the study. A total of 104 crossbred cattle which were diagnosed as oestrus based of anamnesis, clinical signs, gynaeco-clinical examination and ultrasonographic examination were selected randomly. The animals were categorized into three groups viz. Group I: Heifers (2-3 years; n = 22); Group II: Primiparous (1 calving; n = 28) and Group III: Pluriparous (≥ 2 calvings; n = 54). The body weight (BW) of all the animals were assessed by indirect method by following the Minnesota formula (Wangchuk *et al,* 2018).

BW (kgs) = L x G^2 / 600, where, L is the length of the animal from point of shoulder to point of buttocks (inches) and G is the chest girth of the animal (inches).

All the animals were screened using a real time ultrasound scanner equipped with a 7.5-MHz transrectal linear probe to observe the largest follicle on the day of oestrus *i.e.,* POF. Theinternal ultrasound caliper was utilized to measure the length (mm) and width (mm) of thePOF at the maximum cross-sectional area and the diameter (mm) was determined by taking the mean of these measurements (Satheshkumar *et al,* 2008).

The means and standard errors of the BW and POF diameter were arrived for all the three groups of animals. Level of significance between these values was calculated by One-way ANOVA. The BW and POF diameter were correlated using Pearson's correlation co-efficient method (Snedecor and Cochran, 1994).

RESULTS AND DISCUSSION

The mean BW and POF diameter on the day of oestrus was represented in the Table 1. Perusal of the data revealed that there was a significant (P < 0.05) increase in the BW of the crossbred cattle as the age and/or parity advanced. Even though, the POF diameter increased sequentially with parity, there were no significant differences between the groups. The observation was in concurrence with the earlier report of Satheshkumar *et al* (2019) in Indian crossbred heifers and cows. The mean POF diameters of Indian crossbred cows recorded in these studies (10.53 - 11.47 mm) were smaller when compared with *B. taurus* cows (15-18 mm) maintained at temperate climate (Vasconcelos *et al,* 2013; Keskin *et al,* 2016). However, Okouyi *et al* (2015) recorded a mean POF diameter of 9.3 mm in *B. taurus* cows maintained at tropical climate. Thus climatic factor might have an influence on the follicular characteristics.

Statistical analysis revealed no significant correlation between the BW of the animal and the POF diameter. Hence, it could be concluded that POF diameter might be related to genetic makeup, nutritional status, metabolic status, climate etc., rather than the size of the body. On perusing the literature, it was found that the present study is the

first report to correlate and document the follicular size in relation to BW characters in crossbred cows.

CONCLUSION

The diameter of the POF of the crossbred cows increased non-significantly with the increase in parity and BW of the animal. However, there was no significant correlation between these parameters.

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