



# Evidence Based Approach for Midcycle Estrum in a Crossbred Jersey Cows

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## ABSTRACT

**Background:** Effective and correct estrus detection determines the successful Artificial Insemination (AI) and in turn acceptable performance in dairy cows. All cows presented with estrus signs for AI are not usually fit for breeding for which mid cycle estrum (MCE) is one of the major causes that must be ruled out to prevent unnecessary AI and thereby preventing economic loss to the farmer.

**Methods:** The present study was designed to compare reproductive parameters of True Estrum (TE) and MCE in crossbred Jersey cows. Around 24 cows addressed for AI has been randomly selected for the study. Based on history, clinical signs and ultrasonographic examination the cows were divided into two groups TE (n=12) and MCE (n=12) and assessed for their qualitative and quantitative parameters.

**Result:** No significant difference could be observed between TE and MCE cows in expression of estrus signs. The size of the corpus luteum (CL) was significantly larger in MCE cows. In conclusion, no ovulation will occur in MCE cows, hence cows addressing with estrus signs needs to be ruled out for prominent CL (>15 mm) and relaxation of cervical internal os before AI.

**Key words:** Corpus luteum, Crossbred Jersey cow, Follicle, Mid cycle estrum, Ovulation, True estrum.

## INTRODUCTION

The estrous cycle is a rhythmic process ranging from 18 to 24 days with an average of 21 days in cattle. Anything deviated out of this range is considered as abnormal (Senger, 2005).

Within a cycle various numbers of (two or three) follicular waves will occur without much alterations in the length of the cycle. Kumaresan *et al.* (2001) reported that 11.5 per cent cattle are being inseminated apart from the actual estrum. In reproductive management, estrus detection is the vital factor in deciding the conception rate and improper identification of true estrum (TE) is the major limit to the reproductive efficiency of the animal (Madkar *et al.* 2002).

Expression of estrus signs in luteal phase of the estrous cycle is termed as mid cycle estrum (MCE). These animals with MCE exhibit similar signs like TE such as bellowing, vaginal discharge, mounting on other animals, decrease in milk yield (Sood *et al.* 2009; Satheshkumar *et al.* 2014). Rectal examination of the MCE cows revealed a tonic uterus and relaxed cervix as observed in TE (Satheshkumar, 2018). Often the cows are being addressed by the farmers for AI with history of behavioral estrus signs exhibited by the animal. It's difficult in differentiating the animals for TE and MCE based on the routine clinical observations. MCE is one of the etiologies for the cows being inseminated and not getting conceived. With this background the present study was designed to record the incidence and compare reproductive parameters of TE and MCE in crossbred Jersey cows.

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## MATERIALS AND METHODS

A total of 2104 cows presented to the Gynaecology Unit of Veterinary Clinical Complex, Veterinary College and Research Institute Orathanadu, Tamil Nadu India during the period of January to December 2022 were subjected for the study. All the cows reported for estrus signs were ultrasonographically examined (Sonoscape S2V, Italy) and the incidence of TE and MCE has been recorded with evidence (Satheshkumar, 2018). Further, the crossbred Jersey cows with expression of heat signs has been selected for the study and divided into two groups viz., Group I: True Estrum (TE; n= 12) and Group II: Mid Cycle Estrum (MCE;

n = 12). All the cows in both groups were assessed for their qualitative and quantitative parameters. The qualitative parameters include bellowing, vaginal discharge, nature of vulva, vaginal mucous membrane and uterine tonicity were assessed by information form the owner and clinical examination. The cervical relaxation status was determined by the passing an AI catheter through the cervical canal. The DF in the ovary was followed for three days to assess the ovulatory status in all the animals in both the groups. Inter-estrus interval, diameter of dominant follicle (DF) and corpus luteum (CL) and duration of ovulation were categorized under quantitative parameters and assessed by ultrasonographic examination of both the groups.

## RESULTS AND DISCUSSION

Among 2104 cows presented to gynecological examination, 1493 cows had expression of heat signs, of which 1335 cows (89.45%) were in TE and 158 cows (10.55%) were in MCE. Rest of the animals were categorized such as diestrus (6.4%), anestrus (16.20%), repeat breeder (5.18%) and cystic ovarian degeneration (0.67%). The incidence of MCE in crossbred cows was found to be in increasing trend in comparison to previous reports of 2.4%, 6.2% and 8.8% by Sood *et al.* (2009), Satheshkumar *et al.* (2014) and Satheshkumar (2018) respectively.

The inter estrous interval was 18-21 days for TE and 7-12 days in MCE cows. Clear vaginal mucus, bellowing, edematous vulval lips, pink moist vaginal mucus membrane with moderate to intense tonicity of uterus were found in both TE and MCE cows.

The biometry of ovarian structures in TE and MCE are presented in Table 1. Perusal of the data revealed a

significantly larger CL in MCE animals Fig 1a and 1b, but there was no significant difference in the diameter of DF in concurrence with the findings of Satheshkumar (2018). In addition to the DF and CL, multiple small to medium sized follicles (2-4 nos) were present in both TE and MCE cows. Ovarian follicle secrete estrogen which is responsible for expression of estrus signs (Noakes, 2001). Eventhough the estrogen level reached peak at the time of estrus, some distinct rise in estrogen was observed in luteal phase from the large sized follicle in follicular wave (Sood *et al.*, 2009); often its activity is being suppressed by the progesterone from the mature CL of diestrus.

In the three day follow-up study, 75 per cent of animals ovulated in TE group, while no animal ovulated in MCE group. Progesterone has negative feedback at hypothalamus and suppress the release of GnRH. A temporary decline of progesterone during the mid cycle (Fisher and Lamming, 2004) which could increase the sensitivity of estrogen secreted from the first or second wave DF would have resulted in expression of estrus signs at the mid luteal phase (Satheshkumar *et al.* 2012), but the supra basal levels of progesterone could have prevented the ovulation in MCE animals. Hence the threshold size for mature CL in mid luteal phase can be determined with >15 mm diameter, (Satheshkumar, 2018) as a deciding factor for AI.

The qualitative parameter of TE and MCE are presented in Table 2. All animals in the TE cows had relaxed external and internal os of the cervix; however only 75% of the animals in MCE cows had relaxed external os and 25% of the animals had relaxed internal os of the cervix. Procedure of catheterization was assessed based on the degree of easiness 100% and 25% in TE and MCE cows respectively.

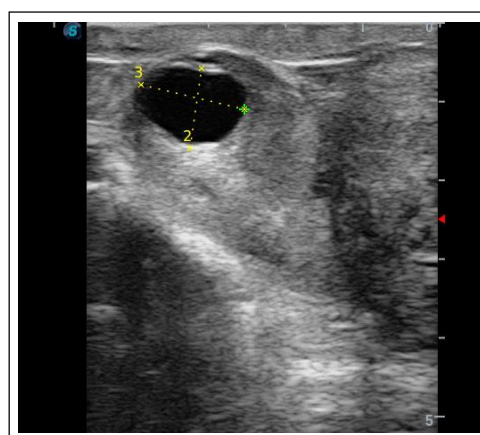
**Table 1:** Ovarian dynamics of True estrus and Mid cycle estrus in crossbred Jersey cows.

Parameter	True estrus (n=12)	Mid cycle estrus (n=12)
Size of the dominant follicle (mm)	10.3±0.5 <sup>a</sup>	9.2±0.3 <sup>a</sup>
Size of the corpus luteum (mm)	9.0±0.7 <sup>a</sup>	18.8±1.2 <sup>b</sup>

Values within the column with different superscripts differ significantly (P>0.01).



**Fig 1a:** Prominent corpus luteum along with dominant follicle in mid cycle estrus.



**Fig 1b:** Dominant follicle in true estrus.

**Table 2:** Qualitative parameter of true estrum and mid cycle estrum in crossbred Jersey cows.

Parameter	True estrum (n=12)	Mid cycle estrum (n=12)
Relaxation of Ext. os of cervix	12 (100%) <sup>a</sup>	9 (75%) <sup>b</sup>
Relaxation of Int. os of cervix	12 (100%) <sup>a</sup>	3 (25%) <sup>b</sup>
Ease of AI technique- Easy	12 (100%) <sup>a</sup>	3 (25%) <sup>b</sup>
Ease of AI technique- Difficult	0 <sup>a</sup>	9 (75%) <sup>b</sup>

Values within the column with different superscripts differ significantly ( $P>0.01$ ).

The ease of performing AI in terms of cervical relaxation was 100% evident in TE cows; however, 25% of MCE cows had a relaxed internal os of the cervix made the AI procedure easy and 75% of the MCE cows had closed to partially relaxed internal os of the cervix result in negotiating the AI catheter while performing AI; which may cause disruption of the normal closure of the internal os if the animal would have been conceived from the previous AI in TE. Hence negotiation of the internal os of the cervix if the cow is suspected for AI has to be avoided. Thus, assessment of cervical relaxation of internal os may be considered as an additional parameter in differentiating MCE from TE.

## CONCLUSION

To conclude, MCE cows exhibit signs like TE cows. Under small farming community with few animals on rearing, mounting signs may not be evident and visual observation on expression of heat signs is the idyllic method which is being followed for estrus detection and AI (Sood and Nanda, 2006). It is difficult to distinguish between TE and MCE by rectal examination. Even though the DF in the MCE cows is responsible for expression of estrus signs, it cannot ovulate due to the presence of progesterone block from the CL of the mid luteal phase. Use of ultrasonography to assess the size of the CL before attempting for AI will aid in differentiating between TE and MCE. In absence of ultrasonography, cervical relaxation of internal os may aid in deciding the MCE from TE.

## Conflict of interest

Authors declare no conflict of interest.

## REFERENCES

Fisher, M.W. and Lamming, G.E. (2004) Expression of behavioural signs of oestrus during mid-cycle in a dairy cow. *New Zealand Veterinary Journal*. 52: (5): 297-297. DOI: 10.1080/00480169.2004.36443.

Kumaresan, A., Ansari, M.R. and Sanwal, P.C. (2001). Assessment of the accuracy of oestrus detection by progesterone assay in cattle and buffaloes. *Indian Journal of Dairy Science*. 71(8): 34-36.

Madkar, A.R., Boro, P. and Abdullah, M. (2022). Estrus detection methods in dairy animals-Advances and the prospects: A Review. *Agricultural Reviews*. 43(3): 362-367. DOI: 10.18805/ag.R-2107.

Noakes, D.E. (2001): Endogenous and Exogenous Control of Ovarian Cyclicity. In: Arthur's Veterinary Reproduction and Obstetrics. [Noakes, D.E., T.J. Parkinson, G.C.W. England, Eds.]. 8<sup>th</sup> ed., Baillierer Tindall, London. Pp: 19-21.

Satheshkumar, S. (2018). Physiological and Endocrinological Characterization of Mid-Cycle Oestrus in Crossbred Cows. *International Journal of Livestock Research*. (8):128 -134. doi:10.5455/ijlr.20180201050059.

Satheshkumar, S., Raj, H.P., Saravanan, M., Kumar, M.R. and Veerapandian, C. (2014). Ultrasonographic and Endocrinological Characterization of Mid-cycle Oestrus in Crossbred Cattle. In: *Proceedings of the International Symposium: Current Challenges and Translational Research to Augment Animal Reproduction*. Chennai, India. Pp: 155.

Satheshkumar, S., Subramanian, A., Devanathan, T.G., Kathiresan, D., Veerapandian, C. and Palanisamy, A. (2012). Follicular and endocrinological turnover associated with GnRH induced follicular wave synchronization in Indian crossbred cows. *Theriogenology*. 77: 1144-1150.

Senger, P.L. (2005). *Pathways to Pregnancy and Parturition*. Second Revised ed. Current Conceptions, Inc, Pullman, WA.

Sood, P. and Nanda, A.S. (2006): Effect of lameness on estrous behavior in crossbred cows. *Theriogenology*. 66: 1375-1380.

Sood, P., Vasishta, N.K., Singh, M. and Pathania, N. (2009). Prevalence and certain characteristics of mid-cyclic estrus in crossbred cows. *Veterinarski Arhiv*. 79(2): 143-149.