INFLUENCE OF BODY CONDITION SCORE AT THE TIME OF AI AND DURATION OF ESTRUS ON OVULATION RATE AND FERTILITY IN CROSSBRED JERSEY COWS

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ABSTRACT

Based on behavioural signs of estrus and on rectal palpation of genitalia, sixty-eight crossbred Jersey cows were selected to study the influence of Body Condition Score (BCS) at the time of AI and duration of estrus on ovulation rate and fertility. Ovarian Ultrasonography was carried out to determine the presence of preovulatory follicle (POF) on d0 (day of AI), and the disappearance of POF on d1 or d2 after AI, whichever is earlier. Ovulation was confirmed based on presence of CL on d12 post-AI on the ovary that had dominant follicle at the time of AI. Pregnancy diagnosis was done on d27 post-AI. Between pregnant and non-pregnant cows, BCS and duration of estrus were similar ($p>0.05$). Similarly, there was no correlation ($p>0.05$) between duration of estrus and intensity of estrus and between duration of estrus and BCS at the time of AI. A positive correlation was noticed between BCS and intensity of estrus. Also, BCS between group of cows that ovulated at different time intervals was similar ($p>0.05$). The duration of estrus was longer ($p<0.05$) in cows that ovulated beyond 48h after AI compared to other cows. The percentage of cow showing intense, intermediate and weak estrus signs was 63.1%, 36.8% and 0%, respectively. The ovulation and pregnancy rate tended to be higher ($p>0.05$) in cows that exhibited intense estrus compared to intermediate estrus.

Keywords: Conception rate, Crossbred cows, Estrum, Ovulation, Progesterone profile

Despite progress in synchronizing estrus and artificial insemination, the reproductive performance of dairy cows has not substantially improved (Lopez-Gatius, 2003). The variation in both intensity and duration of estrus forms a major contributing factor to decline in reproduction efficiency in modern dairy cows (Law *et al*., 2009). The knowledge of estrous behaviour is essential for estimating the ovulation time, the best time for AI and to obtain best conception rate (Venkata Ramana *et al*., 2013). In the present study, the effect of estrous pattern and Body Condition Score (BCS) at the time of AI on fertility was studied in crossbred Jersey cows.

Sixty-eight post-partum crossbred Jersey cows bought for artificial insemination were utilized for the present study. Following confirmation of estrus by per-rectal palpation of genitalia, cows were inseminated (Day 0) with frozen semen straws from a bull of prove fertility. The intensity of estrus was quantified based on the behavioural signs of estrus visualized by the cattle owner and estrous confirmation by palpation per-rectum. The intensity of estrum was scored by using a modified estrous score card (Abdul Salam, 2014). Based on the total score assigned, animals were classified as in intense, intermediate and weak estrus. At the time of AI, BCS was determined in all cows from one (thin) to five (fat) on a five-point scale with 0.25 unit increments based on evaluation of eight body areas (Edmonson *et al*.,1989). The time of onset of estrus and post-AI cessation of behavioural signs of estrus were recorded to determine the duration of estrus.

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Ultrasonographic examination of the ovaries of all the animals was carried out to determine the presence of preovulatory follicle on d0, and the disappearance of POF d1 or d2 after AI, whichever is earlier. Ovulation was confirmed based on the presence of corpus luteum (CL) on d12 post-AI on the ovary that had dominant follicle at the time of AI. The pregnancy status was determined for all the cows on d27 after AI. All the statistical analyses were performed using Prism 5 for windows software.

For the pregnant cows (n=31), the mean values and range of BCS at the time of AI and the duration of estrus were 2.70±0.07 (2.0-3.5) and 22.9±0.7h (10-41.4h), respectively, whereas, the respective values ($p>0.05$) for their non-pregnant counterparts (n=37) were 2.76±0.09 (2.0-4.5) and 23.2±1.1h (12.5-41.4h.) respectively. Overall, the mean duration of estrus (22.9±0.7h; n= 68) observed in the present study was similar to a previous study in dairy cows (21.74h; Das *et al.*, 2009).

There was no significant correlation between duration of estrus and intensity of estrus (r=-0.075) and between duration of estrus and BCS (r=- 0.052) at the time of AI. However, the BCS was positively correlated (r=0.291; $p<0.05$) with intensity of estrus, suggesting that cow in good body condition exhibited prominent behavioral signs of estrus compared to their counterparts in poor body condition at the time of AI, in agreement with a previous study (Flores *et al.*, 2006).

Body condition score at the time of AI and the duration of estrus was similar ($p>0.05$) between cows that ovulated before AI, and <24h or 24-48h following AI and the anovulated cows (Table 1). However, the mean duration of estrus was higher ($p<0.05$) in cows that ovulated >48 h after AI compared to cows in other groups (Table 1). Similar to the present study, a previous trial recorded longer duration of estrus in cows with delayed ovulation (Das *et al.*, 2009).

When the cows were stratified based on the intensity of behavioural signs of estrus, more number of cows showed intense estrus (63.1%; n=43) followed by intermediate (36.8%; n=25) estrous signs. In the present study, weak estrus was not observed in any of the cows. A previous study reported that 67.7, 22.9 and 9.5% cows were in good, moderate and weak estrus, respectively (Bhattacharyya *et al.,* 2012). Others reported that more number of cows exhibited moderate/good estrus (87.5%) compared to intense/very good estrus (12.5%; Selvaraju *et al.*, 2008). Since in the present trial, only animals that were brought for AI by the cattle owners based on the observation of behavioural signs of spontaneous estrus were included, cows that exhibited weak behavioural signs of estrus might have been unobserved or ignored by the cattle owners. Similar to the present study, earlier studies also reported that animal with weak behavioural signs of estrus were not reported for AI at natural estrus (Selvaraj, 2008).

The ovulation rate for cows that showed intense and intermediate estrus was 93.0% (n=40) and 88.0% (n=22), respectively. The pregnancy rate for cows that exhibited intense and intermediate estrus was 46.5% (n=20) and 44.0% (n=31) respectively. The ovulation and pregnancy rates were higher ($p>0.05$) in cows that exhibited intense estrus compared to intermediate estrus. Earlier, a positive correlation was reported between intensity of estrus and pregnancy rate (Gunasekaran *et al.*, 2008). In the present study, intensity of estrus was assessed based on the history on behavioural signs and on rectal palpation. Further, most of the cows in the present study were from small units, managed in intensive housing system, where the cows could not able to exhibit mounting behaviour. This could result in difference in expression level of estrus behaviour in individual cows (Van Vlient and Van Eerdenburg, 1996).

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Table 1: Ovulation time in relation to Body Condition Score (BCS) and duration of estrus in crossbred Jersey cows. Ovulation time with respect to time of AI (day 0; 0h)

Ovulation time	**<0h**, n=3	**0≤24h**, n=46	**24-48h**, n=8	**>48h**, n=5	**Anovulatory**, n=6
BCS	3.00±0.0 (3.0-3.0)	2.67±0.06 (2.0-3.0)	2.81±0.19 (2.0-3.0)	2.50±0.15 (2.0-3.0)	3.00±0.3 (2.0-4.5)
Duration of estrus, h	20.8±2.5[a] (16-24)	21.7±0.5[a] (12.5-28.5)	24.4±3.0[a] (10-36.5)	32.4±6.5[b] (13-41.5)	24.1±1.7[a] (21-23.5)

$p<0.05$, Mean bearing different superscript within a row differ significantly

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