RELATIONSHIP BETWEEN FIRST OVULATION AND PREGNANCY OUTCOME IN EARLY POSTPARTUM DAIRY COWS

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ABSTRACT

The aim of the study was to investigate the relationship between the first postpartum ovulation and subsequent fertility in dairy cows. Forty HF crossbred cows were subjected to ultrasonography examination of ovaries at 72 hours interval from day 7 to 60 days postpartum. Ovulation was confirmed by the disappearance of the dominant follicle that had been detected at the previous examination and subsequent CL formation. The cows which were ovulated between 10 to 26 (21 ± 1.56) days postpartum were conceived within 90 days.

Keywords: First ovulation, HFx , Ovarian resumption, Pregnancy outcome

INTRODUCTION

The calving interval is the major parameter used to assess bovine reproductive efficiency. In general, a calving interval of about 1 year is considered economically optimal for dairy cows (Dijkhuizen *et al*., 1984). To achieve such a calving interval, a new conception after parturition is based on the coordinated work of the hypothalamus, pituitary, ovaries, and uterus, will result in an excellent uterine involution and an early resumption of ovarian function (Lamming *et al*., 1981).

Uterine involution is considered to be complete when both uterine horns have returned to their non-gravid size. The time required for complete involution varied from 25 to 50 days post-partum (Hussain *et al*., 1991) and early resumption of ovarian activity hasten the uterine involution. The resumption of ovarian activity plays an important role in subsequent fertility (Darwash *et al*., 1997). Since ultrasound imaging technique has been applied to the study of bovine ovarian activity (Savio *et al*.,1988; Sirois and Fortune,1988), the first post-partum ovulation in dairy cows with a normal puerperium and not affected by cystic ovarian disease occurs between 15 and 21 days (Claus *et al*., 1983). More than 80% of postpartum dairy cows had their first ovulation by 50 days after calving , only 54-68% resumed having normal ovarian cycle. Cows with abnormal ovarian function have significantly lower conception rates (Lamming *et al*., 1998).

MATERIALS AND METHOD

Normally calved forty Holstein Friesian cross bred cows with an average body weight of 450-500 Kg were selected as experimental animals. A balanced feeding protocol was followed consisting of green and dry fodder along with concentrates and mineral mixture. These animals were fed according to standard recommendations so as to meet the requirements of growth, maintenance, pregnancy and lactation. Animals had unrestricted access to clean water. Cows were milked twice daily (04.00 and 15.00 hrs).

Transrectal ultrasonography 7.5 MHz , (Sonoray, China, DS-30) was used to examine the ovaries, twice weekly, from 7 DPP until confirmation of first ovulation or until 60 DPP whichever occurred earlier. Ovulation was confirmed by the disappearance of the dominant follicle that had been detected at the previous examination and subsequent CL formation (Colazo *et al.,* 2009).All the cows were inseminated (day 0) with good quality frozen thawed semen having post-thaw motility more than 50% and cows that retained the pre ovulatory follicle on d1 post-AI were re-inseminated. All the cows were subjected to pregnancy verification on 28 and 60 day post-AI by using ultrasound scanner.

The data collected on various parameters were grouped and subjected to statistical analysis by one-way ANOVA and correlation coefficient for correlating the parameters as per the procedure of statistical analysis system (SPSS, version 20.0 for windows).

RESULT AND DISCUSSION

The relationship between first postpartum ovulation day and pregnancy outcome between pregnant and non-pregnant cows is presented in Table 1. Significant difference was observed between the day of first ovulation after parturition and pregnancy outcome. Cows ovulated between 10 to 26 (21.50 ± 1.56) days postpartum were conceived earlier compared to Cows ovulated between 27 to 45 (29.79 ± 1.61) days postpartum.

The present study clearly indicated that cows ovulated within 3 weeks postpartum had a shorter interval

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from parturition to first service and increased the conception rate by 90 days after calving compared with the cows which ovulated after 3 weeks of postpartum. Similar reports were found in the study conducted by Kawashima *et al*., (2006) and Furukawa *et al*., (2020).

Table No. 1: Relationship between first postpartum ovulation day and Pregnancy outcome (Mean ± SEM)

Pregnancy outcome	First Ovulation day*	First observed estrum & AI*	Pregnancy diagnosis at 28 days post AI by US (n)	Pregnancy diagnosis at 90 days post AI by US (n)
Pregnant	21.50 ± 1.56 (10 to 26)	62.1±6.7 (59 to 65)	16	16
Non Pregnant	29.79 ± 1.61 (27 to 45)	73.6±8.7 (69 to 82)	24	24

*Means - Significant at 5 % Level (P < 0.05)

The first postpartum ovulation is related to earlier resumption of ovarian function, earlier first service and conception in dairy cows (Darwash *et al*., 1997).In this study also, early postpartum ovulation (<3 weeks) resulted in higher pregnancy rate. Smith *et al.,* (1998) observed 85% of cows that failed to ovulate (<3 weeks) had subsequent normal ovarian cycle.

Earlier studies indicated that the first postpartum ovulation was silent and short luteal phase (Horan *et al*., 2005 and Khawashima *et al*., 2006).Other Studies indicated that the LH pulse frequency (Beam *et al*., 1999) and plasma insulin-like growth factor-1 (IGF-1) level (Beam *et al*., 1999) are closely related to the first ovulation during the postpartum period. Negative energy balance is one of the predisposing factors, which is caused by insufficient feed intake for milk production during the early lactation period, reduces the LH pulse frequency (Beam *et al*., 1999) and plasma IGF-1 level (Spicer *et al*., 1990), which results in delayed resumption of ovarian activity followed by increase in intercalving period.

In conclusion, Ovulation within three weeks of postpartum had reduced the interval from parturition to first service, positively influenced the conception rate. Resumption of ovarian activity subsequent to early postpartum ovulation has been shown to play an important role in subsequent fertility in dairy cows (Darwash *et al*., 1997), and abnormal ovarian cycles before service have been shown to have negative effects on reproductive performance, including interval to first AI and pregnancy rate (Shrestha *et al*., 2004).

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