SERUM PROGESTERONE AND OVULATION TIME IN COWS PRESENTED FOR AI AND THE SUBSEQUENT PREGNANCY RATE

C. EZHILARASAN[1], K. MURUGAVEL[2]*, D. ANTOINE[3] AND M.S. RAJU[4]

Department of Veterinary Gynaecology and Obstetrics,
Rajiv Gandhi Institute of Veterinary Education and Research,
Pondicherry - 605 009

ABSTRACT

Serum progesterone at the time of AI, ovulation time and the subsequent pregnancy rate was investigated in 68 crossbred Jersey cows presented for AI (day 0). Ovarian ultrasonography was carried out, a) to record preovulatory follicle (POF) on day 0, b) disappearance of POF on day 1 or day 2 after artificial insemination (AI), c) to confirm ovulation on day 12 post-AI, and d) on day 27 to confirm pregnancy. Serum progesterone was estimated from the blood samples collected on day 0. Ovulation rate in cows was 91.2% (n=62/68). Out of these, the percentage of cow that ovulated between 0-24h (67.6%) was higher (p<0.05) than their counterparts ovulating between 24-48h (11.8%). The number of cows ovulating before AI and 48h after AI was three and five, respectively. The percentage of anovulation was 8.8. Pregnancy rate for the cows that ovulated between 0-24h or between 24-48h after AI was 54.3% and 75.0%, respectively. Serum progesterone was higher (p<0.05) in cows that ovulated before AI, >48h after first AI and in the anovulatory cows compared to their counterparts ovulating between 0-24h and 24-48h following first AI, thus concluding that 20.6% cows reported for AI were not in proper estrus.

Keywords: Crossbred cows, Estrus, Ovulation time, Pregnancy rate, Progesterone

INTRODUCTION

The time of artificial insemination (AI) with respect to status of estrus when a cow was brought for AI and the duration between AI and ovulation of a preovulatory follicle (POF) influences the pregnancy rate (Roelofs, 2005; Van Eerdenburg *et al.,* 2002). In fact, milk/plasma progesterone assays indicate that between 5-30% cows reported for AI and inseminated were not in proper estrus (Kafi *et al.,* 2007). However, the reports regarding the ovulation-AI interval and the subsequent pregnancy in Indian condition remains scanty (Layek *et al*., 2011). Thus, our main objective was to study the ovulation time and serum progesterone in crossbred Jersey cows that were reported for AI and the subsequent pregnancy rate.

MATERIALS AND METHODS

The present study was conducted on post-partum crossbred Jersey cows that were bought for AI (d0). Cows with abnormal genital discharge, pathological abnormalities of the reproductive tract detectable on palpation per rectum and cows with sub-clinical endometritis based on white side test of vaginal discharge were excluded from the study. The study population was finally formed by 68 post-partum lactating cows that had confirmed estrus based on behavioural signs of estrus and per rectal palpation of genitalia.

Ovarian ultrasonographic examination of all the cows was carried out using Honda HS-2000 unit equipped with a 7.5 MHz rectal probe to determine the presence of preovulatory follicle (POF) on d0, disappearance of POF d1 or d2 after AI, whichever is earlier. Ovulation was considered to have occurred if the dominant follicle detected on the previous

[1]Veterinary Consultant, Cooperative Milk Producers' Union Ltd., Tirunelveli, Tamilnadu; [2]Associate Professor, [4]Professor and Head; [3]Professor and Head, Department of Teaching Veterinary Clinical Complex; *dr.murugavel@gmail.com

day disappeared. The presence of circumscribed hyperechoic reflection due to ovulatory depression along with number of small follicles in the periphery of the ovary during first ultrasound examination on d0 was considered that ovulation has taken place prior to AI. Ovulation rate was calculated based on the presence of corpus luteum (CL) on d12 post-AI on the ovary that had dominant follicle at the time of AI. Anovulation was confirmed based on absence of CL on the ovary on d12 post-AI. All the cows were inseminated with frozen semen (day 0) and cows that retained the POF on d1 post-AI were re-inseminated. All the cows were subjected to pregnancy verification on day 27 post-AI by using ultrasound scanner.

Blood samples were collected from all the cows at the time of AI. Blood was allowed to coagulate at room temperature, stored at 4°C for 24h and centrifuged at 1200xg for 30 min. Serum was separated and stored at - 20°C until Radioimmunoassay (RIA). Serum progesterone was estimated using a commercial solid-phase RIA kit (Immunotech, Beckman Coulter, France) at National Institute of Animal Nutrition and Physiology (ICAR), Bengaluru. The mean progesterone values were statistically analyzed using Student's "t" test.

RESULTS AND DISCUSSION

Overall ovulation rate in the cows of present study presented for AI was 91.2% (n=62/68, Table 1). The percentage of cow that ovulated between 0-24h (67.6%; n=46) was higher (p<0.05) than the cows that ovulated between 24-48h (11.8%; n=8). These results concurred with the findings of previous studies in dairy cows (Van Eerdenburg *et al*., 2002). However, in case of heifers, 92.1% ovulated within 24 h post-AI (Hernández-Cerón *et al*., 1993).

At the time when cows were presented for AI, three (5.9%) had already ovulated, ovulation in five (7.3%) occurred >48h after first-AI and six (8.8%) failed to ovulate (Table 1). The anovulatory percentage of the present study was in accordance with the findings of a previous study, where 8.1% cows exhibited anovulation (Bhat and Bhattacharyya, 2012). However, another study recorded higher incidence of anovulation of 16.3% in repeat breeder cow (Bhattacharyya *et al.,* 2012).

The present study revealed that pregnancy rate for the cows that ovulated within 0-24h after AI was 54.3% (Table 1), which agreed to a previous observation reporting 52.0% pregnancy rate in dairy cows ovulated during same AI-ovulation interval (Van Eerdenburg *et al.,* 2002). In addition, the pregnancy rate was lower (p>0.05) in cows that ovulated between 0-24h after first AI compared to cows that ovulated between 24-48h after first AI (Table 1).

Serum progesterone was higher (p<0.05) in cows that ovulated before AI, >48h after first AI and anovulatory cows compared to cows that ovulated between 0-24h and 24-48h following first AI (Table 1). In fact, in the present study, 20.6% (n=14) cows had serum progesterone ≥1 ng/ml on d0 (Table 1), indicating that these cows were not in proper estrus when reported for AI. This result agreed with the previous findings in dairy cows (Reimers *et al.*, 1985).

Tablet 1: Serum progesterone (P$_4$) and pregnancy rate in cows presented for AI in relevance to AI-ovulation interval. Ovulation with respect to time of first AI (day 0; 0 h)

Ovulation time	<0h (n=3)	0≤24 h (n=46)	24-48h (n=8)	>48h (n=5)	Anovulatory (n=6)
Pregnancy rate, %	0.0 (n=0)	54.3 (n=25)	75.0 (n=6)	0.0 (n=0)	0.0 (n=0)
Serum P$_4$, ng/ml	2.30±0.13[c] (2.17-2.57)	0.59±0.16[ab] (0.01-4.78)	0.12±0.03[a] (0.04-0.30)	1.55±0.62[b] (0.03-3.08)	1.80±0.78[c] (0.05-4.19)

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

Similarly, based on progesterone profile, several authors have reported that 5-30% cows reported for AI and inseminated were not in proper estrus (Nebel *et al.*, 1987 and Kafi *et al.,2007*). From the present study, it can be concluded that 20.6% cows reported for AI by the dairy farmers were not in proper estrus.

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