EFFECT OF POSTPARTUM PERIOD ON SUPEROVULATORY RESPONSE IN CROSSBRED AND INDIGENOUS CATTLE

D.V. PATEL, S.D. BHALODIA, N.N. CHAUDHARI, S.R. PATIL, J.G. BHATOL, H.C. SHARMA AND C.P. DEVANAND

Sabarmati Ashram Gaushala, Bidaj Farm, PO- Lali, Kheda, Gujarat-387 120

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ABSTRACT

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Large numbers of factors are responsible for the superovulatory response in bovines and one of them is calving to flushing interval. Milking animals are under considerable stress due to negative energy balance post-calving which considerably affects the reproductive system. Sizeable number of crossbred and indigenous donor cows were superovulated and flushed at different stages post-calving, i.e. <90 days, 90-150 days, 150-300 days and >300 days. The pooled mean total embryos recovered were 7.57, 7.29, 7.98 and 4.31, respectively. The corresponding mean viable embryos recovered were 2.64, 4.90, 4.69 and 3.88, respectively for the four postpartum periods. Although there was no significant difference with respect to total embryo recovery, there was non-significantly less number of viable embryo recovery in < 90 days group compared to all other groups. Superovulatory response with recovery of total and viable embryos per donor was better at all intervals postpartum in crossbreds as compared to indigenous cows. In both, crossbred and indigenous animals, the viable embryo recovery rate was low compared to the total embryo recovery rates when the donors were flushed before 90 days post-calving.

Key words: Calving, Flush, Superovulation, Responses

Donors from a nucleus herd are always under considerable stress of selection and production of milk and embryos. Further, ovarian responses to the superovulation treatment vary between breeds, individual donors, within cycles of the same donor, stage of lactation, parity, season of flush, etc. This along with limited availability of disease free donors is the major constraint in carrying out MOET programmes.

To cater to the demand of frozen semen doses of high pedigreed bulls in the country, Sabarmati Ashram Gaushala, Bidaj Farm maintains an elite nucleus herd of HF X S, HF X G, HF X K and J X S crossbreds, HF and Jersey purebreds and Sahiwal, Gir and Red Sindhi indigenous animals. Crossbred and exotic animals are machine milked while indigenous animals are hand milked and allowed to suckle till two months after calving. All animals under present study were maintained as per the standard management practices. Deworming, Vaccination and disease testing were done as per the standard health protocol. Flushing data presented here is collected from 2009- 2011.

Donors were selected with <90 days, 90-150 days, 150-300 days and >300 days postpartum period for superovulation and programmed as per standard procedures. Same donor was also repeated during the study period. SOV was done using either 200/400 mg (equally divided constant dose) of Folltropin V (Porcine Follicle Stimulating Hormone). Flushing was carried out on day 7 as per the standard procedure (Misra *et al.*, 1990) using 18 G Rusch catheter (Minitub, Germany) and DPBS media (IMV, France) added with 0.1% Bovine Serum Albumin (BSA, Fraction V, Sigma). All the recovered embryos were evaluated as per standards given by International Embryo Transfer Society Manual (IETS). Based on the availability of recipients, fresh embryos transfers were made in recipients and the surplus embryos were frozen using 1.5M ethylene glycol or vitrified. Data were analysed using standard statistical methods given by Snedecor and Cochran (1989).

In crossbred animals SOV at <90 days, 90-150 days, 150-300 days and >300 days postpartum the

mean total embryo recovery rate was 8.94, 8.85, 9.20 and 5.67, respectibvely. For indigenous animals the corresponding response was 5.10, 4.47, 5.30 and 3.50. Similarly, for crossbred animals the mean viable embryo recovery rate for the 4 periods was 2.78, 5.74, 5.17 and 4.83 and for indigenous animals was 2.40, 3.40, 3.73 and 3.30, respectively. Superovulatory response with recovery of total and viable embryos per donor was better at all intervals postpartum in crossbreds as compared to indigenous cows

The viable embryo recovery rate was non-significantly ($P<0.05$) lower in < 90 days group compared to all other groups. This clearly indicates an undergoing stress period resulting in poor quality embryos. An early stage of lactation is characterized by increase in milk production leading to increase in negative energy balance and reduction in body weight. Cows with high negative energy balance have higher blood concentrations of non-esterified fatty acids (NEFA), which were also detected in the follicular fluid during early postpartum period by Leroy *et al.* (2005). Further in vitro studies by Leroy *et al.* (2008) has showed that high NEFA and low glucose environments during oocyte maturation are detrimental for developmental competence and impair early embryo development. As reviewed by Sartori *et al.* (2010), increased feed intake increases blood flow to the liver, resulting in increased metabolism and circulating steroids leading to reduction in their concentrations, which may lead to reduced embryo quality. Also in superovulated donors, fertilization failure may occur due to inappropriate gamete transport due to hormonal imbalances.

As reviewd by Leroy *et al.* (2012), primary follicles exposed to negative energy balance in early postpartum period may be less capable of producing adequate amounts of oestrogens and progesterone and are likely to contain inferior quality oocyte, which will then be ovulated 4 60-80 days postpartum. Oocyte quality seems to be better during early postpartum (before 30 days) compared with three to four months later. This supports our findings of improvement in viable embryos vs total embryos during early postpartum, which is 35% and improved to nearly 90% viable embryos in late lactating period.

During the early stage of lactation, crossbred and indigenous donors respond poorly in terms of viable embryo recovery rate.

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