



Progesterone impregnated intra-vaginal device and timed artificial insemination (TAI) on fertility in repeat breeding Jersey crossbred cows

T SARATH¹, CECILIA JOSEPH², P VEERAMANI³, J THANGA JEYA⁴, S CHEMMALAR⁵, C PUGAZHARASI⁶, R SURESHKUMAR⁷ and D GOPIKRISHNAN⁸

Tamil Nadu Veterinary and Animal Sciences University, Chennai, Tamil Nadu 600 007 India

Received: 19 November 2018; Accepted: 16 January 2019

Key words: Cow, Fertility, Intra-vaginal progesterone device, Jersey, Repeat breeder, Timed artificial insemination

Interest in bovine infertility increased with the introduction of artificial insemination in the 1950s and as the factors involved became known to farmers, herdsmen physiologists and other workers (Roberts 1956). The causes of infertility in bovine are many and can be complex (Arthur 1982) and they relate to Graafian follicle development and maturation, estrus onset, successful coitus, ovulation, fertilization, implantation, development and delivery of the fetus and its membranes. Anything that interferes with these routines makes the animal infertile (Osmanu 1979). One calf from cow per year is the reproductive objective for dairy animals. Nevertheless, this is not always attained and cows must be re-inseminated during several consecutive cycles. In this context appears the Repeat Breeder Cow syndrome (RBC), comprising a heterogeneous group of sub-fertile cows, without anatomical abnormalities nor infections, that exhibit a variety of reproductive disturbances in a consistent pattern during the course of 3 or more consecutive estrous cycles of normal duration (17–25 days). Any of these disturbances may affect the delicate interplay of estrous behaviour, hormone patterns, and ovarian dynamics, which in synchrony with the uterine functions finally determines the outcome of mating or artificial insemination (Bage *et al.* 2002).

Timely intervention is necessary to enhance fertility and estrus synchronization is a valuable tool to enhance fertility in repeat breeding animals by using hormonal treatments like progesterone and PGF_{2α} for regular induction of estrus in cattle and buffalo. Under this background, the present work was conducted to study the efficacy of estrus

synchronization by using progesterone impregnated intra-vaginal device (TRIU-B) and fixed time artificial insemination (FTAI) protocol in improving conception rates in repeat breeding Jersey crossbred cows under field conditions.

The present study was conducted on repeat breeding cows in 27 selected villages of Kanchipuram district in Tamil Nadu, India. Out of 729 Jersey crossbred cows screened, 450 cows were identified as repeat breeders. All the 450 cows were selected based on body condition score (BCS) 3 to 5 and on rectal examination with no palpable structural abnormality and free from infection. Pregnant cows and cows with poor body score, endometritis, cystic ovarian degeneration, underdeveloped genitalia were not included in this study.

The selected repeat breeding cows were dewormed with a single dose of 3 g Fenbendazole bolus (Fentas, Intas, India) orally and supplemented with TANUVAS mineral mixture @ 30–50 g/day for one month. Re-examination was carried out after 15–30 days to assess the ovarian status and selected for synchronization. Jersey crossbred (450) cows were synchronized with Progesterone impregnated intra-vaginal device (TRIU-B, Virbac, India) on day 0. Cloprostenol sodium (Inj. Pragma, Intas, India) was administered intramuscularly @ 500 µg to these animals on day 8 and TRUI-B was removed on day 9. Timed Artificial Insemination with superior Jersey crossbred bull semen was carried out as per schedule on day 11 and day 12. The animals returning to next oestrus were also artificially inseminated. The pregnancy diagnosis was carried out through trans-rectal ultrasonography (Sonascope, China) on day 45–60 post insemination. The data were collected and analyzed as per standard statistical procedure.

In initial screening, out of 729 animals, 61.72% repeat breeders (450), 17.28% pregnant animals (126), 8.09% in estrus (59), 1.92% cystic ovaries (14), 2.19% subclinical endometritis (16), 8.77% under developed genitalia (64) were identified. All the repeat breeder cows responded for estrus synchronization and exhibited estrus (100%) and out

Present address: ¹Assistant Professor (drsarathvet@gmail.com), Department of Clinics; ²Professor and Head (drceciliajoseph@yahoo.com), Department of Veterinary Gynaecology and Obstetrics; ⁸Assistant Professor (gopikrishnanmvsc@gmail.com), Resident Veterinary Services Section, Madras Veterinary College, Chennai. ³Assistant Professor and Head (vibheeshveera@gmail.com), ^{5,6}Mobile Veterinary Officer (sem05vet@yahoo.co.in, pugazharasi1994@gmail.com), FTC, Kanchipuram. ⁴Veterinary Assistant Surgeon (vet.thangajeya.j@gmail.com), AAVIN, Salem. ⁷Assistant Professor (drskvet@yahoo.in), Department of Clinics.

of 450 animals synchronized, 312 cows tested positive for pregnancy. The number of animals positive for pregnancy by artificial insemination were 147 at first heat, 128 at second heat and 37 at third heat with a conception rate of 61.10% up to second heat and 69.32% up to third heat. The conception rate in the present study was 69.33% (312/450) which is in agreement Chaudhari *et al.* (2015) who also reported an improvement of 21.79% conception rate in CIDR treated repeat breeding Vrindavani cows as compared to control. It may be due to correction of progesterone concentration in repeat breeding cows which might be affected with the luteal dysfunction, as Kimura *et al.* (1987) had demonstrated luteal insufficiency as the major cause (60–62%) for repeat breeding condition. The findings in the present study are similar with the findings of Reshma *et al.* (2018) who also reported that the conception rate in repeat breeder cows treated with Controlled Intra-vaginal Drug Release (CIDR) was significantly higher at 43.33% as compared to control. The significantly higher conception rate in repeat breeder cows could be due to the impact of fine regulation of plasma progesterone profile and priming of reproductive system which was favourable for the better development of ovulatory follicles that would yield a better developed CL (Resma *et al.* 2018).

Further, the progesterone impregnated intra-vaginal device acted as an artificial corpus luteum (CL) and elevated progesterone level in circulation after its insertion and also increased the sensitivity of the hypothalamus to estrogen which resulted in increase in the intensity of heat (Fabre-Nys and Martin 1991). Moreover, prostaglandin administration on day 8, i.e. one day before removal of insert increased the pituitary sensitivity to GnRH and caused luteolysis of the pre-existing CL in the ovary, if any (Randel *et al.* 1996). Consequently, the drop in circulatory concentration of progesterone after progesterone impregnated intra-vaginal device withdrawal promoted the release of GnRH, followed by FSH and LH release with subsequent resumption of ovarian cyclicity (Zerbe *et al.* 1999). Therefore, when combined with TRUI-B, PGF2 α enhanced the intensity of estrus behaviour. Hence, progesterone based intra-vaginal device and TAI protocol could be effectively employed to improve conception rate in repeat breeding cows under field conditions.

SUMMARY

Out of 729 Jersey crossbred cows screened, 450 cows were identified as repeat breeders in 27 selected villages of Kanchipuram district in Tamil Nadu. All the cows were selected based on Body Condition Score (BCS) of more than 2.5 and on rectal examination with no palpable structural abnormality and free from infection. The selected cows were dewormed with Fenbendazole (Bolus Fentas) @ 3g once and supplemented with TANUVAS mineral

mixture @ 30–50 g/day orally for one month. The selected animals were re-examined after one month to rule out early pregnancy and inserted with intra-vaginal device containing 958 mg of progesterone (TRIUB) as per standard procedure on day 0. The animals were given PGF2 α (Inj. Pragma) @ 500 μ g on day 8 and TRIUB was removed on day 9 of insertion. Timed Artificial Insemination was done with Jersey crossbred frozen bull semen on day 11 and 12. Pregnancy was verified on day 45 after insemination using transrectal ultrasonography and 312 cows were found to be pregnant with a conception rate of 69.32%. Hence, the progesterone based intra-vaginal device for estrus synchronization programme was effective in improving the conception rate in repeat breeder crossbred cows.

ACKNOWLEDGEMENTS

The authors are thankful to Principal Investigator and Liaison Officer, National Agricultural Developmental Project, Government of Tamil Nadu for providing the necessary fund and facilities to carry out this research work.

REFERENCES

- Arthur G H. 1982. *Veterinary Reproduction and Obstetrics*. 5th edn. Bailliere Tindall, London, UK. p. 616.
- Bage R. 2002. 'On repeat breeding in dairy heifers. With special focus on follicular dynamics, ovulations, and oocyte quality'. Doctoral thesis, SLU.
- Chaudhari R K, Mehrotra S, Narayanan K, Kumawat B L, Das G K and Singh G. 2015. Effect of CIDR on conception rate in repeat breeding cattle inseminated with liquid semen. *Journal of Animal Research* 5(3): 649–51.
- Fabre-Nys C and Martin G B. 1991. Roles of progesterone and oestradiol in determining the temporal sequence and quantitative expression of sexual receptivity and preovulatory LH surge in the ewe. *Endocrinology* 130: 367–79.
- Kimura M, Nakao T, Moriyoshi M and Kawata K. 1987. Luteal phase deficiency as a possible cause of repeat breeding in dairy cows. *British Veterinary Journal* 6: 143–560.
- Osmanu S T. 1979. Studies on bovine infertility at the Agricultural Research Station (Legon) over half a decade (1972–77). Ghana University, Department of Animal Science Studies, Legon, Ghana. pp. 82.
- Randel R D, Lammoglia M A, Lewis A W, Neuendorff D A and Guthrie M J. 1996. Exogenous PGF2 β enhanced GnRH induced LH release in postpartum cows. *Theriogenology* 45: 643–54.
- Reshma A, Veerapandian C, Sathiamoorthy T and Arunmozhi N. 2018. Relationship of plasma progesterone levels following controlled internal drug release (CIDR) insertion and conception in repeat breeder cows. *Journal of Entomology and Zoology Studies* 6(2): 2851–54.
- Roberts S J. 1956. *Veterinary Obstetrics and Genital Diseases*. 1st edition. Edwards Brothers, Ann Arbor, Michigan, USA.
- Zerbe H, Gregory C and Grunert E. 1999. Treatment of ovarian conditional cycle disorders in milky indipro-progesterone delivery devices (Translated) *Tierarztl Umsch* 54: 189–92.