

Effect of Usage of Transdermal Progesterone Cream for Estrus Induction in Repeat Breeding Dairy Cattle

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(Received : July, 2021 20/21 Accepted : August, 2021)

Abstract

Reproductive efficiency is of critical importance in the dairy industry. Repeat breeding in cattle is a common reproductive inefficiency faced by dairy farmers, which leads to serious economic losses in terms of milk production and lower calf crop. Suprabasal concentration of progesterone at estrus is thought to be an important contributing factor for repeat breeding. Estrus synchronization using progesterone based protocols has been essentially used in cattle. This On Farm Trial (OFT) was carried out to study the effect of administration of progesterone in the form of a transdermal cream in the induction of estrus in dairy animals. The overall proportion of dairy cattle that evinced estrus after treatment with transdermal progesterone cream was 82.5%. Among these, cattle that evinced estrus after 72 hours of treatment was 76.92%, out of which 30% were found pregnant at 60 days post insemination. Remaining 23.08% of the animals evinced estrus within 72 hours of treatment and all of them were found pregnant at 60 days post insemination.

Key words: Dairy cattle, progesterone, treatment, estrus induction, repeat breeding

Reproductive inefficiency due to repeat breeding syndrome is an expensive hitch in profitable dairy farming due to delayed age at first calving in heifers and delayed inter-calving interval, thus leading to lower calf crop (Thakur *et al.*, 2006). The costs of herd management and rearing are increased due to the incremental expenses on repeated unsuccessful artificial inseminations, culling costs and replacement of

those cows that cannot conceive (Ahmadi and Dehghan, 2007). The cause of repeat breeding is unclear and multi factorial. Prolonged duration of estrus, extended follicular phase, delayed luteinizing hormone surge and delayed ovulation, late post ovulatory rise in plasma progesterone are considered to be most prominent factors responsible for repeat breeding (Bage *et al.*, 2002). Hormonal insufficiency and dysfunction contribute about 40.1% causes of repeat breeding (Maurer *et al.*, 1985). There is a failure of conception even in normal cyclic repeat breeding buffaloes and this has led to an increase in calving interval and hence reduces the annual birth rate of calves (Barlett *et al.*, 1986).

Regardless of the causative factor, treatment with progesterone supplementation initiated during early diestrus was found to be effective for increasing the conception rate in repeat breeding cows, lactating cows and anestrus cows (Mann and Lamming 1999, Keskin *et al.*, 2010 and Paul *et al.*, 2015).

This study is aimed to evaluate the efficiency of transdermal progesterone cream "TANUVAS Prosync-NC" on estrus induction in repeat breeding cattle.

Materials and Methods

Sixteen dairy cattle that were showing signs of repeat breeding, i.e. cows with regular estrus interval that have not conceived after three consecutive inseminations were selected for the trial with administration of TANUVAS Prosync-NC. The selected cows belonged to eleven farmers in Coimbatore district. Pluriparous cows and heifers (n=16) were selected for the

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On Farm Trial. The farmer was instructed to watch the cows for signs of heat. On the 7th day of estrus, TANUVAS Prosync – NC cream was applied to the lower fetlock region after depilation of the area. Protective adhesive bandage was applied over the area of application of the cream and demonstration was carried out for the farmers to perform this procedure on their own. The cream was left in place for 5 days and the plaster was removed on the 6th day. The farmer was instructed to watch for signs of heat from the next day of removal of the bandage. Deworming was done on the day of appearance of the estrus symptoms. The cows were also supplemented with 80g of mineral mixture daily from the day of onset of estrus signs. Artificial insemination was done to the cows in estrum. The inseminated cows were watched for signs of estrum from day 18 to 23 after insemination and the cows in subsequent estrus were inseminated again. The inseminated cows were checked for pregnancy at 60 days after insemination and the data was recorded.

Results and Discussion

It was observed that thirteen (81.25%) out of sixteen cows evinced estrus after the treatment. Out of thirteen, three cows (23.08%) showed estrus within 72 h of bandage removal and ten animals (76.92%) showed estrus at more than 72 h of bandage removal. The mechanism behind the induction of heat was explained by Bakr *et al.*, (2015), who stated that the progesterone released by the exogenous device elevates the level of progesterone in the serum of the cows. This exerts a negative feedback on hypothalamus and pituitary. The removal of the adhesive plaster results in rapid drop in circulating progesterone associated with removal of progesterone block on hypothalamus and pituitary and consequently GnRH release followed by FSH and LH release and resumption of ovarian activity, bringing the animal to ovulatory heat. It has been reported that progesterone treatment increased concentrations of estradiol receptors in the ventromedial hypothalamus of the ewe, suggesting a possible priming effect of progesterone in the brain for various estradiol – mediated functions (Caraty and Skinner, 1999).

On pregnancy verification, it was found

that all the three animals that showed estrus signs within 72 h of bandage removal were pregnant. Out of ten cows that evinced estrus after 72 h of bandage removal, three cows (30%) were positive for pregnancy 60 days post insemination. Six cows returned to the next estrus, out of which five cows (83.33%) were inseminated again. Out of 16 cows treated with TANUVAS Prosync – NC cream, 6 cows (37.5%) conceived. All the three cows that evinced estrus within 72 h of treatment were conceived, which is indicative of 100% fertile estrus induction. Hence, it can be concluded that 82.25 per cent of the dairy cows that were treated with TANUVAS Prosync – NC cream evinced estrus after treatment. The conception rate was 100 per cent in the cows that evinced estrus within 72 h of bandage removal. This finding correlated to that of Folman *et al.*, (1993), who stated that progesterone level during the estrous cycle preceding insemination was closely related to the occurrence of conception. This increase in progesterone level in cows treated with exogenous progesterone during early diestrus and increased conception rate has been demonstrated by Folman *et al.*, (1990), Macmillan *et al.*, (1991), Villaroel *et al.*, (2004), Mann *et al.*, (2006) and Wm *et al.*, (2010). The results of this study coincided with Kajaysri *et al.*, (2017), who concluded that transdermal progestin patch was equally effective in estrus synchronization as compared with traditional CIDR and therefore be considered as an alternative method for estrus synchronization in postpartum beef cattle. Lakshmikantan *et al.*, (2019) also reported similar results using “transdermal progestin patch” in anestrous cattle. Mann and Lamming, (1999) stated that progesterone supplementation initiated during early diestrus using intravaginal progesterone inserts with lactating cows could reliably be expected to increase conception rate.

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Table I. Effect of Transdermal Progesterone Treatment in Induction of Estrus in Repeat Breeding Cattle

S.No	Particulars	No. of animals
1.	Total cows treated	16
2.	Animals evinced estrus after treatment	13 (81.25%)
3.	Animals not evinced estrus after treatment	03 (18.75%)

Table II. Effect of Transdermal Progesterone Treatment in Timing of Induction of Estrus in Repeat Breeding Cattle

S.No	Particulars	No. of animals
1.	Animals evinced estrus after treatment	13
2.	Animals evinced estrus within 72 hours of treatment	03 (23.1%)
3.	Animals evinced estrus after 72 hours of treatment	10 (76.9%)

Table III. Effect of Transdermal Progesterone Treatment in Conception in Repeat Breeding Cattle

S.No	Particulars	No. of animals
1.	Animals evinced estrus within 72 hours of treatment	03
a.	Animals positive for pregnancy 60 days post insemination	03 (100%)
2.	Animals evinced estrus after 72 hours of treatment	10
a.	Animals positive for pregnancy 60 days post insemination	03 (30%)
b.	Animals negative for pregnancy 60 days post insemination	07 (70%)

tion of ovarian activity, bringing the animal to ovulatory heat (Bakr *et al.*, 2015). It has been reported that progesterone treatment increased concentrations of estradiol receptors in the ventromedial hypothalamus of the ewe (Caraty and Skinner, 1999), suggesting a possible priming effect of progesterone in the brain for various estradiol – mediated functions.

Rudolph *et al.*, (2011) demonstrated that in small herds with intensive observation periods to detect estrus, the CIDR-Select Synch protocol produced a pregnancy rate of 50.4% in multiparous dairy cows. The milk progesterone value at the beginning of the protocol did not significantly influence the outcome. Treatment of cows not previously detected in estrus with a CIDR insert during a TAI protocol increased proportion of cows with functional CL after Artificial Insemination and Pregnancies per Artificial Insemination. Anovular cows treated with intravaginal controlled internal drug release (CIDR) inserts containing 1.38 g of progesterone were more likely to resume cyclicity compared with untreated cows (Gümen and Wiltbank, 2005; Chebel *et al.*, 2006; Cerri *et al.*, 2009), and CIDR treatment provided priming with progesterone that reduced the incidence of short luteal phases after AI (Rhodes *et al.*, 2003; Cerri *et al.*, 2009).

In any synchronization program, the application of an intravaginal device for 10 to 14 days increases the risk of local vaginal infection, which, at the worst, creates an ascending infection to the uterus, causing endometritis-pyometra (Claire Card, 2009). Data confirm that progesterone supplementation significantly improves the reproductive performance of animals with anestrus and cystic ovarian disease independent of vaginal reaction (Villaruel *et al.*, 2004 and Zulu *et al.*, 2003).

Summary

Usage of progesterone dermal cream is a technique that can be followed by the farmer himself for the induction of estrus in cattle and also for repeat breeding cattle. The technology involved is quite simple without involving the supervision of technical personnel or the clinical complications like vaginitis that could arise

because of the insertion of intra vaginal devices. Under field conditions the repeat breeding dairy animals can be treated with TANVUAS Prosync – NC cream by the farmers themselves. The cows that did not evince estrus after treatment might have conditions like non-functional corpus luteum, uterine or ovarian pathology, etc. In such cases veterinary medical intervention may be needed with the treatment for uterine or ovarian pathology, or the use of luteolytic agents, as the case may be.

Acknowledgement

The authors are grateful to The Director, TRPVB, TANUVAS, Chennai 600051 for providing materials for this On Farm Trial and permitting to publish this paper.

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