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Efficacy of Different Therapeutic Regimens in Subclinical Endometritis in Cross Bred Dairy Cows

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ABSTRACT

The present study was conducted on cross bred cows (n=30) having completed 60 days postpartum to assess the efficacy of different treatments in subclinical endometritis (SCE). A total of 20 animals that had tested positive for subclinical endometritis on endometrial cytology and white side test (WST) were sub divided into three treatment groups corresponding to Group I-III.The Group IV consisting of 10 healthy animals without any uterine infection served as control in which AI was performed on day of estrus. In Group I, single intrauterine dose of cephapirin benzathine (500mg), Group II Levofloxacin @4-5 mg/kg bw i.m. and Group III Lugol's Iodine (0.5%) @ 30ml I/Ufor 3 consecutive days were given. In first three groups, WST was conducted on subsequent estrus and animals testing negative were subjected to AI. Treatment efficiency was evaluated on the basis of first service conception rate (FSCR). In Group I, Group II, Group III and Group IV first service conception rate was 50%, 40%, 33.33% and 60% respectively. FSCR was non-significantly higher in animals treated with cephapirin benzathine compared to other treatment groups. It was concluded that cephapirin benzathine is the most suitable treatment of SCE but Lugol's Iodine can be recommended for treatment of SCE and improving conception rate.

Key words: Cross bred cows, Cephapirin benzathine, Lugol's Iodine, Repeat breeding, Subclinical endometritis

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INTRODUCTION

Endometritis is an apparent inflammation of the endometrium without the systemic signs (Sheldon *et al.*, 2006). Subclinical endometritis is one of the most important causes of repeat breeding, resulting in high economic losses in dairy industry as it adversely affects reproductive performance, leading to decreased conception rates and

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increased intervals between calving (Sheldon *et al*., 2009; Wagener *et al.,* 2017). Subclinical endometritis is characterized by an increased proportion of Polymorphonuclear neutrophils (PMN) in the endometrium in the absence of clinical disease (Gilbert *et al*., 2005). Timely intervention in diagnosis and treatment of uterine infections especially subclinical endometritis may help to mitigate this problem as a cause of repeat breeding in dairy cows. Numerous therapeutic agents have been attempted for the treatment of subclinical endometritis which include antimicrobials, Lugol's iodine as well as some herbal extracts (Tomar *et al*., 2017). Several workers have used different therapeutic regimes to optimize the subclinical endometritis as the major risk for the repeat breeding syndrome *i.e.*, 0.5%, 0.3% Lugol's iodine solution (Ahmad and Elsheikh, 2014; Asfar *et al*., 2020), gentamicin followed by the ceftiofur (Parikh *et al*., 2014), Levofloxacin during 40-60 days postpartum (Parikh, 2021). Effective treatments aim to restore the uterus to a healthy state, promoting optimal conditions for successful pregnancies. Implementing effective therapeutic regimens helps to minimize economic losses and ensures a more sustainable and profitable dairy cattle management.

Disadvantages with use of antibiotics are the development of antibiotic resistance, require milk withdrawal period, frequent administration and cost of treatment (Asfar *et al*., 2020). An effective therapeutic strategy helps to minimize the development of antibiotic resistance. The main goal of therapy is to reduce the bacterial load, enhance uterine defense and repair mechanisms and hence reverse inflammatory changes that impair fertility. Therefore, the aim of current study was to reduce the endometrial infection and improve the conception rate in repeat breeder cows by administration of different therapeutic agents.

MATERIALS AND METHODS

The investigation was carried out on cows presented at OPD of Veterinary Clinical Services Complex (VCSC), F.V.Sc& A.H., Shuhama, SKUAST-Kashmir, Srinagar. The screening was done on crossbred postpartum cows of >60 days in milk (DIM). The main criteria for screening were no apparent clinical signs of any uterine infection, clear cervico-vaginal mucus discharge and absence of gross reproductive tract abnormality as examined per-rectally(Asfar *et al*. 2020). Total Thirty (30) animals were evaluated among which twenty (20) animals were diagnosed positive for SCE by endometrial cytology using cytobrush technique with ≥ 4% PMNs as cut-off value (Singh *et al*., 2016; Asfar *et al*., 2020) and white side test (Kumar *et al*., 2015). All the positive animals were sub divided into three treatment groups and rest ten (10) animals were kept as healthy control (Table 1).

Group I (n=6)

In this group, single dose intrauterine infusion of Cephapirin benzathine (Metricef) @ 500mg was given on the day of estrus. Metricef preparation consisted of antibiotic loaded syringe and AI sheath. The sheath was connected with syringe to deliver the dose into the uterus gently. Before intra uterine infusion perineum was cleaned with 70% ethyl alcohol swab to prevent uterine contamination. On the subsequent estrus, cervico-vaginal mucus was again collected from the treated animals and subjected to WST. In animals with negative results, Artificial insemination was done 12 hrs after onset of estrusand was performed by thesame technician during the study period.

Group II (n=8)

Levofloxacin (Meriflox; Vetoquinol India Animal Health. Pvt. Ltd., India) was given @ 4-5 mg/kg body weight by intra muscular route once a day for 3 days. Likewise, in this groupon the subsequent estrus, cervico vaginal mucus was collected, subjected to WST followed by Artificial insemination if negative on test.

Group III (n=6)

Intra-uterine administration of 30 ml of 0.5% Lugol's iodine once a day for 3 consecutive days was given. Lugol

Table 1: **Different treatment regimens followed in the study**

Groups (n=30)	Treatment regimen followed
I (n=6)	Cephapirin benzathine (Metricef) @ 500mg I/U single dose on the day of estrus followed by AI
II (n=8)	Levofloxacin (Meriflox; Vetoquinol India Animal Health. Pvt. Ltd., India) @ 4-5mg per kg BW I/M×OD×3days, followed by AI on the subsequent estrus SE
III(n=6)	0.5% Lugol's Iodine @ 30ml I/U× 3 Days followed by AI on the subsequent estrus SE
IV (n=10) Healthy Control	AI

s iodine (0.5%) solution was prepared from 5% stock solution of Lugol's iodine (Sisco Research Laboratories Pvt. Ltd., India). For 30 ml of 0.5% Lugol's iodine preparation, 3 ml of stock solution of Lugol's iodine (5%) were mixed with 27 ml of distilled water. Cervico-vaginal mucus was collected in all the animals on the subsequent estrus, subjected to WST and the animals that tested negative were subjected to AI.

Group IV (n=10)

The animals in this group were kept as healthy control and were artificially inseminated as in rest of the groups.

Evaluation of efficacy of treatment regimen of Group I, II and III was evaluated on the basis of WST on subsequent estrus and by first service conception rate while for the control groups *i.e.,* Group IV were evaluated on conception rate only. First Service Conception Rate (FSCR) was determined by pregnancy diagnosis on 60 days post insemination using ultrasonography/Per-rectal examination whichever was feasible.

Statistical analysis

The data obtained was analysed by using independent t-test using SPSS-20 software (Snedecor and Cochran, 1994).

RESULTS AND DISCUSSION

For group I, II, IIIand IV First Service Conception Rate (FSCR) found were 50%, 40%, 33.33% and 60%, respectively (Table 2). FSCR was non significantly better in animals treated with cephapirin benzathine compared to other treatment groups. Comparing the treatment cost per animal, Lugol's Iodine was found to be most cost effective with 10 rupees only per animal, Meriflox treatment costed 230 rupees while the Cephapirin benzathine was much expensive (550 rupees per dose/animal) compared to other treatment groups (Table 3).

In the present study, cephapirin benzathine showed better results, that may be due to the direct intra uterine infusion of broad-spectrum antibiotic to the site of infection, allowing higher concentrations at the target site. This helps to effectively eliminate or control bacterial infections within the uterus. Single administration of cephapirin benzathine, a first-generation cephalosporin antibiotic is active against Gram positive organisms and anaerobic bacteria and less active against Gram-negative organisms besides showing good results in improving reproductive performance of cows with subclinical endometritis (Kasimanickam *et al*., 2005; Nehru *et al*., 2018). The advantages of cephapirin benzathine are single intrauterine administration and zero milk withholding period post treatment. 80% conception rate were observed in animals treated with cephapirin benzathine (Metricure) (Khalil *et al*., 2023). Kasimanickam *et al*. (2005) also reported that cephapirin can improve the conception rate and decrease days open in cows affected with sub-clinical endometritis. Meriflox showed conception rate comparable to Lugol's iodine *i.e.,* 40% and 33.33%, respectively. The results of the present study showed lower conception rate in levofloxacin group as reported earlier (Asfar *et al*. 2020). Similarly other workers have observed higher conception rate of (57.9%) and (50%), respectively using levofloxacin (Pillai, 2012; Singh *et al*., 2018). However, the results of the present study were better than Parikh

Table 2: Conception rate in different treatment groups (N=30)

Group No.	Treatment	First Service Conception rate (%)
I	Metricef @ 500mg I/U single dose on the day of estrus followed by AI on subsequent estrus	50%
II	Meriflox@ 4-5mg per kg BW I/M×3 days and AI on subsequent estrus	40%
III	0.5% Lugol's Iodine @ 30ml I/U× 3 Days and AI on subsequent estrus	33.33%
IV	AI	60%

Table 3: Economics of treatment per animal and milk withdrawal period

Treatment	Amount of drug used/ animal	Cost/unit of drug preparation	Approx Cost/animal	Milk withdrawal period (days)
Metricef	500 mg	550/ unit	550	0
Meriflox	15 ml	115/15 ml	230	7
Lugol's Iodine	90 ml of 0.5%	182/25 ml	10	0

(2021), who reported 25.0% first service conception rate and overall conception rates (50.0%) using levofloxacin.

Lugol's iodine is one of the alternate therapies for treatment of SCE through intrauterine route. Lugol's iodine has a wide range of bactericidal activity, which promotes endometrial repair and therefore raises the possibility of conception (Sarkar, 2006). Lugol's iodine being counter irritant to the endometrium, improve blood flow to the ovaries, and boosts uterine iodine absorption. This increase in iodine absorption hastens the metabolism and triggers the release of thyroid hormones, which in turn helps to maintain calcium and phosphorus homeostasis and controls the onset of estrus (Waheeb and Hatab, 2017). In the present study, 0.5% Lugol's iodine showed 33.33% of FSCR. Our results are in agreement with the findings of previous workers (Bhardwaz *et al*., 2018). On contrary, some studies have reported 70% CR in animals treated with 0.5% Lugol's Iodine (Khalil *et al.,* 2023). Sawale and Markandeya (2023) stated that Lugol's Iodine treated repeat breeder cross-bred cows had 53.33% CR. Other studies using the 0.1% and 0.3% Lugol's Iodine have documented the conception rate of 42.86% and 50%, respectively (Singh *et al*., 2018; Asfar *et al*., 2020). However, lower conception rate (20%) has also been reported in animals undergoing treatment with 0.25% Lugol's Iodine (Das, 2004). Lugol's iodine has advantage that it does not require a milk withdrawal period, and is cost effective (Carleton *et al*., 2008; Asfar *et al*., 2020). In healthy control group (IV), FSCR was 60%, which was higher than other treatment groups

The comparison of results showed that cephapirin benzathineis the most appropriate choice for treatment of SCE but is not cost effective. Khalil *et al*. (2023) also reported that cephapirin is the utmost choice for treatment of clinical endometritis in cows that could be used either in presence or absence of CL. Although levofloxacin showed better results than Lugol's iodine, but its milk withdrawal period of 7 days limits its use. Lugol's Iodine is cost effective and is being used in field conditions for SCE treatment (Asfar *et al*., 2020; Sutriana *et al*., 2021).

CONCLUSION

Although Cephapirin benzathineis the most suitable treatment of SCE but Lugol's Iodine can be recommended for treatment of SCE and improving conception rate in repeat breeding cases due to subclinical infections.

CONFLICT OF INTEREST

None

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