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Effect of intrauterine infusion of gentamicin in repeat breeding cattle

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ABSTRACT

Effect of intrauterine infusion of gentamicin was studied in 40 repeat breeding crossbred cows at Livestock research station, Thiruvazhamkunnu, Kerala. The animals were divided into 5 groups with 12 and 10 animals respectively in Gr. I & IV and 6 animals each in other three groups. Group I and II consisted of animals with apparently normal reproductive tract, while groups III to V were animals with minor abnormalities of reproductive function. Animals of Group I & III were infused with 80 mg of Gentamicin intrauterine 24 hours after insemination. Gr. IV was treated with 160 - 200 mg of Gentamicin intrauterine during heat followed by AI in the subsequent heat. Gr. II and V were kept as controls. All the animals returning to heat were inseminated once again without any treatment. Success rate of AI among the groups were compared based on pregnancy verification after 60 days of insemination.

Out of Gr. I animals, 5 (42 %) conceived by AI followed by post AI infusion and another 3 conceived by 1 more AI in the subsequent cycle making total conception 8 out of 12 (67 %). In Gr. II (control-1) only 1 (17 %) animal conceived even after 2 AI each in all the animals. Out of 6 animals in Gr. III, one animal each conceived by first and second AI making total conception 2 (33 %). In Gr. IV, out of 10 animals 4 and 2 animals conceived by the first and second AI following Gentamicin infusion making total conception to 6 (60 %) while in Gr. V (Control -2), no animal conceived even after 2 AI. It is concluded that in repeat breeding animals with apparently normal reproductive tract, post AI infusion of 80 mg Gentamicin gives promising results while in animals suspected for endometritis, 160-200 mg gentamicin infusion during heat followed by AI in the subsequent heat is effective.

Key words: Repeat breeding, Gentamicin, Infertility, Post AI therapy, Dairy cows

Service failure (Repeat breeding) in dairy animals forms one of the major infertility problem causing considerable economic loss to dairy farmers. It is manifested as failure of conception even after 3 or more services with no apparent abnormality of reproductive organs. Incidence of repeat breeding has increased many folds after introduction of cross breeding and artificial insemination (AI) programme (Kutty and Ramachandran, 2000). Besides poor quality of semen and /or faulty technique of insemination, reproductive tract infection (RTI) is attributed to be the main reason for service failure in animals bred through AI (Rao *et al.*, 2001; Kutty and Ramachandran, 2003). Even after observing all aseptic precautions, various non-specific microorganisms gain entry into the reproductive tract during insemination and get established following faulty technique and/or improper timing of insemination leading to sub clinical infection and repeat breeding. Hence treatment against infection forms the first line of treatment in repeat breeding animals (Awasthi and Nema 1995; Al-Sultan, 1998; Singh *et al.* 2001).

Rational therapy with antimicrobial drugs involves administration of required dose of suitable drug at adequate frequency and route for a minimum period of 3-5 days (Huber, 1982). However systemic administration ensuring adequate frequency and completion of recommended course of therapy is often difficult for farmers as well as technicians, expensive and often impractical under field situations (Kutty, 1999). Moreover attainment of adequate antimicrobial concentration inside the uterus following systemic administration is not guaranteed in the case of most antimicrobial drugs (Sinha *et al. 1994).* Hence intrauterine therapy with various antimicrobials has been reported for treatment of uterine infections (Awasthi and Nema, 1995; Arora *et al.*, 1998; Singh *et al.*, 2001).

Gentamicin has been found to be very effective in treating repeat breeding due to sub clinical infections and has been tried in different treatment regimes by different workers (Singh 1994; Singh *et al.*, 2001). Even though local therapy favours selection of resistant organisms (Levy 1998, Ramaswamy *et al.*, 1998), magnitude of the resistance

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development depends directly on the extent of usage of the drug (Carbon and Bax, 1998; Mc Kellar, 1998). Hence development of a low cost, convenient and effective strategy favouring minimum resistance development will be highly useful for treatment of repeat breeding animals under field conditions. With this view, the present study was carried out to find out the effectiveness of low doses of gentamicin administered as intrauterine infusion for the treatment of repeat breeding in cows.

MATERIALS AND METHODS

The study was conducted at Livestock Research Station of Kerala Agricultural University, located at Thiruvazhamkunnu. Crossbred dairy cattle are being managed semi intensively under the dairy farm as per standard recommendations. Heat detection is done by manual observation two or three times a day and breeding is done exclusively through AI. For the purpose of this experiment, 40 repeat breeding cows having history of 4 to 7 inseminations were selected and were categorised into five groups. Group I and II consisted of 12 and 6 cows, respectively having regular cycle, clear mucous discharge during heat and with no detectable abnormality of reproductive tract. Group III, IV and V consisted of 6, 10 and 6 cows respectively with history of either irregular cycle, cloudy discharge or recurrent metoestrual bleeding (since conception rate was found to be very less in such animals).

Animals of Group I, II and III were inseminated during the heat period using frozen semen. In group I & III, 80 mg of Gentamicin diluted with 20 ml with distilled water was infused into the uterus 24 hours after insemination and group II was left untreated (Control -1) without any post AI therapy. All the animals were observed for return to oestrum and those showed heat signs within 60 days were subjected to one more AI and the duration of such cycle was also recorded.

Group IV animals were given intrauterine infusion of 160 - 200 mg (depending upon size of the reproductive tract) of Gentamicin diluted to 20-30 ml during heat period and were inseminated only during subsequent heat. In animals of Group V one heat was skipped without AI or treatment and were inseminated during the subsequent heat period as in Gr. IV animals (Control - 2). Animals returning to heat within 60 days after the first AI following treatment were re-inseminated in subsequent one more cycle without any further treatment. Nature of the cycle after the treatment was also recorded. All non-return cases were checked for pregnancy 2 months after the inseminations and the data were analysed to compare the effectiveness of the three treatment regimes.

RESULTS AND DISCUSSION

Success rate of AI is compared between Gr. I and II in table No 1. Among 12 cows, 8 (67 %) did not return to heat following the insemination with post AI infusion and 5 (42 %) of them were found to be pregnant upon subsequent verification. All the 4 returned to service conceived by subsequent 1 more AI making total conception 9 (75 %). In Gr. II (Control - 1), no animals conceived by the first AI and 1 conceived by the subsequent AI making total conception 17 %.

Beneficial effect of single infusion with small dose of gentamicin can be attributed to elimination of sub clinical infection making the uterine environment congenial for embryonic development and establishment of pregnancy. Direct infusion of gentamicin provides adequate microbicidal concentration inside the uterus and endometrium rather than systemic therapy (Sinha *et al.*, 1994). Conception rate obtained in this study was higher than results of similar study conducted by Singh (2003) and the variation may be due to small sample size or difference in the sensitivity of the organisms. Awasthi and Nema (1995) also have reported a lower success rate (50 %) for post AI therapy with Gentamycin. They have used a rather higher dosage and the variation may be due to higher amount of bactericidal substance used post insemination or differences in microbial sensitivity.

Table 1. Conception rate of AI in repeat breeding animals treated with intrauterine infusion of gentamicin compared with control group.

Group	No of animals	Conception to insemination during			
		First heat	Second heat	Total	Per cent
I	12	5	4	9	75
II	6	0	1	1	17

In cases returned to oestrus, inter oestrus interval was 20 days in 2 animals, and 31 and 34 days respectively in other two animals. Out of the non-return animals 3 remained anoestrus beyond 2 months. Those not conceived returned to cycle almost at regular intervals. Though the cycle was almost regular in all the animals before treatment, prolongation of cycle in some of the treated animals may be due to embryonic death after maternal recognition or other functional disturbances including missing of heat at detection (Arthur *et al.*, 1989; Ramakrishna, 1996). However, further studies are needed in this aspect.

Repeat breeding animals with irregular cycles were taken in Groups III to V since irregular cycles have been found to be more in repeat breeding animals (Ghosh *et al.*, 1996) and repeat breeding is mainly caused by sub clinical infection (Kutty and Ramachandran, 2003). Vaginal infection and resultant irritation has been found to shorten the cycle length and endometritis leading to embryonic death causes long cycles (Arthur *et al.*, 1989). Even though metoestrual bleeding is considered normal phenomena (Arthur *et al.*, 1989), increasing incidence of the condition with very low conception rate has been found to be an emerging problem (Muller, 1999 and Duchens *et al.*, 1995) in crossbred cattle. Recurrent metoestrual bleeding is believed to promote infection and treatment with antimicrobial was found to be beneficial.

Conception details for AI done among animals of Groups III to V are compared in table No 2. In animals with detectable abnormalities of reproductive function, conception rate following post insemination infusion of 80 mg (Gr. III) Gentamycin was 33 %. Among those not conceived, cycle remained irregular with inter oestrus interval ranging from 10-76 days. Low success rate and irregularity of the cycle after treatment may be due to inadequacy of dosage compared to intensity of infection, longer periods needed for tissue healing or reduced action of the drug in the presence of pus cells in the discharge (Huber, 1982).

In Gr. IV, 5 (50 %) and 3 (60 %) animals did not return to heat following first and second AI respectively after the treatment and the conception was 40 % for each AI making the total conception 60 %. At the same time none conceived among Gr. V (control -2) animals even after two AI. In all the conceived animals, apparent abnormalities such as cloudiness of mucous discharge, metoestrual bleeding and irregularity of the cycle was corrected completely or to a greater extent following treatment. Gentamicin infusion during heat without insemination enables to clear off infection both by the action of the drug along with biological benefits of skipping one cycle providing sufficient time for tissue repair. The conception rate obtained in this study is similar to the report of Singh *et al.* (2001), while it is lower that than the report by Saini *et al.* (1999). This variation may be due to the difference in treatment regime since they have infused double the dose of gentamicin compared to this study consecutively for 4 days.

Out of the 10 animals in Gr. IV, 7 showed heat signs within 60 days, while heat was prolonged beyond 100 days in other 3 animals. The interval from treatment to expression of oestrum was highly irregular with only 3 animals showing oestrum at 21 days' interval. Interval between first and second heat was normal in animals conceived while it was irregular in others ranging from 23-81 days. Not restoring regular cycle even after treatment can be attributed to factors such as severity of infection, resistance of organisms, presence of pus cells in the discharge and non infectious reasons like endocrine imbalances.

Perusal of results showed that in repeat breeding animals with no apparent abnormality of reproductive tract, post insemination infusion of Gentamicin gives encouraging results. This in turn prevents the loss of days equivalent to

Table 1. Effectiveness of two intrauterine infusion regimes using gentamicin in repeat breeding animals with detectable abnormality of reproductive function compared with controls

Animal Group	No of animals	Conception to insemination during			
		First heat	Second heat	Total	Per cent
III	6	1	1	2	33
IV	10	4	2	6	60
V	6	0	0	0	0

one cycle and is very convenient and cheap. However post insemination infusion in animals with signs of endometritis, is not very promising as evidenced by low success rate of insemination. In such animals comparatively higher dose of gentamicin can be infused during heat so that animal will be ready for insemination in the coming cycle.

Effectiveness of the low dose of Gentamicin when administered locally can be attributed to attainment of adequate bactericidal concentration inside uterine lumen. Instead systemic administration necessitates very high dose for attainment of same bactericidal concentration inside the uterus (Sinha *et al.,* 1994). Single dose treatment and local administration with antimicrobial drugs are often discouraged for the reason of favouring microbial resistance development against such drugs (Levy, 1998). Rational therapy with Gentamicin involves systemic injections of adequate dose for 3-5 days at a frequency of 6-8 hours. Under field conditions though systemic administration is often resorted to, maintenance of adequate frequency is very difficult (Kutty, 1999; Kutty & Thankappan, 2000). In such situations, better approach will be to minimise the extent of usage to the possible minimum level (Mc Kellar, 1998; Kutty 2002). In that respect results of this study showing effectiveness of using low doses is highly encouraging.

It is concluded that in repeat breeding animals with no apparent abnormality of reproductive system, post insemination intrauterine infusion of a single dose of 80 mg Gentamicin diluted to 18-20 ml gives encouraging results. However in animals with signs of mild endometritis such treatment is not very effective, instead they can be treated with a single dose of 160 - 200 mg of Gentamicin diluted with 20-30 ml distilled water during heat followed by AI in the coming heat.

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