

Effects of Intrauterine Infusion of Antibiotics and Quality of Mucous on Non Return Rate in Repeat Breeding Dairy Cows

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Abstract

A study was conducted to observe the effect of intrauterine infusion of three antibiotics (viz. penicillin, gentamycin and streptopenicillin) and mucous quality on non return rate in post AI repeat breeding dairy cows. 101 cows were selected from Central Cattle Breeding Station and Dairy Farm (CCBSDF), Savar, Dhaka and Artificial Insemination (AI) centre in Chittagong metropolitan area during the period from July/2006 to December/2006. The experimental cows were divided into 4 groups (Group I, n= 21, Group II, n= 29, Group III, n= 26 and Group VI, n= 25). The first three groups received intrauterine infusion of penicillin, gentamycin and streptopenicillin, respectively, while Group IV was control. First dose of each antibiotic was infused 8 hours post AI then 2nd dose 24 hrs later of 1st infusion. Physical observation and rectal palpation have been done to detect heat within 18-24 days of treatments. The non-returned rate (%) was 51.72, 46.15 and 38.10 in group II, III and I, respectively, and 28.0 were in group IV. The same animals were divided into 4 groups depending on the quality of mucous: Group A (n=30, clear mucous), Group B (n=7, slight cloudy), Group C (n=2, slight frothy) and Group D (n=3, voluminous mucous). The non return rate (%) was 51.72, 50.0, 25.0 and 22.22 in group A, D, B and C, respectively. Comparatively higher non return rate was found in those cows treated with gentamycin compared to other antibiotics and cows discharged clear mucous than others. However, the result was not statistically significant.

Keywords: Antibiotics, Artificial insemination, Intrauterine infusion, Repeat breeding cows.

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1. INTRODUCTION

Repeat Breeder Cows (RBC) are a heterogeneous group of subfertile cows with no anatomical abnormalities or infections that exhibit a variety of reproductive disturbances in a consistent pattern over three or more consecutive heat cycles of normal duration (17-25 days) and repeated conception failures are major causes of the reproductive inefficiencies (Kamal, 2010). Repeat breeding can be caused by a number of factors including subfertile bull endocrine problems, malnutrition, endometritis, reproductive tract infection and poor management. Shamsuddin (1995) reported 5% repeat breeding cases in Bangladesh. Faruq (2001) found that the incidence of repeat breeding in zebu cows was 31.5%. Sarder et al (2010) reported that anestrous and repeat breeding are the highest prevalence (20.4% and 20.2%, respectively) in crossbred cows in Rajshahi district. Failure of services lead to major economic loss in dairy industry by forming increased calving interval, increased service per conception leading to infertility or subfertility (Roberts, 1971). Azizunnesa (2002) reported 1.5 services are required for a conception in Bangladesh in cow on the other hand Kamal (2010) found that about 2 services are required for conception in cow. Inflammation of the endometrium of the uterus, diagnosed by cytology in the absence of any abnormal vaginal discharge called subclinical endometritis, is one of the major causes of repeat breeding in cows (Gilbert et al., 2005). Gani et al. (2008) found positive correlation ($r = 0.94$) between repeat breeders and bacterial infection of uterus. Intrauterine infusion of antibiotic during AI is the rational treatment for repeat breeding cows (Huber, 1982). Intrauterine infusion of Lugols' iodine is common treatment for repeat breeding cows (Sarker, 2006) in Bangladesh. Antibiotic sensitivity showed moderate to high sensitivity to amoxicillin, oxytetracycline and ciprofloxacin in repeat breeding cows (Gani et al. (2008) . Kamal et al. (2010) found that double insemination with intrauterine antibiotic improve conception in repeat breeding dairy cattle. Therapeutic use of GnRH and PGF_{2α} for repeat breeders has been demonstrated with some improvement in pregnancy rate compared to untreated controls (Peters, 2005). Intrauterine infusion of chloramphenicol followed by Lugol's iodine on the next day during AI is the choice of treatment of repeat breeder cows (Maharaj, 2003). Gentamycin is the choice of drug for treating repeat breeding cows due to subclinical infection in India (Singh, 1994; Singh et al., 2001). However, in Bangladesh, Gentamycin is not popularized yet for treating repeat breeding cows. It is necessary to introduce convenient, easily administrable low-cost treatment for repeat breeding cows in the field level. The management and treatment of repeat breeders should form a significant part of the fertility section of a dairy

herd (Leven, 2006). The aim of the present study was to evaluate the effectiveness of three antibiotics and quality of mucous on non return rate of repeat breeding dairy cows.

2. MATERIALS AND METHODS

2.1. *Experimental design*

Experimental cows were selected from Central Cattle Breeding Station and Dairy Farm, Savar, Dhaka, and different AI centers of Chittagong Metropolitan areas. The cows were crossbred and cyclically normal with clear transparent, slight cloudy, slight frothy and voluminous mucous discharge through vagina during estrous period. Before Artificial Insemination and intrauterine infusion of antibiotic treatments, animals were examined and all necessary information was gathered by face to face interviewing with the owner to confirm the repeat breeder cow. The information was recorded in a questionnaire. The recorded variables were: absence of any detected or visible abnormality, 2.5 or >2.5 BCS, have one or more than one parity, less than ten years old, normal condition of previous calving, regular estrous cycle and three or more unsuccessful services. All the experimental cows were considered as repeat breeders according to the information gathered. At the beginning of these activities each and every cow's owner was informed about the purpose of this experiment. Gentamycin (Genacyn vet®, Square BD Ltd), Streptopenicillin (SP vet®, Acme Laboratories Ltd. BD) and Penicillin (Combipen®, Acme Laboratories Ltd. BD) were used to treat the cows. The cows were divided into four following groups; Group I consisted of 21 cows treated with penicillin (Combipen 40 lac diluted with 20 ml distilled water intrauterine); group II included 29 cows, treated with gentamycin (Genacyn vet 4 ml diluted with 20 ml distilled water intrauterine), group III was consisted of 26 cows that were treated with streptopenicillin (SP vet 2.5 gm diluted with 20 ml distilled water intrauterine); and group IV was used as control animals without any treatment. Two doses of each antibiotic were infused intrauterine at 24 hours' interval. The first dose was infused after 8 hours of AI. All cows were examined physically within 18-24 days of AI to observe whether the animals return to heat or not and they were examined individually by rectal palpation to know the state of uterus.

2.2 Statistical analysis

All the raw data were entered and stored into Microsoft Excel and analyzed by STATA version 9.2 (StataCorp, College Station, Texas). To test the relationship between different treatment groups and mucous quality, groups with outcome variable (non-return heat after AI), Chi square test was performed. A p-value of <0.05 was considered as significant.

3. RESULTS

The effects of treatments with different antibiotics on non return rates in repeat breeding cows following AI was presented in Table 1. Total experimental cows were one hundred and one. The non return rate obtained in group II treated with gentamycin, group III treated with streptopenicillin and group I treated with penicillin was 51.7%, 46.1% and 38.1%, respectively. The group IV (controlled) without any treatment showed 28.0% non return rate. The result obtained from different groups was not significant ($p=<0.3$)

Table 1. Effects of intrauterine infusion of three antibiotics after AI on non return rates in repeat breeding dairy cows.

| Group | Treatment | Total number of cows | %Non-return to heat after AI | P value |
|-----------|--|----------------------|------------------------------|---------|
| Group IV | Control | 25 | 28.0 (7) | |
| Group I | Penicillin (CombiPen® 40 lac/cow) | 21 | 38.1 (8) | P<0.3 |
| Group II | Gentamycin (Genacine vet® 4 ml/cow) | 29 | 51.7 (15) | |
| Group III | Streptopenicillin (SP- vet® 2.5 gm/cow) | 26 | 46.1 (12) | |
| Total | | 101 | 41.6(42) | |

*Data in parentheses indicate total number of cows

Table 2 is represented with the effects of different quality of cervico vaginal mucous at heat period on non-return to heat following AI in crossbred dairy cows. In total, 58 cows were found to discharge clear mucous. The slight cloudy mucous

was recorded from 28 cows. The slight frothy and voluminous mucous were recorded in 9 and 6 cows, respectively.

Table 2. Effects of mucous quality on non return rates of AI in repeat breeding dairy cows

| Group | Mucous quality | Total number of cows | %Non-return to heat after AI | P value |
|---------|-------------------|----------------------|------------------------------|---------|
| Group A | Clear transparent | 58 | 51.72 (30) | |
| Group B | Slight cloudy | 28 | 25.00 (7) | |
| Group C | Slight frothy | 09 | 22.22 (2) | P=<0.06 |
| Group D | Voluminous | 06 | 50.00 (3) | |
| Total | | 101 | 41.58 (42) | |

*Data in parentheses indicate total number of cows

The group A had 51.7% non return rate in cows (30) discharging clear mucous and group C had 22.2% non return rate in cows (2) discharging slight frothy mucous at heat period. The cows (3) discharging voluminous mucous under group D showed 50.0 % non return rate. Slight cloudy vaginal mucous during estrous period were shown by 7 cows in group B and their non-return to heat was 25.0%.

4. DISCUSSION

In this experiment antibiotics including penicillin, gentamycin and streptopenicillin were used intrauterine to treat repeat breeding crossbred dairy cows. Non return to heat was the indicator of success of treatment in this study. The animals in group II, treated with gentamycin, showed the best result - 51.7% non return rate among others. The cows in group II treated with streptopenicillin and group I treated with penicillin showed 46.1% and 38.1% non return rate, respectively. Although there was no statistical significant variation ($p=<0.3$) in different treatment groups, intrauterine infusion with gentamycin had revealed the better result. The similar result was observed by Awasthi and Nema (1995). They reported that the success rate of post AI treated with gentamycin in repeat breeding crossbred dairy cows was 50%. Huber (1982) stated that intrauterine infusion of antibiotic during AI is the rational treatment for repeat breeding cows. Varieties of treatment have been provided in cows following uterine infection including antibiotics, antiseptics, prostaglandin and lavage (Mollo *et al.*, 1997; Hoedemaker, 1998). Intrauterine infusion with penicillin or dihydrostreptomycin or furacin (Miller *et al.*, 1980) is

the treatment of uterine infection. Warriach *et al.* (2008) reported the non return rate in cows treated with intrauterine infusion of gentamycin was 80% after AI compared 33%, achieved with infusing enrofloxacin in repeat breeding crossbred dairy cows. The result of the present study was comparatively lower (51.7%) than that of Warriach *et al.* (2008) who reported 80%. Kutty and Ramachandran (2003) also found the beneficial result of intrauterine infusion with gentamycin in repeat breeding dairy cows. In this experiment, cows did not receive any extra care. Traditional management practices were done by the owners. AI technician was not the same person because cows were selected from different AI centers, and the number of included in a group was small. The lower non return rate or insignificant result of the present experiment might be relating to the above mentioned limitations. A good result of intrauterine infusion of gentamycin can be attributed to elimination of microbial infection from uterus and making a favorable uterine environment for embryo. Singh *et al.* (1996) stated that direct infusion of gentamycin provides adequate microbicidal concentration inside the uterus and endometrium rather than systemic therapy. The poor result (38.1%) of penicillin in repeat breeding cows could be due to the presence of microorganisms in the uterus which can synthesize penicillinase enzyme, and inactivate the antibiotic. The other reasons behind the poor results could be due to the antibiotics resistance. The untreated repeat breeding cows showed the lowest result (41.6%) in this study. It is clearly indicated that treatment with antibiotic in repeat breeding cows improved non return rate which could lead to improved fertility.

The non return rate of group A (cows discharging clear mucous) was the highest (51.7%) and group C (cows discharging slight frothy mucous) was the lowest (22.2%) in this study. The animals in group D (cows discharging voluminous mucous) showed 50.0% non return rate which was near similar to the result of group A (51.7%). The result of group B (cows discharging slight cloudy mucous) was 25.0% (Table 2.). There was no significant variation among the results of non return rate of AI in cows having various categories of vaginal mucous at heat period ($p=<0.06$). During collection of data, all the cows discharging cervico vaginal mucous were considered as normal estrous secretion including slight cloudy and slight frothy because there was absence of pus or any other visible abnormality in mucous and accordingly all the cows were apparently normal. However, the poor non return rates were found in cows discharging slight frothy (22.2%) and slight cloudy (25%) mucous in this experiment. It could be due to subclinical uterine infection which could not be detected visually. Inflammation of the endometrium of the uterus, diagnosed by cytology in the absence of any

abnormal vaginal discharge called subclinical endometritis, is one of the major causes of repeat breeding in cows (Gilbert *et al.*, 2005). Subclinical endometritis in apparently healthy cows can be a cause of poor reproductive performance (Bacha, 2010). Vandeplassche (1982) reported that repeat breeding can be caused by subclinical endometritis. Endometritis is either clinical or subclinical inflammation of the uterine endometrium. Clinical endometritis is characterized by purulent vulval discharge on the other hand, subclinical endometritis is sometimes difficult to diagnose grossly. It can be diagnosed by cytology, in the absence of purulent material in the vagina (Gilbert *et al.*, 2005). Subclinical endometritis might interfere the conceptus to establish in uterus, and helps to decrease non return rate. Reneau and Kinsel (2001) stated that subclinical endometritis is a major cause of repeat breeding cows due to unhygienic conditions under which some technicians performed AI, leading to the entry of organisms into the uterus. It could be concluded that effect of clear transparent and voluminous mucous during estrous on repeat breeding dairy cows comparatively better than slight cloudy and slight frothy mucous. It could also be said that slight cloudy and slight frothy mucous discharge through genital tract during estrus indicate subclinical endometritis which lead to decrease non return rate.

5. CONCLUSION

The overall results suggest that the uterine infusion with gentamycin after AI in repeat breeding cows could increase non return rate compared to streptopenicillin and penicillin. It is also recommended that clear transparent and voluminous mucous during estrous on repeat breeding dairy cows might be an better indication of comparatively low non-return rate to heat than slight cloudy and slight frothy mucous. However, further study is necessary with a higher number of cows to be sheltered in similar management condition to achieve more reliable results.

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