EFFICACY OF INTRAUTERINE ADMINISTRATION OF GENTAMICIN IN THE TREATMENT OF CLINICAL ENDOMETRITIS IN CROSSBRED CATTLE

By

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THESIS

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DECLARATION

I hereby declare that this thesis entitled "EFFICACY OF INTRAUTERINE ADMINISTRATION OF GENTAMICIN IN THE TREATMENT OF CLINICAL ENDOMETRITIS IN CROSSBRED CATTLE" is a bonafide record of research work done by me during the course of research and that the thesis has not previously formed the basis for the award to me of any degree, diploma, associateship, fellowship or other similar title of any other University or Society.

Mannuthy,
18-7-1985.

M. VARADARAJAN

CERTIFICATE

Certified that this thesis entitled "EFFICACY OF INTRAUTERINE ADMINISTRATION OF GENTAMICIN IN THE TREATMENT OF CLINICAL ENDOMETRITIS IN CROSSBRED CATTLE" is a record of research work done independently by Sri. M. Varadarajan under my guidance and supervision and that it has not previously formed the basis for the award of any degree, fellowship or associateship to him.

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Mannuthy,
19-7-1985.

Dedicated to my beloved parents

and

Congenitally blind brother Nambidi

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INTRODUCTION

Potentiality of crossbreeding of indigenous cattle with recognised exotic breeds had been known since long in our country. However, the advantages of crossbreeding programme can be fully realised only if the crossbreds produced have high reproductive efficiency, especially under the prevailing agroclimatic conditions.

Reproductive efficiency greatly depends on the intricate interplay of seasonal, genetic, neuroendocrine and managemental factors. In commercial livestock production high reproductive efficiency plays a pivotal role in augmenting profits by regulating the production potential of cows. The total milk production from a cow depends on the number of freshenings during her life time. In order to get the maximum calf crop from a cow, its reproductive health has to be maintained at the highest level. The optimum quantitative level of reproductive efficiency has been spelled out as a calf every 12 to 13 months from every cow. However, this target is not often achieved under field and farm conditions due to various infertility conditions to which the cow is exposed during its productive life.

Infertility in cattle is rampant all over the world. The magnitude of economic loss due to cattle sterility or

impaired fertility is reflected in the alarming figures quoted from all over the world. Roberts (1971) has estimated that sterility due to reproductive disorders causes a loss to the tune of 25 million dollars annually in United States of America. He further reported that delayed conception of individual cows accounts to a loss of 30 dollars to the farmer per month. In Scandinavian countries infertility is said to be the most important single factor for culling dairy animals. Reports from Austria, Germany and Sweden show that annually 30 to 40 per cent animals are disposed off due to infertility (Frank and O'Berry, 1962).

There are good reasons to believe that the magnitude of prevalence of infertility among crossbred cattle of our country is far more wide spread and serious than hitherto apprehended. A comprehensive study carried out on the causes and magnitude of prevalence of "cyclic non-breeders" in our state revealed that the infection of uterus with non-specific organisms constituted 63.14 per cent of the total (Namboodiripad et al. 1976). A preliminary investigation of the incidence of infertility among crossbred cattle in Kerala revealed that repeat breeding existed to the tune of 37.93 per cent (Mathew and Namboodiripad, 1982). Review of the breeding records maintained in the artificial insemination centre attached to

the Department of Animal Reproduction, College of Veterinary and Animal Sciences and the University Livestock Farm, Mannuthy Kerala indicated that more than 75 per cent of the cows which failed to conceive with 3 or more inseminations had some infection or other of the genital tract (Nair, 1982).

Hinse (1959) opined that genital infection is most commonly caused by Streptococci, Staphylococci, Corynebacterium organisms and Escherichia coli, all of which are found in the normal surroundings of the dairy herd. Investigations on the bacterial flora of uterus of the normal and sterile cows indicated that even organisms normally inhabiting the tract, could endanger conception by producing unfavourable uterine environment (Roberts, 1971; Arthur, 1975; Patnak, 1982).

The advent of antibiotics has greatly helped the clinicians to combat the ever increasing menace of clinical endometritis. Several workers have tried various antibiotics alone or in combination with oestrogen as intrauterine infusion for treating clinical endometritis (Dawson, 1960; Gibbons et al. 1961; Namboodiripad et al. 1976; Alexov et al. 1984). Recently Gentamicin, a potent broad spectrum antibiotic derived from actinomycete Micromonospora purpurea has been reported to be effective in treating various genital infections (Smaley and Hennessey, 1979; Venkateswarulu et al. 1983).

The present work was, therefore, taken up with a view to study the efficacy of Gentamicin alone or in combination with stilboestrol in the treatment of clinical endometritis.

Indiscriminate use of antibiotics in the treatment of genital infection and other diseases might do more harm than good by opening the avenue for development of resistant strains. The necessity of carrying out antibiotic sensitivity test before treatment is, therefore, warranted. The study also envisages isolation of causative organisms from a few clinical endometritis cases and performance of antibiotic sensitivity test with an ultimate view to find out the pattern of infection and sensitivity to antibiotics.

Review of Literature

REVIEW OF LITERATURE

There is consensus of opinion that uterine infections are generally associated with tardy involution of uterus and chronic endometritis which would lead to delayed conception with increased number of services per conception (Roberts, 1971). It has been established beyond doubt that infection of the reproductive organs with non-specific organisms constituted the most important diagnosed cause of impaired fertility in cattle (Asisudin, 1954; Roberts, 1971). Frank and O'Berry (1962) observed that conception rate in many herds remained low even after elimination or control of specific genital diseases and attributed this to non-specific "low grade infections".

Roberts (1955) studied the incidence of different degrees of endometritis in 120 cases. He observed that 97 cases (80.83%) were first degree endometritis, 15 cases (12.5%) were second degree endometritis and 8 cases (6.66%) were third degree endometritis. Markusfeld (1984) observed that the incidence of primary metritis in Israeli-Friesian cattle was 37.3 per cent.

Though there are numerous reports on the incidence of various infertility conditions in the crossbred cattle population of our country, there seems to be paucity of information

on the incidence of various degrees of endometritis and other genital infections due to non-specific organisms. Rao and Kotayya (1976) reported that the incidence of endometritis in crossbred cattle in Andhra Pradesh was to the tune of 30.77 per cent of the total infertility conditions. The proportion of 1st, 2nd and 3rd degree endometritis due to non-specific organisms in buffaloes was reported to be respectively 36 per cent, 57 per cent and 7 per cent (Rao and Murty, 1977). Among parous buffaloes post puerperal infection (51.4%) and post coital infection (31.1%) were presumed to be the cause of endometritis. Singh et al. (1981) recorded the incidence of cervicitis, metritis and pyometra in cows to be respectively 12.78, 9.61 and 1.67 per cent. The overall incidence of retention of placenta in Gir cows and their crosses was 8.86 per cent and the average number of insemination per conception was more by 1.26 to 2.6 in the different groups of the affected cows (Pandit et al. 1981). The incidence of infertility condition due to infectious causes in apparently healthy crossbred cattle in Karnataka was reported to be 32.86 per cent of the total infertility conditions (Rao et al. 1983). He further stated that the incidence of cervicitis, metritis, granular vaginitis and oophoritis were respectively 27.39, 2.43, 2.38 and 0.66 per cent.

Reports on the incidence of genital infections with special reference to endometritis in the crossbred cattle of Kerala are scanty in literature. The incidence of repeat breeding due to low grade genital infection in crossbred cattle of Kerala was recorded to be 63.14 per cent (Namboodiripad, et al. 1976). Detailed investigation carried out on the incidence of various infertility conditions of cattle in a crossbreeding tract in Kerala revealed that genital infections formed nearly 37.93 per cent of the total infertility conditions (Mathew and Namboodiripad, 1982). Review of the breeding records of the cows of the Kerala Agricultural University Farm and those brought to the artitificial insemination centre showed that 75 per cent of cows which failed to conceive with three or more inseminations had some infection or other of the genital tract (Nair, 1982).

The normal bacterial flora of the vagina of the healthy cow is kept within bounds by the natural defense mechanism aided by the intact endocrine system. It is postulated that massive bacterial contamination of the vagina occurs through a defective vaginal sphincter and this in turn results in the aspiration of the infective organisms into the uterus causing endometritis (Arthur, 1975).

Organisms those were once considered to be facultative

saprophytes are seen more regularly as pathogens in the equine uterus and these include Pseudomonas aeruginosa, and Candida albicans. Fungal and yeast infections have become more prevalent due to excessive use of broadspectrum antibiotic therapy in the genital tract infection (David and Abith, 1977).

Albrechtsen (1917) was the first to emphasis the importance of bacterial infection as a cause of endometritis in cattle. His opinion had since been supported by many others (William, 1943; Hasley et al. 1951). Asdell (1958) reported that bacteria that were known to be relatively harmless might act synergestically to cause sufficient damage to the endometrium leading to early embryonic death or even abortion. Dawson (1960) stated that Staphylococci, Streptococci, Coliform, Pseudomonas diptheroids and Proteus formed the major isolates from infertile cows.

Ocal and Senida (1964) found that when broth culture of Escherichia coli was injected into the uterine horn of female rabbits at the beginning of the luteal phase or 6 to 9 days later resulted in the multiplication of the organisms and resultant endometritis. He further reported that the morbidity rate of endometritis tend to be higher in rabbits with large number of corpora lutea.

Nair (1973) obtained isolates such as Escherichia coli, Staphylococcus epidermidis, Proteus vulgaris, Staphylococcus pyogenes aureus and Pseudomonas aeruginosa from 6 out of 12 cases of metritis and endometritis. In an exhaustive study on the bacterial flora of cervical mucus in repeat breeding bovines, Krishnamurthy et al. (1974) isolated organisms such as haemolytic Escherichia coli, Staphylococcus aureus, Corynebacterium pyogenes, Pseudomonas aeruginosa, Aerobacter aerogenes, Klebsiella pneumoniae, Proteus vulgaris, Micrococcus ureae, Bacillus mesaterium and Bacillus cereus. Mamboodiripad et al. (1976) conducted a bacteriological study of uterine samples from 26 repeaters and isolated Proteus (7), Pseudomonas (7), Escherichia coli (4) and Staphylococci (6). Panangala et al. (1978) isolated Streptococci, Mycoplasma and fungi including Candida, Aspergillus, Penicillium notatum and Cladosporium from cervico-vaginal mucus of repeat breeder cows. Awad and El-Hariri (1980) identified Staphylococci aureus, Streptococcus pyogenes, Corynebacterium pyogenes, Klebsiella sp. and Proteus sp. from repeat breeder cows. Patnak and Kohli (1982) isolated Flavobacterium kurthia, Micrococcus, Lacto bacillus and Chromo bacterium from ovine vagina. Microbiology of cervical mucus from repeat breeder cows with no apparent abnormality of genital tract yielded Streptococcus epidermidis, Streptococcus aureus,

Bacillus species, Proteus vulgaris, Proteus morganii, Proteus rettegerii, Pseudomonas species. Klebsiella species, Candida albicans, Candida tropicalis, Candida cullier mondii and Cladosporium species (Garg et al. 1982). They opined that sub clinical infection might be responsible for repeat breeding. The presence of microbes can reduce fertility either by affecting viability of the sperms or the embryo due to altered uterine pH.

Naik (1982) obtained isolates such as Staphylococcus aureus, Streptococcus pyogenes, Escherichia coli Pseudomonas sp., Corynebacterium sp. and Bacillus sp. from 91 out of 106 (85.85%) genital discharges from repeat breeder cows. Derashri et al. (1983) carried out bacteriological study of cervico-vaginal mucus from 87 repeat breeder Surti buffaloes which yielded isolates such as Staphylococcus epidermidis, Escherichia coli, Corynebacterium sp., Staphylococcus aureus and Micrococcus. The percentage of non sporulating gram negative bacilli, sporulating gram positive bacilli, gram positive bacilli and gram positive cocci were found to be respectively 29.83, 31.57, 7.91 and 30.69. Messier et al. (1984) conducted a bacteriological study using swab biopsy samples from bovine uterus and isolated Streptococcus faecalis, Corynebacterium pyogenes Escherichia, Proteus, Bacteroides and Clostridium. Obligate

anaerobes were not isolated from the six repeat breeder cows.

Namboodiripad et al. (1976) studied the in vitro antibiotic sensitivity of isolates from the uterus of repeat breeder cows and the efficacy of intrauterine treatment with specific antibiotics. The bacterial isolates were tested for sensitivity to Penicillin, Streptomycin, Chloramphenicol and Oxytetracycline and treatment with specific antibiotics resulted in 83.46 per cent of the repeat breeders conceiving with single insemination. They further reported that almost all isolates were sensitive to oxytetracycline. While Pseudomonas was totally resistant to Penicillin and Streptomycin, Proteus and Escherichia showed maximum sensitivity to chloramphenicol. In vitro antibiotic sensitivity test and treatment of endometritis in cows with Chloramphenicol, Terramycin, Streptomycin, Ledermycin and Penicillin proved that Chloramphenicol was the most effective in inhibiting the growth of 89.3 per cent of the isolates (Sinha et al.1977). The other antibiotics in their decreasing order of effectiveness were Terramycin (78.6%), Streptomycin (71.4%), Ledermycin (5%) and Penicillin (29.6%). Murty and Rao (1978) conducted in vitro antibiotic sensitivity, in vivo response and future fertility of 106 buffaloes with first and second degree endometritis. The number of cases sensitive to Nitrofurazone, Terramycin,

Streptomycin, Mastalone U and Penicillin were respectively 99, 80, 79, 70 and 18. Eventhough the percentage cure with Nitrofuraxone, Terramycin, Streptomycin, Mastalone U and Penicillin were 95.8, 96.1, 58.3, 100 and 100 respectively, percentage conception obtained with the above treatments were 70.8, 80.7, 58.3, 66.6 and 50.0 respectively.

In vitro sensitivity study of isolates from repeat breeder cows with Neomycin, Terramycin, Chloramphenicol, Nitrefuraxone and Streptomycin has revealed that there was maximum sensitivity of the isolates to Neomycin and the most effective treatment was obtained with the same antibiotic (Sharma et al. 1978). They further reported a rarely recorded isolate of Klebsiella from a repeat breeder cow, which had become pregnant with Neomycin plus Oxytetracycline treatment. Based on the antibiotic sensitivity studies of 148 isolates from 20 repeat breeder cows and 50 repeat breeder buffaloes, Awad and El-Hariri (1980) reported that the bacterial isolates were more sensitive to Chloramphenicol, Polymycin B, Gentamicin and Ampicillin but less sensitive to Colistin sulphate. Naik (1982) obtained bacterial isolation from 85.85 per cent of the 106 genital discharges collected from 90 repeat breeder cows and 16 repeat breeder buffaloes. Further he recorded an overall conception rate of 72.97 per cent by treatment with

specific antibiotic based on *in vitro* sensitivity studies. The percentage of isolates from cervico-vaginal mucus samples of buffaloes sensitive to Neomycin and Gentamicin were reported to be respectively 87.69 and 76.00 (Deraadhri *et al.* 1983). Venkateswarulu *et al.* (1983) subjected isolates from uterine discharges of 180 cows and buffaloes having second degree endometritis to antibiotic sensitivity test with six antimicrobial drugs and obtained the highest sensitivity to Chloramphenicol (21%) and the lowest to Tetracycline (8.3%). They further recorded the highest conception rate (85%) in the group treated with Furacin with an overall conception rate of 72 per cent. The decreasing order of efficiency of drugs with respect to the conception rate obtained were found to be Tetracycline, Chloramphenicol, Streptomycin, Ampicillin and Gentamicin.

There are numerous reports in the literature about the development of drug resistance among the common microbes. Davis and Abbitt (1977) pointed out that widespread use of antibacterial drugs has not markedly decreased the incidence of metritis or infertility in mares, but it might be causing a shift in the nature of pathogenic bacteria. Most pathogenic strains isolated from mares with uterine infections were not sensitive to Penicillin, Chlortetracycline,

Streptomycin, Oxytetracycline, or Sulfonamides, while they were sensitive to Chloramphenicol and Gentamicin which were not extensively used in equine practice. They opined that it is only just a question of time for the organisms to develop resistance against these drugs too.

Murty and Rao. (1978) in an exhaustive in vitro antibiotic sensitivity study recorded resistant strains of microbes against Penicillin, Streptomycin, Terramycin, Mastalone U and Nitrofurazone to be 83.3, 24.5, 25.5, 34 and 6.6 per cent respectively. Sarma and Boro (1979) studied the antibiotic resistance pattern of pathogenic bacteria isolated from clinical materials to Penicillin Streptomycin, Tetracycline, Chloramphenicol, Neomycin and Furazolidone. They observed that most of the organisms were sensitive to Chloromycin, Neomycin and Streptomycin However, gram negative organisms in general were resistant to Penicillin and Tetracycline. Beauage and Fox (1979) reported that the widespread use of antibiotic therapeutically and as feed supplements for animals increase the risk of transmission of R factors from normal enteric bacteria in animals to other animals. The increase in antibiotic resistance in enteric pathogens, in particular Salmonella indicated that R factor transfer in animals was widespread. Horodniceanu et al. (1982) studied the high level of aminoglycoside

resistance in group A, B, G, D (Streptococcus bovis) and viridans Streptococci. All strains from the 20 isolates carried genetic markers for high level resistance to Streptomycin, Kanamycin, Neomycin, Lividomycin A and Ribostamycin, as well as resistance to Macrolides and related drugs Tetracycline and Chloramphenicol. It was observed that the resistance to Streptomycin and Kanamycin may be mediated by the same aminoglycoside modifying enzymes for Streptococcus faecalis strains. Pass (1982) studied the in vitro interaction of moxalactam and mecillinam singly and in combination against multi-drug resistant gram negative enteric bacilli by check board microdilution susceptibility tests and by killing curve kinetics. Against Entero bactericeae the combination was unpredictable, the frequencies of synergy indifference and antagonism were 11, 17 and 13 per cent respectively. Against Pseudomonas sp. the two drugs were consistently indifferent. The combination of moxalactam and mecillinam was no more active than moxalactam alone. Shimoda et al. (1983) in a exhaustive study of drug resistance and R plasmids in Escherichia coli observed that high incidence of drug resistant organisms was demonstrated in the animal colonies where treatment with Tetracycline had been undertaken. Conjugation analysis revealed that all the resistant strains from mice

and rabbits carried their resistance determinants on R plasmids. Ansari et al. (1984) observed that infectious nature of the R-factors is one of the major mechanisms of rapid spread of antibiotic resistance in bacterial populations. A wide distribution and high incidence of R-plasmids transfer by clinical resistant isolates of Escherichia coli to different groups of bacteria has been demonstrated by several workers.

Balganesh and Setlow (1985) established that by a special processing of plasmid DNA, which enters the competent cell in transformation, that makes recombination of homologous regions of the plasmid with the chromosome and pairing with the chromosome that aid plasmid establishment.

Efforts to counteract uterine infections, with different antibacterial agents in various combinations are in vogue since many years. Most of the work, however, has been confined to "cyclic non breeder" animals. Chambers (1948) reported the successful use of antibiotics in treating infertile cows. The beneficial effect of intrauterine administration of antibiotics was reported by (Manley et al. 1951). Lindley (1954) reported that 65 per cent of 20 infertile cows conceived when treated with intrauterine injection of antibiotics the day following service. It was further reported that Streptomycin and Penicillin infused one or two days following service had increased

the conception rate of cows that were hard to breed. Kattner (1954) found that the conception rate had substantially improved by intrauterine administration of 6 per cent Aureomycin ointment within one to two days of insemination. Holdan (1955) found that the uterine irrigation with a combination of Penicillin and dihydro Streptomycin in distilled water after artificial insemination settled 73 per cent of cows with endometritis and irregular sexual cycle. Stula et al. (1958) obtained 70 per cent conception rate in clinically normal repeaters when uterus was irrigated with 10 ml of Terramycin after insemination. Intrauterine therapy with Penicillin and Streptomycin settled 33 out of 40 repeaters (Luktuke et al. 1959). Smith (1959) claimed that intrauterine infusion of aqueous solution of Embryostat (Calcium-Oxytetracycline - Glucose complex) was of immense value in treating infertile cows due to non-specific uterine infection. Vigue et al. (1959) observed intravaginal inserts reduced the number of services per conception and shortened the interval between calvings. Hinse (1959) claimed that low-grade metritis can be treated with intrauterine instillation of a Penicillin, Streptomycin mixture "(Combiotic)".

Treatment of endometritis with various antibacterial drugs has proved that the maximum conception rate (80.9%)

was obtained with Mastalone U (Sinha et al. 1976). The other drugs of choice in the order of merit being Steeline bolus (66.7%) Lugol's solution (57.1%) Uni-Berbyl tablets (52.4%) and Aureomycin (33.3%). Oxender and Bradley (1976) reported that infusion of Oxytetracycline caused premature luteolysis and hence suggested that non irritating solution only be selected for antibacterial infusion after insemination to prevent the possibility of premature luteolysis and loss of conceptus. Raghavan et al. (1977) treated seven cases of chronic reproductive tract infection in cattle successfully with Furea. Kodagali et al. (1977) found that one to three intrauterine infusions of Mastalone U cleared uterine infection and rendered the animal fit for artificial insemination by 29 to 30 days of the commencement of treatment. Murty and Rao (1978) in an exhaustive study on the treatment of non-specific endometritis in buffaloes with Terramycin, Nitrofurazone, Streptomycin, Penicillin and Mastalone U obtained respectively 80.7, 70.8, 58.3, 66.6 and 50.0 per cent conception with intrauterine infusion of the respective antibiotic for five consecutive days. Sharma et al. (1978) obtained 86.6 per cent conception in repeat breeder cows treated with intrauterine infusion of Neomycin, Terramycin, Nitrofurazon, Chloramphenicol or Streptomycin based on antibiotic sensitivity of isolates 6 to 24 hours post insemination. It has been

reported that slow releasing iodine polymers can eliminate some of the strains of bacteria resistant to antibiotics (Mayer et al. 1978; Afeefy et al. 1979). Bernhard (1979) claimed that a combination of lugol's (7.1 g iodine and 14.2 g KI/100 ml) and Dorleam (0.1 g of carbachol in propylene glycol 100 ml) administered intrauterine 5 days after parturition was effective in the treatment of puerperal uterine atony. A study was conducted at Wisconsin and Kansas on the use of intrauterine infusion of Gentamicin in the treatment of endometritis (Knaley and Hennessey, 1979). In Wisconsin 91 per cent of 46 infected cows conceived with one intrauterine infusion of 200 mg of Gentamicin as against 81 per cent in the Kansas study. In the same study, treatment with Utonex (Ethinyloestradiol and Nitrofurathiazide) gave a conception rate of only 79 per cent.

Venkateswarlu et al. (1983) treated 180 buffaloes and cows having second degree endometritis with Streptomycin, Ampicillin, Tetracycline, Gentamicin, Chloramphenicol and Furacin after antibiotic sensitivity test and obtained an overall conception rate of 72 per cent. The highest percentage conception of 88 per cent was obtained in animals treated with Furacin. Cows treated with Tetracycline, Chloramphenicol, Streptomycin, Ampicillin and Gentamicin recorded respectively

conception rate of 77.78, 68.75, 61.54 and 61.54 per cent. Deramhri et al.. (1985) recorded an overall conception rate of 76 per cent in Surti buffaloes affected with genital infections which were treated with Neomycin or Gentamicin based on antibiotic sensitivity of isolates. Post insemination intrauterine infusions of Penicillin and Streptomycin, Lugol's iodine and Mastalone U in repeat breeder cows resulted in a conception rate of 47.0, 44.3 and 30.8 per cent respectively (Gupta et al. 1985). Goe (1984) claimed that uterine flush (with sterile physiological saline and PGF_2 alpha I/M) was effective in settling 13 out of 20 repeat breeder cows. Berger (1984) claimed that either weak solution of iodine and potassium iodide or a combination of Procaine Penicillin and Streptomycin sulphate infused after 3 to 6 unsuccessful inseminations improved conception rate in repeat breeder cows. A higher conception rate of 77 per cent could be obtained with foaming tablets of Gentamicin sulphate than with the non-foaming tablets (Klesov et al. 1984).

Rofte et al. (1980) stated that opsonisation requires immunoglobulins and serum complement was hence essential in effective opsonisation for maintaing the normal homeostasis of natural defensive mechanisms of the body. This

was further confirmed by Asbury (1984) who settled 15 mares out of 26 barren mares with intrauterine infusion of a combination of saline and its own plasma.

Georgiev et al. (1980) claimed clinical recovery of 93 per cent of chronic endometritis cases treated with a combination of ultra short waves and chemotherapy. A recovery rate of 67 per cent was claimed in the treatment of endometritis with Utrovet, a powerful ayurvedic cebolic (Kerur, 1981). Verganov and Openkunov (1983) reported that Doderlins bacillus (Bacillus vaginae) from the human vagina had an antagonistic action on bacteria associated with bovine endometritis. They further reported high recovery rate and conception of bovine endometritis cases treated with 48 hours culture of Bacillus vaginae having 12 x 10^9 bacteria. Youngquist et al. (1984) claimed that EDTA-tris might be a useful adjunct for treatment of uterine infection in the mare.

Recently the use of PGF_2 alpha in the treatment of endometritis in cows has been attempted by several investigators (Jackson, 1977; Coulson, 1978; Zuber, 1980; Jackson, 1981; Zeremski et al. 1981; Humke and Zuber, 1982). A combination of prostaglandin and antibiotic was reported to be superior over prostaglandin treatment alone (Lamblin, 1979; Humke and Zuber, 1982). Cows with endometritis that are

still cycling may also benefit from prostaglandin treatment, due to shortened diocstrum with an ultimate induction of more estrus periods over a short interval. This naturally results in more frequent exposure of the endometrial tissue to natural defensive mechanism (Coluson, 1978).

Dawson (1960) reported that oestrogen is effective to counter act experimently produced endometritis. Common forms of hormonal treatment used for endometritis include oestrogen alone or in combination with Oxytocin (Laing, 1979; Bretzlaff et al. 1982) Intramuscular injection or intrauterine infusion of oestrogen has been reported to be useful in the treatment of endometritis due to its stimulating effect on the uterus (Roberts, 1971). Vunko (1978) cured 1485 out of 2430 cows (61%) with endometritis by a single course of stilboestrol(20 to 30 mg)and Oxytocin (3 to 5 ml) on alternate days.

Materials and Methods

MATERIALS AND METHODS

All the cows and heifers brought to the artificial insemination centre attached to the Department of Animal Reproduction during the period of study (1984-85) were thoroughly screened to estimate the incidence of clinical endometritis. One hundred and seventy crossbred cows and heifers with a history of more than three unsuccessful inseminations and with clinical evidence of endometritis formed the material for the study. The selected animals were randomly allotted to two groups and given the following treatment.

Treatment Group I. 86 animals were given intrauterine administration of 250 mg of Gentamicin in 25 ml distilled water.

Treatment Group II. 84 animals were given intrauterine administration of 250 mg of Gentamicin and 10 mg of Stilboestrol in 25 ml distilled water.

The animals in the experimental group I and II were given the respective treatment during the same heat. Those animals which were completely free of infection by the next heat were inseminated. Treatment schedule was repeated in the rest of the animals until the oestrual mucus was devoid of mucopurulent discharge and then they were inseminated.

Percentage conception was worked out based on both 90 days non-return rate and actual pregnancy verification of randomly selected animals. The collected data were tabulated and analysed (Snedecor and Cochran, 1967).

Uterine discharges were collected aseptically before administration of the drug from 25 animals with clinical endometritis, using a special biopsy instrument (Ghosh et al. 1980). Bacterial isolation was made from the discharges and generic level identification of the isolates was carried out by standard procedures (Cowan, 1974). Sensitivity of the isolates to Gentamicin, Septran, Ampicillin, Terramycin and Chloramphenicol was carried out by standard procedures (Cruickshank et al. 1975).

Results

RESULTS

Results of investigation on the incidence of endometritis and effect of treatment of endometritis with Gentamicin alone or a combination of Gentamicin with Stilboestrol are presented in table I to VII.

Out of the 8352 crossbred cows and heifers subjected to detailed clinicogynaecological examination, 807 (9.66%) were found to be affected with clinical endometritis (Table I).

It could be seen from table II that out of the 86 crossbred cows and heifers treated with one to two intrauterine infusions of Gentamicin and inseminated in the subsequent heat only 55 (63.95%) did not return to service after single artificial insemination. Among 84 animals which received a combination of Gentamicin and Stilboestrol 54 (64.28%) did not return to service. Conception rate based on 90 days non return rate was recorded to be 63.95 per cent in group I as against 64.28 per cent in group II. The conception based on actual pregnancy verification in group I and II were respectively 56.45 and 40.90 per cent. Analysis of data revealed that there was no significant difference in conception rates between groups either based on non return rate or actual pregnancy verification. The average number of days between treatment and conception

in group I (26.17 days) did not differ significantly from that of group II (22.28 days).

The overall conception rate with two or more insemination based on 90 days non return rate was recorded to be 80.23 per cent in group I as against 80.94 per cent in the group II animals (Table III). The conception based on actual pregnancy verification in group I and II were respectively 72.58 per cent and 63.63 per cent. There was no significant difference in conception rate between groups either based on non return rate or actual pregnancy verification. While the number of insemination per conception in group I was 1.91, that of group II was recorded to be 2.39. The average number of days between treatment and conception in group I (35.33 days) did not differ significantly from that of group II (31.11 days).

It could be seen from table IV that single intrauterine infusion of Gentamicin and subsequent insemination resulted 79.16 per cent conception rate based on 90 days non return rate (66 out of 83) while double intrauterine infusion of the drug resulted in 100 per cent conception (3 out of 3). There was no significant difference in conception rate based on non return rate between the above two sub groups. The conception based on actual pregnancy verification was respectively 71.18 per cent and 100 per cent, which also did not

differ significantly between groups. The average number of days between treatment and conception in sub group I (35.36 days) did not also differ significantly from that of sub group II (35.00 days).

Perusal of data presented in table V would reveal that among 79 crossbred cows and heifers receiving one intrauterine infusion of a combination of Gentamicin and Stilboestrol and inseminated in the subsequent heat, only 66 did not return to service, while among 5 animals which received double intrauterine infusions of the drug only 3 did not return to service. The conception rate based on 90 days non return rate was recorded to be 83.54 per cent in the former as against 60.00 per cent in the latter. The conception based on actual pregnancy verification in the two sub groups were respectively 64.35 per cent and 60.00 per cent. This variation was not found to be significant statistically. The average number of days between treatment and conception in sub group I (29.80 days) did not also differ significantly from that of sub group II (42.00 days). Statistical analysis also revealed that there was no significant difference between the paired sub groups in the treatment group I and II with respect to the effect of number of intrauterine administrations on the percentage conception. Average number of days from treatment to

conception did not also differ significantly between groups (Table V).

Effect of parity on the conception revealed that 90 days non return rate in the sub groups heifer (H) upto 3rd calving (upto C^3) and above 3rd calving (above C^3) of group I were respectively 86.66, 77.58 and 69.23 per cent as against the percentage conception based on actual pregnancy of 80.00, 70.31 and 63.63 in the respective sub groups. There was no significant difference in conception rate either on non return rate or on actual pregnancy verification between sub groups due to parity. The average number of insemination per conception in the respective groups were 1.50, 1.90 and 1.72 which also did not differ significantly. Similarly the average number of days from treatment to conception in subgroup H (35.50 days) upto C^3 (36.60 days) and above C^3 (29.71 days) did not also differ significantly (Table VI).

The percentage of conception based on 90 days non return in the three subgroups of group II were respectively 78.57, 80.70, 84.61. Similarly percentage conception based on actual pregnancy verification were 66.66, 59.25 and 75.00 respectively. Statistical analysis did not reveal any significant difference in conception rate between sub groups

both on non return rate and actual pregnancy verification. While the average number of artificial insemination per conception in the 3 sub groups were 2.00, 2.58 and 2.66, the average number of days from treatment to conception were 31.50, 27.50 and 40.33 respectively. Statistical analysis did not reveal any significant difference between the sub groups with respect to the average number of days from treatment to conception. The analysis also revealed that the variation due to parity on the conception rate did not differ significantly in both the groups and also between the groups (Table VII).

Results of the isolation of the causative organisms and the antibiotic sensitivity pattern are presented in table VIII to XI.

The various organisms isolated from uterine discharges were Haemophilus (8%), Enterobacteria (24%), Pseudomonas (12%) Staphylococcus (20%), Bacillus (4%), Pasteurella (8%), Actinobacillus (4%), Necromonas (12%), Lactobacillus (4%) and Streptobacillus (4%) (Table VIII and X).

Isolates of Haemophilus were sensitive to Gentamicin (100%), Neptran (50%), Chloramphenicol (50%) and Tetracycline (50%) but were totally resistant to Ampicillin (Fig. 1). Gentamicin was found to be the antibiotic of choice for

genital infections by the Enterobacteria as 66.66 per cent of the organisms where sensitive to the antibiotic. The percentage of sensitivity of Enterobacteria to both Septran and Tetracycline were 16.66 per cent while all the strains were resistant to Ampicillin and Chloramphenicol (Fig. 2). Among the Staphylococcal isolates 80 per cent were sensitive to Septran. The sensitivity of Staphylococcal isolates to Gentamicin, Chloramphenicol and tetracycline was found to be equal (60%). Ampicillin was effective only in 20 per cent of the cases. The Bacillus species isolated from one of the cases was sensitive to all the antibiotics tested. Both Pseudomonas and Actinobacillus isolated from the clinical materials were totally resistant to all the 5 antibiotics (Fig. 4 & 5).

Out of the five antibiotics used only Gentamicin was found to be effective (50%) against Pasturella strain associated with this condition. Septran and Gentamicin were equally (66.66%) effective against Neoromonas isolated while Chloramphenicol, Tetracycline and Ampicillin were ineffective (Fig. 3). While Lactobacillus was sensitive (100%) to all antibiotics except Ampicillin, Streptobacillus showed sensitivity (100%) to Chloramphenicol, Septran and Gentamicin.

Out of the 25 cases 60 per cent could be treated with Gentamicin. The other antibiotics in the order of decreasing efficiency were Septran (44%), Chloramphenicol (28%), Tetracycline (28%) and Ampicillin (8%) (Table XI).

Tables

Table 1. Incidence of endometritis

Total number of cows examined	No. of cows affected with clinical endometritis	Percentage of incidence
8352	807	9.66

Table I . Conception rate of cows treated with Gentamicin and Gentamicin with stilboestrol with single insemination.

Treatment group.	No. of cows/ heifers inseminated after treatment	No. which did not return to service	Percentage conception based on 90 days non return rate	Conception based on actual pregnancy verification			Average number of days from treatment to conception
				No. followed up	No. pregnant	Percentage	
Group I							
Gentamicin	86	55	63.95	62	35	56.45	26.17
Group II							
Gentamicin with Stilboestrol	84	54	64.28	44	18	40.90	22.28

't' value for comparing percentages of conception 1.5778 (NS)*

't' value for comparing number of days from treatment to conception 1.1734 (NS)

NS* = Not significant at 5 per cent level.

Table III. Overall conception rate of cows treated with Gentamicin and Gentamicin with Stilboestrol.

Treatment group	No. of cows treated	No. which did not return to service	Percentage conception based on 90 day non return rate	Conception based on actual pregnancy verification			Average number of insemination per conception	Average number of days from treatment to conception
				No. examined	No. pregnant	Percentage		
Gentamicin	86	69	80.23	62	45	72.58	1.91	35.33
Gentamicin with Stilboestrol	84	68	80.94	44	28	63.63	2.39	31.11

't' value for comparing percentages of conception 0.9806 (NS)*

't' value for comparing number of days from treatment to conception 0.8256 (NS)*

NS* = Not significant at 5 per cent level

Table IV. Effect of number of intrauterine infusions of the drug on the percentage conception of treated cases in group I.

No. of intra uterine treatment	No. of cows treated	No. which did not return to service	Percentage conception based on 90 days non return rate	Conception based on actual pregnancy verification			Average number of A.I. per conception	Average No. of days from treatment to conception
				No. followed up	No. pregnant	Percentage		
1	83	66	79.16	59	42	71.18	2.04	35.36
2	3	3	100.00	3	3	100.00	1.66	35.00
Total	86							

't' value for comparing percentages of conception 1.0915 (NS)*

't' value for comparing number of days from treatment to conception 0.0255 (NS)

NS* = No significant at 5 per cent level

Table V. Effect of number of intrauterine infusions of the drug on the percentage conception of treated cases in group II.

No. of intrauterine treatments	No. of cows treated	No. which did not return to service	Percentage conception based on 90 days non return rate	Conception based on actual pregnancy verification			Average number of A.I. per conception	Average number of days from treatment to conception
				No. followed up	No. pregnant	Percentage		
1	79	66	83.54	39	25	64.35	2.40	29.80
2	5	3	60.00	5	3	60.00	3.00	42.00
Total	84							

't' value for comparing percentages of conception 0.1904 (NS)*

't' value for comparing number of days from treatment of conception 1.1671 (NS)

't' value for comparing single intrauterine infusion of Gentamicin or Gentamicin Stilboestrol combination of group I and II 1.0171 (NS)

't' value for comparing double intrauterine infusion of Gentamicin or Gentamicin Stilboestrol combination of group I and II 0.50 (NS)

NS* = Not significant at 5 per cent level.

Table VI. Influence of parity on the conception rate of cows in treatment group I.

Parity	No. of cows treated	No. which did not return to service	Percentage conception based on 90 days non return rate	Conception based on actual pregnancy verification			Average No. of A.I. per conception	Average No. of days from treatment to conception
				No. followed up	No. pregnant	Percentage		
Heifer	15	13	86.66	10	8	80.00	1.50	35.50
Upto C^3	58	45	77.58	41	30	70.31	1.90	36.60
Above C^3	13	9	69.23	11	7	63.63	1.72	29.71
Total	86							

't' value for comparing percentages of conception Heifer and upto C^3 0.6304 (NS)*

't' value for comparing percentages of conception upto C^3 and above C^3 0.4342 (NS)

't' value for comparing percentages of conception Heifer and above C^3 0.8294 (NS)

't' value for comparing number of days from treatment to conception Heifer and upto C^3 0.1117 (NS)

't' value for comparing number of days from treatment to conception upto C^3 and above C^3 0.7050 (NS)

't' value for comparing number of days from treatment to conception Heifer and above C^3 0.5026 (NS)

NS* = Not significant at 5 per cent level

Table VII. Influence of parity on the conception rate of cows in treatment group II

Parity	No. of cows treated	No. which did not return to service	Percentage conception based on 90 days non return rate	Conception based on actual pregnancy verification			Average number of A.I. per conception	Average number of days from treatment to conception
				No. followed up	No. pregnant	Percentage		
Heifer H	14	11	78.57	9	6	66.66	2.00	31.50
Upto C^3	57	46	80.70	27	16	59.25	2.58	27.50
Above C^3	13	11	84.61	8	6	75.00	2.66	40.33
Total	84							

't' value for comparing percentages of conception Heifer and upto C^3 0.3949 (NS)*

't' value for comparing percentages of conception upto C^3 and above C^3 0.8098 (NS)

't' value for comparing percentages of conception Heifer and above C^3 0.3767 (NS)

't' value for comparing number of days from treatment to conception H and up to C^3 0.5237(NS)

't' value for comparing number of days from treatment to conception upto C^3 and above C^3 1.5367(NS)

't' value for comparing number of days from treatment to conception H and above C3 0.8291(NS)

't' value for comparing percentage of conception of H in treatment Group I & II 0.3320 (NS)

't' value for comparing percentage of conception of up to C^3 in treatment group I & II 1.3397(NS

't' value for comparing percentage of conception of above C^3 in treatment group I & II 1.0173(NS

NS* = Not significant at 5 per cent level.

Table VIII. Identification of bacterial isolates from 2nd degree endometritis case

Description of case			Details of bacterial isolates									Identification
Case No.	Parity	Where there was any post partem complication or not	Staining	Shape	Acid fast	Spore	Motility	Catalase	Oxidase	Glucose	O/F	
1	C2	No	Gram -	R	..	..	-	+	-	+	-	Haemophilus
2	C2	No	Gram +	S	-	-	-	+	-	+	F	Staphylococcus
3	C1	No	Gram -	R	..	..	+	+	+	+	O	Pseudomonas
4	C1	No	Gram +	R	-	+	+	+	+	+	F	Bacillus
5	C2	No	Gram -	R	..	..	-	+	-	+	F	Enterobacteria
6	C1	No	Gram -	R	..	..	-	+	+	+	F	Actinobacillus
7	C3	No	Gram -	R	..	..	-	+	-	+	-	Haemophilus
8	C4	No	Gram -	R	..	..	-	+	-	+	F	Enterobacteria
9	C1	No	Gram -	R	..	..	-	+	-	+	F	Enterobacteria
10	C4	Yes/Abortion	Gram -	R	..	..	-	+	-	+	F	Enterobacteria
11	H	No	Gram -	R	..	..	-	+	-	+	F	Enterobacteria
12	H	No	Gram -	R	..	..	-	+	-	+	F	Enterobacteria
13	C1	No	Gram -	R	..	..	+	+	+	+	O	Pseudomonas

(Table VIII contd.....)

Description of cows			Details of bacterial isolates									Identification
Case No.	Parity	Where there was any post partem complication or not	Staining	Shape	Acid fast	Spore	Motility	Catalase	Oxidase	Glucose	O/F	
14	C1	No	Gram -	R	..	..	-	+	+	+	F	Necromonas
15	C2	No	Gram -	R	..	..	-	+	+	+	F	Necromonas
16	C1	No	Gram -	R	..	..	-	+	+	+	F	Pasteurella
17	C1	No	Gram -	R	..	..	-	-	-	+	F	Streptobacillus
18	C5	No	Gram -	R	..	..	-	+	+	+	F	Necromonas
19	C1	No	Gram -	R	..	..	-	+	+	+	F	Pasteurella
20	C1	No	Gram -	R	..	..	+	+	+	+	O	Pseudomonas
21	C2	No	Gram +	R	-	-	-	-	-	+	F	Lactobacillus
22	C1	No	Gram +	S	-	-	-	+	-	+	F	Staphylococcus
23	C3	No	Gram +	S	-	-	-	+	-	+	F	Staphylococcus
24	H	No	Gram +	S	-	-	-	+	+	+	F	Staphylococcus
25	C1	No	Gram +	S	-	-	-	+	-	+	F	Staphylococcus

Gram - : Gram negative
Gram + : Gram positive

R = Rod
S = Spherical

O = Oxidation

F = Fermentation

(Table VIII contd.)

Table IX. Sensitivity of Bacterial isolates from clinical endometritis cases.

Sl. No.	Genus of bacterial isolates	Ampicillin	Tetracycline	Chloramphenicol	Septran	Gentamicin
1.	Haemophilus	R*	R	R	S	S**
2.	Staphylococcus	R	R	R	R	R
3.	Pseudomonas	R	R	R	R	R
4.	Bacillus	S	S	S	S	S
5.	Enterobacteria	R	R	R	S	S
6.	Actinobacillus	R	R	R	R	R
7.	Haemophilus	R	S	S	S	S
8.	Enterobacteria	R	R	R	R	S
9.	Enterobacteria	R	R	R	R	R
10.	Enterobacteria	R	S	R	S	S
11.	Enterobacteria	R	R	R	R	R
12	Enterobacteria	R	R	R	R	S
13.	Pseudomonas	R	R	R	R	R
14.	Neisseria	R	R	R	S	S
15.	Neisseria	R	R	R	S	S
16.	Pasteurella	R	R	R	R	R
17.	Streptobacillus	R	R	S	S	S
18.	Neisseria	R	R	R	R	R
19.	Pasteurella	R	R	R	R	S
20.	Pseudomonas	R	R	R	R	R
21.	Lactobacillus	R	S	S	S	S
22.	Staphylococcus	S	S	S	S	S
23	Staphylococcus	I***	S	S	S	S
24.	Staphylococcus	R	R	I	S	R
25.	Staphylococcus	S	S	S	S	S

*R - Resistant **S - Sensitive ***I - Intermediate

(Table IX Contd.....)

Zone size interpretative chart

Chemotherapeutic agent	Symbol	Strength	Diameter of zone inhibition		
			Resistant mm or less	Intermediate mm	Sensitive mm
1. Ampicillin	A	10 mcg	12	13-17	18
2. Oxytetracycline	O	30 mcg	14	15-18	19
3. Chloramphenicol	C	30 mcg	12	13-17	18
4. Septran	S	25 mcg	10	11-15	16
5. Gentamicin	J	10 mcg	12	-	13

Source

Span Diagnostics
175 - Industrial Estate,
Udhna - 394 210 (Surat), India.

(Table IX contd.)

Table I. Summary of bacterial isolates and their antibiogram.

Name of the isolate		Ampicillin	Tetracycline	Chloramphenicol	Septran	Gentamicin
Micrococcus	2 (8%)	Nil	1 (50)	1 (50%)	1 (50%)	2 (100%)
Enterobacteria	6 (24%)	Nil	1 (16.66%)	Nil	1 (16.66%)	4 (66.66%)
Pseudomonas	3 (12%)	Nil	Nil	Nil	Nil	Nil
Staphylococcus	5 (20%)	1 (20%)	3 (60%)	3 (60%)	4 (80%)	3 (60%)
Bacillus	1 (4%)	1 (100%)	1 (100%)	1 (100%)	1 (100%)	1 (100%)
Pasteurella	2 (8%)	Nil	Nil	Nil	Nil	1 (50%)
Actinobacillus	1 (4%)	Nil	Nil	Nil	Nil	Nil
Aeromonas	3 (12%)	Nil	Nil	Nil	2 (66.66%)	2 (66.66%)
Lactobacillus	1 (4%)	Nil	1 (100%)	1 (100%)	1 (100%)	1 (100%)
Streptobacillus	1 (4%)	Nil	Nil	1 (100%)	1 (100%)	1 (100%)

Table XI. Comparative efficacy of various antibiotics on the uterine isolates

Sl.No.	Chemotherapeutic agent	Sensitive	Resistant
1.	Gentamicin	15 (60%)	10 (40%)
2.	Septran	11 (44%)	14 (56%)
3.	Chloram nemicol	7 (28%)	18 (72%)
4.	Tetracycline	7 (28%)	18 (72%)
5.	Ampicillin	2 (8%)	23 (92%)

Discussion

DISCUSSION

Infertility in cattle is a great deterrant in economic livestock production. Among the various infertility conditions lowering reproductive efficiency, endometritis is considered to be one of the most common and serious condition. The efficiency in the treatment of endometritis greatly depends on the choice of the antibiotic combination. Hence, a study was designed to effectively treat clinical endometritis with Gentamicin alone or Gentamicin in combination with Stilboestrol. Gentamicin was chosen for the study as it is an antibiotic which has been recently introduced in Veterinary Clinical Practice and is endowed with a wide spectrum and greater penetrance.

The incidence of clinical endometritis was 9.66 per cent among the crossbred cattle of breedable age. The single insemination conception percentage of cows treated with Gentamicin was found to be 56.45 as against 40.90 in the cows treated with a combination of Gentamicin and Stilboestrol. Though the conception rate obtained with Gentamicin treatment was apparently higher than that of group treated with Gentamicin Stilboestrol combination, no variation was found on statistical analysis. Similarly the average number of days from treatment to conception in group I (26.17) did not

differ significantly from that of group II (22.28) indicating that Gentamicin alone or a Gentamicin Stilboestrol combination was equally effective in eliminating uterine infection and rendering the cows fertile.

Overall conception rate, average number of insemination per conception and average number of days from treatment to conception in cows treated with Gentamicin were respectively 72.58 per cent, 1.91 and 35.33 days as against 63.63 per cent, 2.39 and 31.11 days in cases treated with Gentamicin Stilboestrol combination. Eventhough, Gentamicin appeared to be apparently more effective in the treatment of clinical endometritis in terms of percentage conception and average number of inseminations per conception, there was no variation between the two treatment groups.

Out of the 86 cases treated with Gentamicin, 83 had clinical recovery with a single intrauterine infusion of 250 mg of Gentamicin. On the other hand, 3 cases needed two intrauterine infusion in the successive heats for complete clinical recovery. However, there was no significant difference in the conception rate and the average number of insemination per conception between the two sub groups. But average number of insemination required for conception in those receiving two intrauterine infusion (1.66) appeared to be lower than those of cases

receiving only a single infusion (2.04). Similarly conception rate of cows receiving a single intrauterine infusion of Gentamicin -tilboestrol combination (64.35%) did not differ significantly from those receiving two infusions in the successive heat periods (60%). The average number of insemin-ations per conceptions in sub group 1 and 2 were respectively 2.4 and 3.0. The average number of days from treatment to conception in sub group 2 (42.00 days) was apparently more than that of sub group 1 (29.80 days) eventhough, there was no variation between the sub groups on statistical analysis.

The study also revealed that parity of the animals treated did not influence the effectiveness of treatment with respect to conception percentage, average number of insemin-ation per conception and average number of days from treatment to conception in both the treatment groups. However, the conception rate of heifers treated with Gentamicin (80%) was apparently higher than those of the other two sub groups. So also the average number of insemination per conception (1.5) was much lower than those of the other sub groups possibly on account of a more effecient natural defense mechanisms in heifer than in parous cows. Goodman and Gillman (1975) suggested that even bactericidal antibiotics probably require the adjunct activity of cellular and humoral defenses to dispose of bacteria.

Eventhough there are reports that addition of oestrogen in the intrauterine antibiotic infusions enhances the effectiveness of treatment (Dawson, 1960; Smaley and Hennessey, 1979) the results of the present study do not lend support to this view.

The bacterial isolates obtained from uterine discharges of 25 cases of clinical endometritis were Haemophilus (8%), Enterobacteria (24%), Pseudomonas (12%), Staphylococcus (20%), Bacillus (4%), Pasteurella (8%), Actinobacillus (4%), Neoromonas (12%), Lactobacillus (4%) and Strentobacillus (4%). The majority of the isolates in the Enterobacteria group might have been picked up by the animals into the vagina through a defective vaginal sphincter from its natural environment. Subsequently these organisms might have gained access into the uterus by ascending infection causing endometritis. The pattern of bacterial isolates is similar to that reported by earlier workers (Nair, 1973; Krishnamurthy et al. 1974; Pathak et al. 1982; Derashri et al. 1983). Sensitivity study of the various isolates to Ampicillin, Tetracycline, Chloramphenicol, Septran and Gentamicin revealed that there was maximum sensitivity (60%) to Gentamicin. The other antibiotics in the decreasing order of efficiency were Septran (44%), Chloram henicol (28%), Tetracycline (28%) and Ampicillin (8%).

The high percentage of resistant strains to Ampicillin (92%), Tetracycline (72%) and Chloramphenicol (72%) might be on account of the fact that these antibiotics are being extensively used in Veterinary Clinical Practice.

Clinical recovery of endometritis was obtained with one to two intrauterine infusions of 250 mg of Gentamicin alone or Gentamicin Stilboestrol combination. Moreover insemination of the affected cows after treatment with Gentamicin resulted in an overall conception rate of 72.58 per cent with 1.91 insemination per conception. The average number of days from treatment to conception was found to be 35.33 days which is less than 2 cycle periods. Hence it can be concluded that Gentamicin 250 mg alone or in combination with 10 mg of Stilboestrol will be an effective treatment for clinical endometritis in crossbred cattle.

Summary

SUMMARY

The objective of the present study was to assess the efficacy of Gentamicin or Gentamicin Stilboestrol combination in the treatment of clinical endometritis. Gentamicin was chosen on account of the fact that it is a broad spectrum antibiotic with deep penetration which is not extensively used in Veterinary Clinical Practice. Bacterial isolation of the uterine discharge, generic level identification of the isolates and sensitivity of the isolates to commonly used antibiotics including Gentamicin were carried out to throw light on the pattern of infection and sensitivity of organisms.

One hundred and seventy crossbred cows and heifers with history of more than three unsuccessful inseminations and clinical evidence of endometritis were randomly allotted into two treatment groups. Group I comprising of 86 cases were administered 250 mg Gentamicin in 25 ml distilled water intrauterine. Similarly 84 animals belonging to group II were administered Gentamicin (250 mg) Stilboestrol (10 mg) combination in 25 ml distilled water. Those cows which showed clinical recovery with single infusion were inseminated in the succeeding heat. In the rest of the animals a second intrauterine infusion was given and they were inseminated only after total clinical recovery. While 62 out of 86

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cases (72.09%) in treatment group I were followed up for pregnancy verification, only 44 out of 84 (52.30%) were verified for pregnancy in group II. The data were assembled and analysed.

Uterine discharge from 25 cases selected at random from both the groups were cultured and generic level identification of the isolates carried out by standard procedure. In addition, sensitivity of isolates to Ampicillin, Tetracycline, Chloramphenicol, Septran and Gentamicin was also carried out.

Among 8352 cows and heifers examined in the A.I. centre during the period of study 807 (9.66%) were found to be affected with clinical endometritis.

The percentage of conception with single insemination in group I and II were 56.45 and 40.90 respectively whereas the overall conception rates in the respective groups were 72.58 per cent and 63.63 per cent. While the average number of A.I. per conception in the above groups 1.91 and 2.39 respectively, the number of days from treatment to conception were respectively 35.33 and 31.11. There was no significant difference between the treatment groups with respect to percentage conception and average number of days from treatment to conception indicating that both the treatments are equally

effective against clinical endometritis.

Out of the 86 cases treated with Gentamicin in group I, 83 (96.51%) had clinical recovery with single intrauterine infusion. Only 3 cases needed a second infusion in the succeeding heat for total clinical recovery. However, there was no variation between the two sub groups with respect to percentage conception and average number of days from treatment to conception. Similarly 79 out of 84 (94.03%) cows in group II treated with Gentamicin Stilboestrol combination had clinical recovery with single intrauterine infusion. A second infusion was needed for total clinical recovery in five cases only. However, no variation in conception rate and average number of days from treatment to conception was noticed between the above sub groups also. It can be concluded that majority of cases of clinical endometritis could be cured with a single intrauterine infusion of Gentamicin or Gentamicin Stilboestrol combination.

The study also revealed that parity of the treated animals in both the treatment groups did not influence the effectiveness of the treatment with respect to conception percentage, average number of inseminations per conception and average number of days from treatment to conception. However, the conception rate of heifers (80%) treated with

Gentamicin was apparently higher than the parous cows. Similarly the treated heifers needed only 1.5 inseminations per conception implying a more efficient natural defense mechanism in heifers.

It can be concluded that Gentamicin or Gentamicin Stilboestrol combination is equally effective in the treatment of clinical endometritis. However, addition of oestrogen did not prove any added beneficial effect. Most of the treated cases had total clinical recovery with single intrauterine infusion resulting in high conception rate requring only 2.5 insemination per conception. Neither the parity of the animal nor the number of infusions for treatment influenced to percentage conception in both the treatment groups.

The bacterial isolates from uterine discharges were Streptococcus (6%), Enterobacteria (24%), Pseudomonas (12%), Staphylococcus (20%), Bacillus (4%), Enterococcus (8%), Actinobacillus (4%), Necromonas (12%), Lactobacillus (4%) and Corynebacillus (4%). The sensitivity of the isolates to Gentamicin, Neptran, Chloroamphenicol, Tetracycline and Ampicillin were respectively 60, 44, 28, 28 and 8 per cent. It is presumed that the high resistance of the isolates to Ampicillin (92%), Tetracycline (72%) and Chloramphenicol (72%) could be on account of extensive and indiscriminate

use of the above antibiotics in Veterinary Clinical Practice. Isolation and sensitivity study has proved that Gentamicin is the most effective antibiotic for treating uterine infection.

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Illustrations

Fig. 1. Isolates of Haemophilus showing sensitivity to Gentamicin, Septran, Chloramphenicol and Tetracycline and resistant to Ampicillin.

Fig. 2. Isolates of Enterobacteria showing sensitivity to Gentamicin, Septran and Tetracycline and resistance to Chloramphenicol and Ampicillin

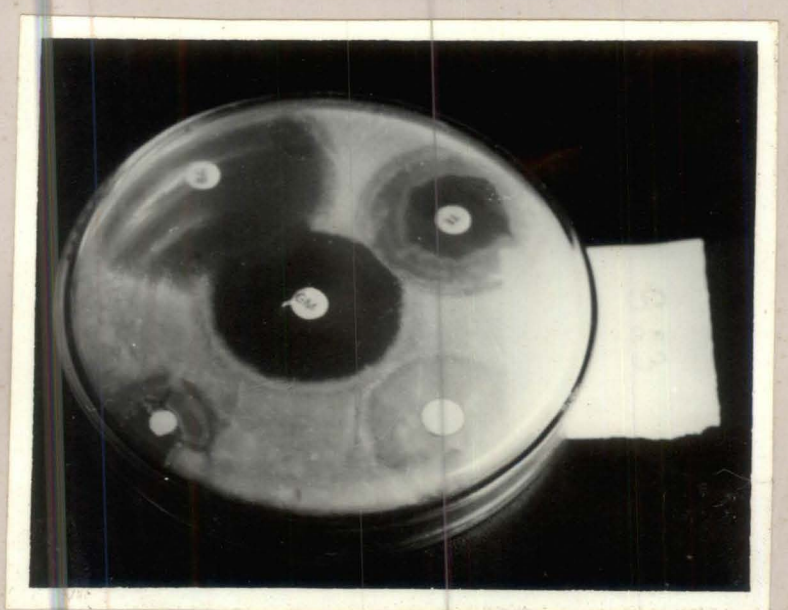
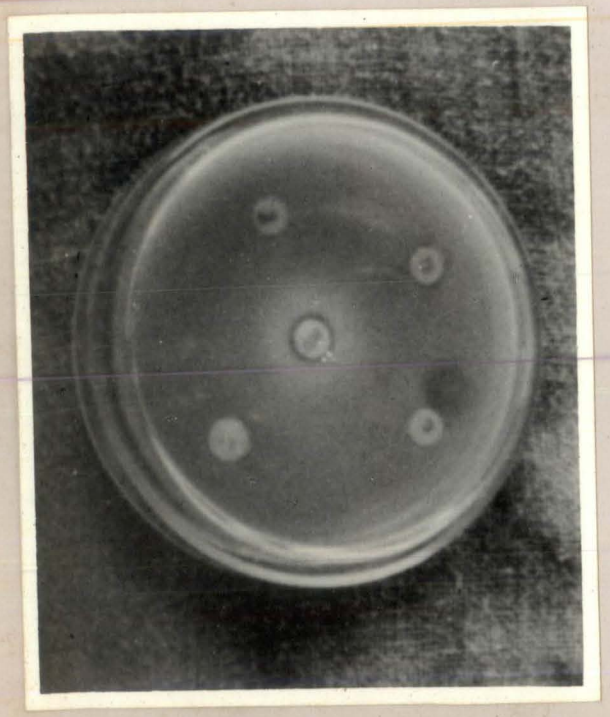
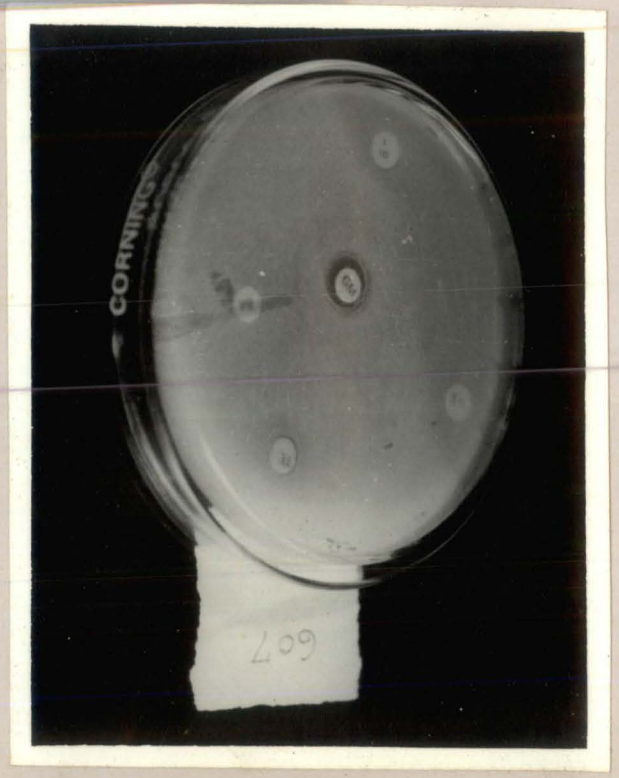


Fig. 3. Isolates of Necromonas showing sensitivity to Septran and Gentamicin and resistance to Chloramphenicol, Tetracycline and Ampicillin.

Fig. 4. Isolates of Actinobacillus totally resistant to Ampicillin, Tetracycline, Chloramphenicol, Septran and Gentamicin.

Fig. 5. Pseudomonas isolates resistant totally to Ampicillin, Tetracycline, Chloramphenicol, Septran and Gentamicin. Note the characteristic uniform greenish yellow colour of the agar plate.

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EFFICACY OF INTRAUTERINE ADMINISTRATION OF GENTAMICIN IN THE TREATMENT OF CLINICAL ENDOMETRITIS IN CROSSBRED CATTLE

By

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ABSTRACT OF A THESIS

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ABSTRACT

The objective of the study was to assess the efficacy of intrauterine infusion of Gentamicin, a broad spectrum antibiotic with deep tissue penetrance either alone or in combination with Stilboestrol in the treatment of clinical endometritis. Isolation of the infective organisms and sensitivity test were also carried out on a limited number of cases.

One hundred and seventy crossbred cows and heifers with clinical endometritis formed the materials for the study. These animals were randomly allotted into two treatment groups. Group I comprising of 86 animals were given 250 mg of Gentamicin intrauterine and group II comprising of 84 animals were given a combination of Gentamicin and 10 mg of Stilboestrol. Those animals which were completely free of infection were inseminated in the next heat and rest were given a second infusion of the above drugs. Conception rate was worked out both on 90 days non return rate and actual pregnancy verification. Uterine discharges from 25 animals were collected for bacterial isolation and sensitivity test.

Among 8352 cattle examined during the period of study 807 (9.66%) were found to be affected with clinical endometritis. Eighty six cases treated with Gentamicin gave a

single insemination conception rate of 56.45 per cent with an overall conception rate of 72.58 per cent needing 1.91 inseminations per conception. On the other hand, 84 cases receiving Gentamicin, Stilboestrol combination recorded a single insemination conception percentage of 40.90 with an overall conception of 63.63 per cent requiring 2.39 insemination per conception. There was no variation between groups with respect to percentage conception and average number of days from treatment to conception.

The percentage clinical recovery with single infusion in group I and II were found to be 96.51 and 94.03. The number of intrauterine infusion was not found to influence the conception rate and the recovery period. The study also revealed that the parity of the animal in both the treatment groups did not influence the effectiveness of the treatment with respect to percentage conception and the average number of days from treatment to conception.

It can be concluded that Gentamicin or Gentamicin Stilboestrol combination is equally effective in the treatment of clinical endometritis. However, addition of Stilboestrol in the Gentamicin infusion did not have any added beneficial effect.

The bacterial isolates were Haemophilus (6%), Staphylococcus (20%), Bacillus (4%), Pasteurella (6%) Actinobacillus (4%), Micrococcus (12%), Lactobacillus (4%) and Streptobacillus (4%). The sensitivity of the isolates to Gentamicin, Septran, Chloramphenicol, Tetracycline and Ampicillin were respectively 60, 44, 28, 28 and 8 per cent. Isolation and sensitivity study has proved that most of the isolates were sensitive to Gentamicin and hence it is considered to be a very effective antibiotic for treating uterine infection.

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