Bovine Endometritis – An Overview

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Introduction

Bovine endometritis is considered as a global problem having a profound impact on the reproductive performance of dairy cattle (Dawson, 1960). The detrimental effect of this condition on subsequent fertility are manifold as evident by the significant increase in the service per conception and service period. Because of the complex nature of the etiology of this melody, a comprehensive approach is needed to investigate this paradoxical situation for a rational regimen in treatment.

Impact on fertility

Among the periparturient disease of dairy cattle endometritis alone appeared to have greatest impact on fertility(Jackson, 1977; Borsberry and Dobson, 1989; Gilbert, 1992). As a short term impact, the extension of calving to conception interval to the extent of 12 days, (Tennat and Peddicord, 1968) 20 days (Erb et al., 1981), 10 days (Bretzlaff et al., 1982) have been reported. Along with this a hike in the service per conception have also been observed from 1.67 and 2.16 to 2.0 and 2.42 respectively by Tennat and Peddicord(1968) and Bretzlaff et al. (1982). Roberts (1971) observed a loss of 30 dollars per month per cow due to prolongation of a day in the calving to conception interval in USA.

As a long term effect a permanent impairment of fertility resulting in higher culling rates with increased replacement costs (Sand. Is et al., 1979; Olson et al., 1986; Pulfer adn Riese, 1991) and loss of freedom to cull for other factors such as low production resulting in culling of genetically superior animals (Paisley et al., 1986) also reported.

Incidence

Review of literature revealed voluminous data on the incidence of endometritis. The prevalence of the condition was reported to be 10.1 per cent in U.K. (Borsberry and Dobson, 1989) and 8.9 per cent in USA (Gilbert, 1992). Endometritis was reported to be prevalent at about 16 per cent in Southern Israel and 14 per cent in Northern Israel (Francos, 1979), 39.1 per cent in Poland (Zezula-Szpysa et al., 1988) and 50.7 per cent in Bulgaria (Maneta et al., 1990).

Quite a few authentic figures are available on the prevalence of endometritis from different parts of India (Table 1)

Etiology

Infections of the bovine genital tract can be specific or non specific with the latter one being the most important etiological factor. Specific pathogens such as Compylobacter foetus and Trichomonas foetus develop infections without any predisposing cause (Arthur et. al., 1989), whereas non-specific opportunist pathogens residing in the genital tract as saprophytes can set infection under favourable conditions (Hinze, 1959). Alternately many infectious agents have their access to the female genital tract either at the time of breeding or parturition, there by setting up a post coital or post partum infection of the uterus. Umpteen number of literature are available regarding the isolation of infectious agents responsible for bovine endometritis (Gunter, 1955; Raghavan et al., 1971); Krishnamoorthy et al., 1974; Namboodiripad et al., 1976; Sharma, 1979; Garg et al., 1982; singh et al., 1989). Percentage distribution of the

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Table 1. Prevalence in India

Author	Place	Percentage of prevalence
1. Narasimha Rao and Moorthy (1972)	Andhra Pradesh	27.3
2. Kaikini et al. (1981)	Maharashtra	8.76
3. Sing et al. (1981)	Bihar	9.61
4. Rao et al. (1983)	Karnataka	2.43
5. Sadatrahman et al. (1990)	Kashmir	16
6. Varadarajan and Nair (1990)	Kerala	9.66
7. Mohanty et al. (1992)	Orissa	27.09
8. Iyer et al. (1992)	Kerala	20
9. Khanna et al. (1993)	Gujarat	10.84

Table 2. Percentage distribution of common bacterial isolates from uterus

	Strepto-coccus	Staphylo-coccus	Coryne-bacterium	E.coil	Bacillus	Pseudo monas	Klebsiella	Proteins
Raghavan et al. (1971)	7.14	10.71	21.42	7.14	10.71	–	–	3.57
Krishnamoorthy et al. (1974)	1.00	18.59	4.02	27.63	9.54	12.04	1.50	6.53
Dholakia et al. (1987)	7.07	8.59	5.13	–	37.34	–	–	–
Ambrose and Pattabhiraman (1989)	2.90	5.90	–	55.90	35.30	20.60	11.80	2.90
Khan et. al. (1990)	3.30	41.00	16.10	6.90	17.30	7.20	–	8.20
Rakeshsharda et al. (1991)	6.00	26.00	10.00	12.00	12.00	–	–	4.00
Venketeswaralu et. al. (1991)	11.60	15.00	10.00	11.60	8.30	13.80	0.55	5.50
Sharma et al. (1993)	16.53	18.88	6.29	31.49	22.83	2.36	0.78	–

common uterine bacterial isolates are given in Table 2 under Indian conditions.

Apart from bacterial agents, a herpes virus was isolated in bovine foetal kidney cell culture from the uterine discharge of 13 cows with chronic metritis (Wellemans et al., 1983). Opdenbosch et al., (1984) also isolated a herpes virus (Strain LVR 140) from cases of puerperal endometritis. An IBR virus was also isolated by Misra and Mishra (1987) from cows harbouring uterine infections.

Panangale et al., (1988) isolated fungal agents such as Candida penicillium, Aspergillus, Arternaria and Cladosporium from uterine discharge of repeat breeder cows. Kremlev and Banakova (1979) isolated Candida, Actinomycetes and Mucoraceous fungi from uterine discharge of 18 of 22 cases of bovine endometritis.

Table 3. Post service intre-uterine treatment

Year	Author	Drug Used	Conception rate (%)
1958	Stula et al.	Chlortetracyclin	67.0
1958	Stula et al.	Neomycin sulphate	65.0
1959	Luktuke et al.	Penicillin Streptomycin	76.5
1967	Khan and Luktuke	Peniciflin Streptomycin	69.0
1977	Kodagali et al.	Mastalon U	53.6
1978	Sharma et al.	Neomycin	86.0
1983	Gupta et al.	Penicillin Streptomycin	47.0
1984	Dabas and Joshi	Gentamycin	85.0
1987	Awasthi and Kharche	Gentamycin	50.0
1987	Awasthi and Kharche	Penicillin Streptomycin	30.0
1990	Kumar	Gentamycin	57.0
1991	Goswami et al.	Kanamycin	80.0

Antibiogram of uterine isolates

Selection of a most suitable antimicrobial agent is essential for the successful treatment of endometritis. Hence an in vitro antibiotic senstitivity test is a pre-requisite for the rational use of chemotherapeutic agent (Smith et al., 1957; Sellers, 1957; Cruickshank, 1965). However, considerable variation in the drug of choice based on in vitro studies has been reported. Accordingly, Gentamycin, (Kharade and Kulkarni, 1983; Rehman et al., 1984; Dholakia et al., 1987; Sirohi et al 1989. Rakesh Sharda et. al., 1991; Mohanty et al., 1992); Chloramphenicol (Dholakia et al., 1987; Venketeswaralu et al., 1983; Venketeswaran et al., 1991; Gupta et al., 1993); Neomycin (Sharma and Borc, 1979; Shah and Dholakia, 1983) and

Table 4.
Response variability in prostaglandin treatment

Author	Drug Used	Percentage of response
Cooper et. al. (1976)	Cloprostenol	88%
Jackson (1977)	Cloprostenol	91%
Coulson (1978)	Dinoprost	76.3%
Zuber (1980)	Cloprostenol	78%
Sevick et al. (1982)	Cloprostenol + iodine	77%
Steffun et al. (1984)	PGF_2	49%
Aldermir and Kilicoglu (1986)	Dinoprost	50-70%
Ferreira et al. (1988)	Cloprostenol	60%
Roy et al. (1990)	Dinofertin	57%

Nitrofurazone (Sharma et al., 1993) was reported to be effective in various trials.

Treatment

The treatment options available for endometritis are very much diverse and their efficacy was often judged emperically. This deserves a rational approach to its treatments to restore the reproductive efficiency in the affected herd. The treatment regimen has been broadly divided into antibiotic and non antibiotic as well as systemic and non systemic (Intrauterine).

Intrauterine infusion of a bewildering array of compounds has been the main stay of treatment of bovine endometritis for decades (Table 3). But there exists a considerable response variability between the drugs used and the treatment adopted. Oxender and Seguin (1976) opined that the drugs infused into the uterus would cause prolongation or shortening of the cycle depending on the time of infusion. They recommended intra uterine treatment during oestrus and 24 to 48 hours after oestrus.

Several controversial reports are available about the failures of intra uterine drug therapy (Dohoo I.R., 1984; Whitacore, 1992; Thurmond et al., 1993). Sande and Mandell (1980) observed that aminoglycoside group of antibiotics are ineffective as intrauterine therapy because they require oxygen for their activity which is scanty in the anaerobic environment of uterus. They also suggested that many micro organisms in the uterus can produce enzymes like penicillinase which can degrade the antibiotics. Presence of pus and organic debris in uterine fluid can inhibit drugs like sulfonamides, amino glycosides and nitrofurazone. Vandeplassche (1984) attributed the failures of intra-uterine therapy to the impared phagocytic function in uterus for several days after intra uterine application. Further, there are no official guide lines for minimum withholding time for milk after intra uterine therapy (Black et. al., 1979).

To over come these disadvantages Ziv et al. (1983), Jayappa and Loken (1983), Aylife et al. (1982) and Masera et al. (1980) suggested systemic antibiotic therapy as an alternative to intra uterine therapy. Systemic administration results in antibiotic concentration in the uterine tissue and lumen that are similar to blood and plasma concentrations (Gustafson, 1984). Systemic therapy can be carried out easily than intrauterine therapy and the risk of introducing new infections, injuring the endometrium, and depressing the uterine phagocytic activity can be avoided. A systemic dose of 20,000 to 25,000 IU of sodium penicillin G per kg would result in genital tract tissue and lumen concentration, which is sufficient to control the infections (Gustafsson, 1984). Bretzlaff et al. (1983) recommended systemic dose of oxytetracyclin as 11 mg/kg twice daily which would maintain a concentration of 5 mic/g of genital tissues.

Vahida (1992) could obtain a conception rate of 71.73 per cent with systemic use of chloramphenicol in cows with endometritis. Guedawy et al. (1983) suggested 4 mg of gentamicin per kg intra muscular as an effective dose in the treatment of uterine infections.

Non antibiotic therapy

Increased awareness of the risk of bacterial resistance and tissue residues, necessitating withholding times for meat and milk, has made it clear that non antibiotic alternatives are needed with a better rationale for the use of antibiotics

(Gustafsson, 1984). Non antibiotic preparations which are capable of stimulating uterine contractibility (like prostagladins, oxytocin and oestrogens) and or increase the uterine defence mechanisms (Oestrogens, gonadotrophin releasing hormone) have been widely used (Frank et al., 1983; Gustafsson, 1984; Kuz'mich et al., 1987). Intra uterine infusions of antiseptics is a relatively common non antibiotic alternative to the treatment of post partum uterine infections. But their use is diminished by taking care of the suppression exerted by these compounds on the uterine defense mechanisms (Frank et al., 1983). However, the irritation caused by the disinfectant has been demonstrated to evoke a prostaglandin release with subsequent luteolysis and return to oestrus (Seguin et al., 1974).

Prostaglandin F2 and several of its analogues have been widely employed in the treatment of uterine infections. The mechanisms by which the prostagladins bring the beneficial effect in uterine infections are very much vivid (Seguin, 1980; Von Haam and Rosenfeld, 1942; Rowson et al., 1953 Paisley et al., 1986). They opined tha the luteolytic effect of prostaglandin brings about a number of beneficial changes like enhanced uterine phagocytosis, increased uterine contractions resulting in evacuation of the uterine contents and reducing the period of luteal phase with the induction of oestrus. Several trials have been carried out in the treatment of uterine infections with prostaglandins (Table 4).

Conclusion

Bovine endometritis is an economically significant problem in most dairy herds with a severe impact on the fertility of animals. This common and purportedly important complex disease of cattle requires an acceptable clinical definition and objective means of diagnosis for its effective control. The cost benefit to recommend multiple treatment regimens of cows with endometritis necessitates the requirement of an objectively evaluated treatment option. With the adoption of extensive clinical trails and collective documentation of results this vexatious problem affecting the reproductive efficiency of animals can be solved.

Table 5. Antibiogram of uterine isolates

	Cloram-phenicol	Genta-mycin	Tetra-cyclin	Penicillin	Strepto-mycin	Ampicillin	Neomycin
Sinha et al. (1977)	89.30	–	78.6	28.60	71.40	–	–
Panangala et al. (1978)	0.40	13.10	28.70	34.60	31.20	8.00	–
Dholakia et al. (1987)	55.67	66.57	32.25	–	35.96	28.75	52.75
Rakeshsharda et al. (1991)	65.79	73.68	60.53	68.12	52.26	15.79	–
Venkateswaralu et al. (1983)	26.10	24.40	8.30	–	11.60	12.20	–
Rahman et al. (1977)	38.00	10.00	29.00	42.00	50.00	–	82.00
Mulei and Gitau (1993)	72.20	–	61.10	–	83.40	–	72.20
Venketeswarana and Rajeswar (1991)	41.27	–	13.49	23.41	33.73	29.76	–