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التهاب الضرع المصاحب لحالات التهاب الرحم

بعد الولادة في الأبقار

مرقص بولس ، عادل حلمي* ، السيد صفوت ، احمد عامر**

أصيبت خمسون بقرة بالتهاب الضرع المصاحب لالتهاب الرحم في قطيع مكون من ١٢٧ بقرة (بنسبة ٣٩.٣%) وتبين أن نسبة الإصابة بالتهاب الضرع المصاحب لالتهاب الرحم قد وصلت الى أربعة أصناف (٨٣.٣%) نسبة الإصابة بالتهاب الضرع منفردا (٢٢.٣%) واستخدم في علاج التهاب الضرع محلول التراميسين والاسبراميسين اللذان ثبت كفاءتها ضد البكتريا المعزولة (الميكروب العنقودي والميكروب السبحي) خلال تجارب الحساسية معمليا ، بينما عولجت حالات التهاب الرحم - نتيجة الإصابة بالبكتريا القولونية ، السبحية ، العنقودية والكوريني موضعيا باستخدام لبوس السوبرونال والتراميسين يوميا لمدة ٣ - ٥ أيام ، وكانت النتائج في كلتا الحالتين مشجعة •

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BOVINE MASTITIS CONCOMITANT WITH POST-PARTUM METRITIS
(With 7 Tables)

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SUMMARY

In a herd of 127 dairy Friesian cows, post-partum metritis developed in 50 animals (39.3%) and was associated with clinical mastitis. The incidence of primary mastitis in the herd was 12%. The results indicated that secondary mastitis which developed in association with metritis was about four times of primary mastitis. The present information seems to be of importance when attempting to plan a control against mastitis.

It is suggested that quarter infection was facilitated through a haematogenous invasion of bacteria to the devitalised mammary tissue and sets up secondary mastitis in cows with infectious metritis.

INTRODUCTION

Although mastitis occurs sporadically in cattle, there are considerable variations in the ease with which it can be set up in individual animals and with different bacteria. Mastitis can be primary or secondary depending upon different responses for its development. Secondary mastitis seems to depend largely upon the invasion phase which allows the organisms to pass and invade the mammary tissue, so that after invasion, multiplication of bacteria into the mammary tissue may occur (FORBES, 1969). Post-partum mastitis is a clinical syndrome which appears to have increased frequently in cattle, but in the present state of knowledge it seems to receive little clinical consideration.

Despite the numerous studies on the various aspects of primary mastitis caused by microorganisms, there has been exiguity of information on secondary mastitis. The latter has been recorded in a high percentage of incidence in association with traumatic reticulitis in buffaloes (MORCOS *et al.*, 1977). WALSER *et al.* (1972) reported on the incidence of cases of intestinal disorders with mastitis.

The present study is therefore, undertaken with a view to assess the current evidence of clinical secondary mastitis concomitant with post-partum metritis, and to obtain information on the clinical aspects on the metritis-mastitis syndrome as a clinical entity in cows. (In this article the term "acute mastitis" refers to mastitis of very recent onset (2-5 days) as diagnosed in the field by abnormal appearance of milk and with gross inflammatory changes in the udder.

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M.B. MORCOS, *et al.***MATERIAL and METHODS**

Fifty-four Friesian dairy cows from one farm containing 127 dairy Friesian cattle were included in this study during the period from April, 1985 to June, 1986. The animals were pregnant and in good clinical condition. Related history showed that previous calvings had occurred normally (21 cows in the second calving, 26 cows in the third calving and 7 heifers in the first calving). Only in eight cows, manual assistance was necessary to help the extraction of the calf. Each animal was given the necessary attention and medical care during and after calving: body temperature, pulse and respiratory rates, expulsion of fetal membranes, inspection of the udder and observation of vaginal discharges. Within two to three days after calving, milk samples and samples of the vaginal discharges were taken aseptically for bacteriological examination, as a routine attempt to discover if microorganisms are present. Vaginal discharges were collected in sterile McCartney bottles from each quarter of the investigated udders. Techniques adopted for cultivation, purification of pathogens were the same as described by SCHALM *et al.* (1971).

Clinical examination of the animals showed the presence of 45 cows with metritis-mastitis syndrome, 5 cows with metritis and 4 cows with acute mastitis. Detection of mastitis was mainly based on careful inspection and palpation of the entire udder. However, none of the cows included in this study suffered from a marked systemic illness.

For purpose of comparison, a report on mastitis in the herd was done within the same period of study to determine the incidence rate of "primary" mastitis among the members of the herd. Fifty cows were chosen randomly and subjected to examination for mastitis clinically and bacteriologically. Clinically, no signs of mastitis were apparent as the udders showed no apparent abnormalities. There were 25 cows in early pregnancy (12-18 weeks) and the rest of animals were unpregnant and lactating.

Sensitivity tests: Bacterial isolates were studied for antibiotic sensitivity. The antibiotic discs were prepared with concentrations of 10 mcg each of penicillin, streptomycin, spiramycin and terramycin; 20 mcg. of Supronal (Bayer) and 200 mcg of nitrofurazone (Smith Kline and French) per disc. The antibiotic sensitivity was graded as very sensitive (V.S.), sensitive (S), and slightly sensitive (S.S.) and resistant. From the results of the antibiograms, treatment was carried out with the selective antibiotic by intramammary infusion for 3 to 5 subsequent days with a dose of terramycin liquid (Pfizer Ltd.) 10 ml., and 5 ml. of Spiramycin.

Supronal boluses (Bayer) and terramycin tablets were used intrauterine for 3 consecutive days.

Samples of milk were taken again from every quarter at four days after the last injection of the course of treatment, to determine the presence of refractory quarters.

RESULTS**1- Clinical Observation :**

a) Metritis / mastitis syndrome : within two days following parturition, 54 cows developed acute signs of malaise. The principal manifestations were: anorexia, pyrexia, decreased appetite and soreness of the udder. Animals were reluctant to allow the young come across to the udder. Body temperature raised to about 40°C. A mucopurulent discharge was observed from the vagina and especially throughout movement of the animal.

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Signs of acute mastitis were evident and included: acute inflammatory swelling and hardness of the mammary gland accompanied by heat and pain and abnormal appearance of milk. A thick exudation developed with some hematologic changes. Milk flow was apparently decreased. The soreness of the gland was enough so that the cow lied on it to avoid the pain of suckling. Cases of mastitis having such clinical features had not been encountered with the same herd since an earlier long period. Out of this group of animals, there were four cows which suffered from post-partum acute mastitis, but the rest of the group (45 cows) developed, in addition, clinical manifestations of metritis, and 5 cows suffered from metritis only. There was inflammatory vulval discharge (greyish or brownish foul-smelling fluid passing from the vagina. The cow was obviously ill: respiration was hurried and abdominal, and pulse rate increased. The incidence of retained placenta was high among the 45 cows and it reached about 18%.

In addition to clinical manifestations, mastitis and metritis were emphasized by bacteriological isolation of pathogenic bacteria, either alone or mixed flora.

b) Primary mastitis : the state of incidence of primary mastitis among animals of the herd was studied on 50 cows chosen randomly as follows:

- 25 cows, normal, with no systemic disease, in early pregnancy. Of this group, 8 cows showed subclinical mastitis in 21 quarters.

- 25 cows, normal, lactating, not pregnant, with no systemic disease. There were 3 cows with 9 quarters suffering from subclinical mastitis.

It appeared evident that the incidence of primary mastitis in the herd is 22% while the incidence rate of mastitis in association with metritis (secondary mastitis) is 83.3%.

2- Bacteriological results :

Results of bacteriological studies on milk samples and samples of uterine discharge are presented in the following tables.

3- Treatment :

Mastitis was treated with terramycin and spiramycin by intramammary infusions. Animals with secondary mastitis were treated as follows: 20 cows received terramycin, 20 cows received spiramycin and 9 cows had a combination of both terramycin and spiramycin. The injection of the drug was made intramammary immediately after a milking. The drug is allowed to remain until the next milking 8-10 hours later. The dose was repeated for 3-5 days, i.e., each animal received from 6 to 10 intramammary infusions. Clinical recoveries were adequately obtained as evidenced by disappearance of clinical inflammatory symptoms and easy passage of milk. Improvement was not temporary.

Animals with primary mastitis were treated by the same technique and clinical recoveries were satisfactorily obtained.

Treatment of metritis was carried out by the use of Supronal boluses and terramycin tablets. Each animal was given two boluses of Supronal and one gram of terramycin intrauterine for 3-5 successive days. Encouraging results were reported governed by clinical improvement and bacteriological assessments.

Treatments for mastitis and metritis were carried out simultaneously.

DISCUSSION

Based on clinical evidence, classical signs of metritis and acute mastitis appeared concomitantly in 45 cows within 48 hours after calving. It is of interest to note that the one factor common to nearly all occurrences of mastitis is the simultaneous incidence with metritis and the presence of an infectious agent within the milk secreting tissue. There were 49 udders infected with pathogenic bacteria and all udders were in the clinical form. On the other hand, when tests were carried out on the udders of 50 healthy lactating cows representing a control group in the same herd, subclinical mastitis was detected. While the rate incidence of primary mastitis in the herd was 22%, a finding which is similar to previous findings, secondary mastitis among animals of the same herd was found to be about 4 times more prevalent in cows with metritis than in the controls.

The results of bacteriological examinations either for "secondary" or "primary" mastitis showed the isolation mainly of Staph. spp. and Strept. spp., and being in agreement with many previous findings (KUNTER, 1968; LORENZEN, 1968; BAGADI, 1970) and others.

As regards the causative microorganisms of metritis, the findings reported here are in agreement with previous workers (ELLJOT et al., 1968; RAGHAFAN et al., 1971; AWAD, 1972; YOUSSEF, 1973). The pathogenic bacteria included Staph. spp. (44.4%), Strept. spp. (35.2%), Coliforms (14.8%), and Corynebacterium (5.5%). These findings included cases of retained placenta which were noticed in 17% of cases. However, the rate prevalence of retained placenta appears to be higher than that reported by BEN-DAVID (1962), BENERJEE (1963 & 1966) and MOLLER et al. (1967) being as 8.4%, 11.2% and 2.0%, respectively. Consequently, retained placenta might be a contribution for the high incidence of metritis.

The present evidence shows clearly that metritis becomes a clinical problem among animals of this herd. This feature has evidently assisted metritis/mastitis syndrome to be a marked clinical entity. The high incidence of metritis may suggest a low grade infection establishing itself in the gravid uterus and causing a mild endometritis. After calving, however, uterine infection becomes more identified. In this connection attention is drawn to the high incidence of mastitis (32%) in early pregnant cows; this percentage decreases to 12% in non-pregnant animals. These observations may strengthen the connection between pregnancy and parturition on the one hand and mastitis on the other hand. The importance of the results seem to arise from the ability to ascribe a pathogenic cause for both mastitis and metritis encountered concomitantly. Such a connection might be due to a possible hematogenic route of infection to play a role. Such a risk can exist also when udder resistance becomes lowered by the stress of pregnancy and parturition, thus facilitating bacteria, which lie in the uterus, to travel-up and build-up inflammation in the mammary tissue causing mastitis.

The fact that the teat canal acts as a path of entry of microorganisms to the udder tissue (McDONALD and PACKER, 1968) is hardly accepted and applied to the present results simply because the incidence rate of mastitis in apparently normal animals, either pregnant or nonpregnant, is about four times less than its incidence in post-parturient metritis cases; although all animals are kept and managed under the same environmental conditions and predisposing factors.

In recent years considerable attention has been given to the control of staphylococcal infection of the udder by hygienic methods mainly because it has not been possible to control infection by methods proved satisfactory for the elimination of *Str. agalactiae* (EDWARDS and TAYLOR, 1949). The failure of antibiotic therapy as an aid for eradication has been difficult to explain in cases in which the organisms are sensitive to the drug; but it is thought

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possible that the Staphylococci may become resistant when located within pockets of fibrosed tissue which develop early in the course of Staphylococcal mastitis. Such pockets may become active when udder resistance becomes decreased by pregnancy and parturition.

In the present study, no attempt to evaluate hygienic measures was made, although the spread of udder infection seemed maximal in cows after parturition or in normal non-pregnant cows. Spread of udder infection was considerably high among the individuals of the present herd EDWARDS and SMITH (1966) found that in some cases udder infection could be as high as 50%. One of the chief contributory factors in the spread of udder infection is the presence of teat lesions, which, in the present study, were practically absent, particularly in the calving cows. Accordingly, this may point out to possible heavy environmental contamination with bacteria.

It is obvious that the bacteriological assessments have been interpreted without reference to the functional state of the udder from which samples originated. Attention has not been aimed to study the possible changes that might take place in these mammary glands. Biopsy samples from the mammary tissue provide a functional assessment of the gland (CROSS *et al.*, 1958).

Trials for treatment of metritis and mastitis have been carried out successfully based on antibiogram tests. The clinical features of metritis/mastitis syndrome disappeared after treatment and animals showed good clinical recovery, except for a small percentage of refractory cases (2.5% mastitis and 10% metritis), which might be attributed to irreversable histopathological changes in the affected organs.

Table (1): Incidence of Mastitis

Item	No. of Cows	No. of Samples	Positive Cases			
			Cows	%	Quarters	%
A.						
Primary Mastitis						
- early pregnant	25	92	8	32	14	15.2
- nonpregnant, normal	25	84	3	12	4	4.7
Total	50	176	11	22	18	10.2
B.						
Secondary Mastitis						
- after parturition	54	201				
. with metritis			45	84.3	117	58.2
. without clinical			4	7.4	6	3.0
Total	54	210	49	88.8	123	61.1

Table (2): Incidence of microorganisms isolated from Secondary mastitis

Microorganisms	No. of strains	%
Staph. aureus	58	47.1
Strept. spp.	65	52.9

Table (3): Incidence of microorganisms isolated from Primary mastitis

Microorganisms	No. of strains	%
Staph. aureus	3	16.6
Staph. epidermidis	5	27.77
Strept. spp.	9	38.87
Coliforms	3	16.66

Table (4): Results of treatment of infected quarters, "Secondary mastitis"; (Four days after the course of treatment).

Antibiotic	No. of Cows	No. of quarters	Bacteriologic	
			Cures	Failures
Terramycin	20	53	50	3
Staph. spp.		24	23	1
Strept. spp.		29	27	2
Spiramycine	20	57	56	1
		36	35	1
		21	21	0
Spiramycin and Terramycin	9	13	13	0
Staph. spp.		8	8	0
Strept. spp.		5	5	0
Total	49	123	120	3

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Table (5): Incidence of microorganisms isolated from metritis cases.

No. of cows	Microorganisms	%
24	Staph. spp.	44.4
19	Strept. spp.	35.2
8	Coliforms	14.8
3	Corynebacterium	5.5

Table (6): In-vitro sensitivity of microorganisms isolated from secondary mastitis.

Antibiotic	Very Sensitive	Sensitive	Slightly Sensitive	Resistant %
Penicillin	2	4	1	30.0
Streptomycin	5	1	1	22.2
Spiramycin	34	9	0	2.2
Terramycin	21	8	1	---
Supronal	11	6	2	5.0
Nitrofurazone	3	1	3	30.0

Table (7): In-vitro sensitivity of microorganisms isolated from metritis cases.

Antibiotic	Very Sensitive	Sensitive	Slightly Sensitive	Resistant %
Penicillin	0	2	0	23.5
Streptomycin	6	4	2	14.3
Spiramycin	1	21	2	9.5
Terramycin	14	9	4	3.8
Supronal	23	7	4	6.5
Nitrofurazone	7	1	6	18.5

REFERENCES

- Awad, H.H. (1972): Studies on periperal infection in cattle and buffaloes. M.D.Vet. thesis, Cairo University.
- Bagadi, H.O. (1970): The etiology of bovine mastitis in three years in the Sudan. *Trop Anim. Health. Prod.* 2, 28-34.
- Benerjee, A.K. (1963): A study of the action of terramycin on the bacterial flora of the uterms in cattle following retained placenta. Thesis, Utrech. (*Alustr. Vet. Bull.*, 34, 350.
- Benerjee, A.K. (1966): A study of the action of terramycin on the bacterial flora of the uterms in cattle with retained placenta. *Ind. Vet. J.*, 43, 319.
- Ben-David, B. (1962): A survey of incidence and treatment of retained placenta in cattle. *Refuah Vet.*, 19, 16.
- Cross, B.A.; Goodwin, R.F. and Silver, I.A. (1958): A method for studying the functional and morphological state of mammary tissue in the sow. *J. endocrin.*, 17, 63.
- Edwards, S.J. and Taylor, J.J. (1949): The control of streptococcus agalactiae infection in herds by means of therapeutic agents. *Vet. Rec.*, 61, 780-783.
- Edwards, S.J. and Smith, G.S. (1966): Observations on bacteriologic isolation from quarter-milk samples. *J. Comp Path.*, 76, 231.
- Elliot, L.; McMahon, K.S.; Gier, H.T. and Marion, G.B. (1968): Uterus of the cow after parturition-Bacterial count. *Am. J. Vet. Res.*, 29, 77.
- Forbes, D. (1969): The pathogenesis of bovine mastitis. *Vet. Bull.*, 39, No.8, 529-541.
- Kunter, E. (1968): Frequent occurrence of bovine mastitis caused by B-haemolytic streptococci. *Mh. Vet. Med.*, 23, 174-178.
- Larenzen, P. (1968): Occurrence of streptococci of various serological groups as mastitis agents particularly group L. *Arch. Lebensmit. el Hyg.*, 19, 57-60.
- McDonald, J.S. and Pacher, R.A. (1968): Incidence of intramammary infection during lactation in dairy cattle exposed to streptococcus agalactiae and aerobacter aerogenes. *Am. J. Vet. Res.*, 29, 1525-1532.
- Moller, K.; Newling, P.E.; Rohson, H.J.; Jensen, G.J.; Meursinge, J.A. and Cooper, M.G. (1967): Retained fetal membranes in dairy cattle in the Huntly District. *N.Z. Vet. J.*, 15, 111.
- Morcos, M.B. and Lotfi, Z.S. (1977): Mastitis concomitant with traumatic reticulo-peritonitis in buffaloes. *Ann. Res. Vet.* 8,3,221-225.
- Raghavan, R., Nilakantam, P.R. and Uppal, P.K. (1971): Studies on the bacteriology of the bovine genital tract. *Ind. Vet. J.*, 48, 779.
- Schalm, O.W.; Carrol, E.J. and Jain, N.C. (1971): *Bovine Mastitis*. Lea and Febiger, Philadelphia.
- Walser, K.; Biester, E.; Dannerbeck, G.; Grospeer, M.; Horopot, M.; Lanckenfeld, H.; Mayer, I.; Vergho, H. and Vikter, M. (1972): Klinische Beitrag von mastitis akuta beim Rind-Berliner Münchener Tierarztl Woekenschs., 55, 941-946.
- Youssef, R.H. (1973): Some etiological factors affecting retention of placenta in cattle and buffaloes. M.D.Vet. Thesis, Cairo University.

REFERENCES

1. W.B. Hodges, Jr., *Journal of Polymer Science*, **10**, 105 (1953).

2. W.B. Hodges, Jr., *Journal of Polymer Science*, **10**, 115 (1953).

3. W.B. Hodges, Jr., *Journal of Polymer Science*, **10**, 125 (1953).

4. W.B. Hodges, Jr., *Journal of Polymer Science*, **10**, 135 (1953).

5. W.B. Hodges, Jr., *Journal of Polymer Science*, **10**, 145 (1953).

6. W.B. Hodges, Jr., *Journal of Polymer Science*, **10**, 155 (1953).

7. W.B. Hodges, Jr., *Journal of Polymer Science*, **10**, 165 (1953).

8. W.B. Hodges, Jr., *Journal of Polymer Science*, **10**, 175 (1953).

9. W.B. Hodges, Jr., *Journal of Polymer Science*, **10**, 185 (1953).

10. W.B. Hodges, Jr., *Journal of Polymer Science*, **10**, 195 (1953).

11. W.B. Hodges, Jr., *Journal of Polymer Science*, **10**, 205 (1953).

12. W.B. Hodges, Jr., *Journal of Polymer Science*, **10**, 215 (1953).

13. W.B. Hodges, Jr., *Journal of Polymer Science*, **10**, 225 (1953).

14. W.B. Hodges, Jr., *Journal of Polymer Science*, **10**, 235 (1953).

15. W.B. Hodges, Jr., *Journal of Polymer Science*, **10**, 245 (1953).

16. W.B. Hodges, Jr., *Journal of Polymer Science*, **10**, 255 (1953).

17. W.B. Hodges, Jr., *Journal of Polymer Science*, **10**, 265 (1953).

18. W.B. Hodges, Jr., *Journal of Polymer Science*, **10**, 275 (1953).

19. W.B. Hodges, Jr., *Journal of Polymer Science*, **10**, 285 (1953).

20. W.B. Hodges, Jr., *Journal of Polymer Science*, **10**, 295 (1953).