New Approaches in Control of Mastitis in Dairy Animals

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Abstract: Mastitis is still the most important disease of dairy herds. It is recognized worldwide as the most costly disease affecting dairy cattle and induces great economic loss to dairy industry. Many infective agents have been implicated as causes of mastitis. The basic program recommended for mastitis control includes: reducing the duration of infection, reducing the new infection rate and monitoring the infection rate. The chemotherapeutic medications are widely used for control of mastitis. The repeated and extensive use of drugs has tend to develop resistance to these drugs. The activity of antibiotic could be enhanced by the use of some immune system components. Immunological control approach is an alternative approach to drugs. Nutrition and inheritance control approach have proved to be of some value in the control of mastitis. Finally, the use of natural products such as herbs had a significant effect in preventing and treating mastitis.
[Nagwa S. Ata, Mona S. Zaki. **New Approaches in Control of Mastitis in Dairy Animals.** *Life Sci J* 2014;11(2):275-277]. (ISSN:1097-8135). http://www.lifesciencesite.com. 37

Key words: Mastitis - dairy cattle - Suez Gulf - natural products - herbs**.**

Introduction:

The term mastitis refers to inflammation of the mammary gland regardless of the cause. It is characterized by physical, chemical and usually bacteriological changes in milk as well as pathological changes in the glandular tissue **(Radostits et al., 1994).**

Mastitis is a disease complex having different causes, different degree of intensity, and variations in duration and residual effects. It is customary to divide them, for better relatively to control procedures, into:

1. Causes of contagious mastitis, particulary *Streptococcus* agalactiae (*S. agalactiae*), *Staphylococcus aureus (S.aureus)*, *Brucella sp. and Mycoplasma sp*.
2. Cause of environmental mastitis, e.g. *Escherichia coli (E. coli), Streptococcus dysgalactiae* (S. dysgalactiae) and *Streptococcus uberis (S.uberis).*
3. Normal teat flora, e.g. *Staphylococcus hyicuss* (S. hyicus), Staphylococcus epidermides (S. epidermides), coagulase – negalive staphylococci and *Corynbacterium bovis (C. bovis).*

Clinical forms of mastitis:

Acute mastitis characterized by the gross signs of inflammation with a generally, an accompanying fever and mild depression. When the cardinal signs of mastitis are subduded and not accompanied by systemic effects, the mastitis is sub-acute. The existence of inflammation in the absence of gross signs is referred to as sub-clinical mastitis. The sub-clinical form is detectable mainly by tests applied to the milk for the demonstration of products of inflammation and changes in chemical composition. An inflammatory process that, persists over many months or from one lactation period to the next is called chronic mastitis. **(Noordhuizen and Hogeveen, 2005).**

Economic Losses:

Although mastitis occurs sporadically in all species, it assumes major economic importance only in dairy cattle. In terms of economic loss it is undoubtedly the most important disease with which the dairy industry has to contend. This loss is occasioned much less by fatalities, although fatal cases do occur, than from the reduction in milk production from affected quarters **(Hogeveen et al., 2011).**

In Egypt, **Bakr (1986)** mentioned that bovine mastitis causes heavy reduction in milk yield resulting in economic losses to dairy-men .

Control of mastitis in dairy animals:

Nowadays all dairy farms are encouraged to practice mastitis control, party to reduce the wastage of the disease causes, but also to contribute to the maintenance of milk quality.

I. The option in mastitis control:

The options are between eradication and limitation of the infection rate:

1. Eradication:

Complete eradication of bovine mastitis from a herd or even an area is not a practicable target in most circumstances. The exception is mastitis due to *S. agalactiae*, which can be eradicated from individual herds by a blitz technique **(Petrovski et al., 2011 and Bertocchi et al., 2012).**

2. Limitation of infection:

This is practicable proposition, the degree of limitation being dependent on the need to maination cost- effectiveness. One of the vitues deriving from this necessity is the concept that sub clinical mastitis causes a continuous low-level leukocytosis in the milk which acts as a protective mechanism against other infection.

II. Recommended mastitis control program:

The basic program includes the following objectives and procedures:

1. Reducing the duration of infection:

a. Treatment of lactating cows: clinical cases as they occur is obligatory; treatment of subclinical infections may be delayed until the dry period. **(Tyler et al., 1992).**

b. Dry period treatment: This may be blanket treatment of all quarters, or selectively restricted to infected quarters **(Malinowski et al., 1993).**

c. Culling of chronic clinical cases **(Olechnowicz and Jaskowski, 2011).**

2. Reducing the new infection rate:

a. Milking hygiene especially disinfection and drying teats before putting on milk machine cups, dipping all teats, in certified efficient teat dip after each milking, disinfecting or back flushing cups after each milking **(El-Bably and Ali, 1997).**

b. Adequately servicing and maintaining milk machinery.

c. Other relevant management procedure **(Diego, 2000).**

3. Monitoring the rate:

A more effective method is to have cell counts or California mastitis test carried out on bulk milk at regular, say weekly, intervals **(Hogeveen et al., 1998).**

This program recommended satisfies the basic needs of the farmers it provides an economic advantage, it is within the scope of the dairyman's technical skill and understanding, it is capable of introduction into the management system employed and encourages farmers to persist by rapidly reducing the occurrence of clinical mastitis.

III. Chemotherapeutic Approach:

Reviewing pharmacology and pharmacokinetics with respect to treatment of mastitis with antibiotics is frightening because one quickly learns that it is miraculous that any mastitis is cured. Obtaining effective levels of antibiotics in milk by either systemic or intramamary routes (local) is difficult **(Gaafar et al., 2010).**

IV. Immunological control approach:

The protective mechanisms of the mammary gland are presumably, not of the most effective kind, at least in that biological anomaly the modern dairy cow. The flushing action of the milk serves to prevent invasion by some potential pathogens, while milk itself contains bacterial inhibitors. A general term for these antibacterial substances in milk is lactenins.

Immune system defence mechanisms could be enhanced in at least two ways: by vaccination and by biological response modifiers, the latter mechanism are either chemical or biological substances that could modify the host's nonspecific response to pathogens **(Castrucci et al., 1996).**

V. Natural products control approach:

Jin Jun Wen et al., 1997 used chinese traditional drug "Ru Yan Ping" consists of 24 herbs such as honeysuckle flower, dandelion herb, lithosperm root, bupleurum root, Dahurian angelica root, chuaxiong and globe thistile root in treatment of mastitis in dairy cows. The treatment was 85% effective against clinical mastitis and had a significant effect in preventing and treating mastitis.

VI. Dietary control approach:

It is commonly belived that the incidence of mastitis increases when cattle go on to lush pasture or are fed diets high in protein.

There is possibility that natural estrogens as well as estrogens in some plants may stimulate bacterial multiplication within the udder and cause clinical mastitis.

Vitamin E and selenium supplements in diets appear to have a preventive effect against acute infections in which high polymorphonuclear response occur in the infected gland **(Ndiweni and Finch, 1996 and Weiss et al, 1997).** In addition, **Nagashima et al., 1995** studied the effect of a vitamin AD_3E premix of the water soluble granule type which given orally to dairy cows. They concluded that the premix provided effective control of subclinical mastitis.

VII. Inheritance approach:

One of the inherited characteristics which may affect susceptibility to mastitis is teat shape. Other characters which should be selected against are deep udders, excessively low hindquarters, widely placed teats, rear teats too for back and short wide teats **(Heringstad et al., 1999).**

References

1. Bakr, M.A. (1986): Comparative studies on different methods used for detection of subclinical mastitis in dairy animals. Ph. D. Thesis (Milk Hygiene), Fac, Vet. Med. Cairo Univ.
2. Bertocchi, L.; Vismara, F.; Hathaway, T.; Fusi, F.; Scalvenzi, A.; Bolzoni, G; Zanardi, G. and Varisco, G. (2012): Trend in the etiology of dairy cow mastitis in Northern Italy from 2005 to 2011. Larg Animal Review, 18 (2): 51-58.
3. Castrucci, G.; Ferrari, M.; Osburn, B.I.; Berreca, F.; Tagliati, S. and Cuteri, V. (1996). Experience with an immunomodulator. Page 209 in the

Symp. World Assoc. Vet. Microb. Immun. and Specialists. Inf. Dis. Edinburgh, Scottland Uk. World Assoc. Vet. Microb. Immun. Edinburgh, Scottland Uk.

4. Diego, J. R.A. (2000). An example of the management of a herd of dairy cattle to reduce the incidence of mastitis. Mundo Granadero, 11 (118), 48-50.
5. Gaafar, H.M.A.; Basiuoni, M.I.; Ali, M.F.E.; Shitta, A.A. and Shamas, A. Sh. E. (2010). Effect of Zinc methionine supplementation on somatic cell count in milk and mastitis in Friesian cows. Archiva Zootechnica, 13 (2): 36-46.
6. Heringstad, B.; Klementsdal, G. and Ruane, J. (1999): Clinical mastitis in Norwegian cattle frequency, variance, components and genetic correlation with protein yield. J. Dairy Sc., 82, 1325-1330.
7. Hogeveen, H.; Lam, T.J. G.M.; Grijsen, E.G and Sampinon, O.C. (1998): Mastitis management using a monitoring system based on somatic cell count. Stocarstvo, 52 (1), 23-33.
8. Hogeveen, H.; Huijps, K. and Lam, T.J. G.M. (2011): Economic aspectis of mastitis: New developments. New Zaxland Veterinary Journal, 59 (1): 16-23.
9. Jin Jun Wen, J.; Qiang, Z.; Ping, W.; Hong, X and Baoman, J. (1997): Experiment of prevention and treatment of mastitis in dairy cows using a Chinese traditional drug " Ru Yan Ping". Chinese J. Vet. Med., 23 (11): 19-20.
10. Malinowski, E.; Klossowska-A.; Markiewicz-H; Szalbiers, M. and Biegala-T. (1993): Drug therapy and prevention of mastitis in cows at drying off. Medycyna-Weterynarryjna, 49 (9); 400-402.
11. Nagashima, M.; Otsuka, M.; Sinseki, T.; Hirose, Y.; Arade, N. and Ichijo, S. (1995): Effect of a vitamin AD3E premix of the water soluble granuals type on somatic cell counts in the milk of dairy cows. J. Vet. Med. Japan, 48 (12), 977-981.
12. Ndiweni, N. and Finch, J.M. (1996): Effects of in vitro supplementation with ∝-tocopherol and selenium on bovine neutrophil functions; implications for resistance to mastitis. Vet. Imm. And Immunopath, 51 (1/2): 67-78.
13. Noordhauy-ML; Nesse. LL; Norcross- NL and Gudding. R. (1994): A field trial with an experimental vaccine against *Staphylococcus aureus* mastitis in cattle 1. Clinical parametersJ. Dairy Sc., 77 (5): 1267-1275.
14. Olechnowicz, J. and Jaskowski, J.M. (2011): Reasons for culling, culling due to lameness, and economic losses in dairy cows. Medycyna Weterynaryjna, 67 (9): 618-621.
15. Petrovski, K.R.; Williamson, N.B.; Lopez-Villalobos, N.; Parkinson, T.J. and Tucker, I.G. (2011). Culture results from milk samples submitted to veterinary diagnostic laboratories from August 2003 to December 2006 in New Zealand. New Zealand Veterinary Journal, 59 (6): 317-322.
16. Radostitis, O.M.; Blood, D.C. and Gray, C.D. (1994): Veterinary Medicin. Eight Edition. Bailliera Tindall, London.
17. Tyler – J.W.; Wilson- RC and Dowling – P (1992): Treatment of suclinical mastiltis. Vet. Clinics- of – North- America, Food. Animal Practice, 8 (1), 17-28.
18. Weiss, W.P.; Hogan, J.S. and Smith, K.L. (1997): Effect of feeding large amounts of vitamin E during the peripartum period on mastitis in dairy cows. Special Circular- Ohio Agricultural Research and Development Center, 156, 125.

1/25/2014