

THE SURVEILLANCE AND CONTROL OF MASTITIS

By Consultant Veterinary Surgeons Jørgen Kathholm, Vivild & Øjvind Runge Jepsen of The Danish Dairy Board.

Definitions:

Mastitis is an inflammatory reaction of the mammary glands. The reason can be infectious, trauma or toxic. The most common form is infectious mastitis that depends upon the colonisation of the udder by pathogenic microorganisms, most usually through the teat canal.

Mastitis destroys udder tissue, thus increasing permeability through the blood/milk barrier which in turn alters the composition of the milk in an undesirable way. In cases of sub clinical mastitis these changes can only be detected by laboratory tests, typically SCC or conductivity tests. Clinical mastitis can be detected by examining the foremilk for milk of abnormal appearance. There is no sharp distinction between clinical and sub-clinical mastitis, as this is dependant upon the thoroughness of the examination.

The duration of the inflammation can vary from acute to different degrees of a chronic condition. Acute mastitis is characterised by the classical inflammatory reactions, but can apart from this be of a local or systemic character eventually resulting in septicaemia. As a rule chronic mastitis can be seen as a progressive development of fibrous tissue, and can either be sub-clinical (where the inflammatory reaction can only be discovered by means of a laboratory test, but can occasionally occur as an acute or a chronically clinical mastitis) or clinical (which are characterized by the morphological changes i.e. an alteration in size, symmetry, palpatorical changes etc.

The healthy milk quarter is defined with the total absence of any form of measurable mastitis, colonization by bacteria in the teat canal or trauma, also by conforming with the current standards of normality. Quarters that are equally healthy will yield the same amount of milk with the same composition.

Information regarding etiology and the morphological changes, a description of the degree of the involved udder tissue as well as the intensity of the inflammatory response is necessary before an adequate description of a case of mastitis can be given. The diagnostic classification´ will be of an arbitrary nature because of the vague borderline between normality and the various pathological stages. It will depend upon the specificity and accuracy of the methods employed.

When describing mastitis it will often be necessary with this kind of arbitrary classification. Designations often used are:

- * **Infectious clinical mastitis** (positive culture finds and makroskopical inflammatory changes of secretions and/or the udder
- * **Infectious sub-clinical mastitis** - positive culture finds and changes in the composition of the milk on a laboratory basis (raised SCC values and chemical changes, but without makroskopical changes of the milk or of the udder)
- * **Non-specific clinical mastitis** – negative culture finds but with makroskopical changes of secretions and/or of the udder.

* **Non-specific sub-clinical mastitis** – negative culture finds but with changes in the composition of the milk on a laboratory basis and no visual changes in the appearance of the milk and/or the udder.

The prevalence of mastitis indicates the part of a defined population of animals that at any one time have or have had mastitis (the number of cases at one particular time)

The incidence of mastitis – is the frequency of cases over a particularly defined period of time. i.e. the number of cows there has been with acutely raised SCC in the last month.

The expression **contagious mastitis** is used regarding Str. agalactia, Str. dysgalactia and Staphylococcus.

Whilst the expression **environmental mastitis** is used regarding Str.uberis, fecal streptococcus and E. coli.

It is important to note that these classifications as regarding the two above mentioned are not strictly rigid.

THE CONTROL OF MASTITIS

In Denmark the preventative work and combating of mastitis is implemented by means of a close cooperation between The Danish Dairy Board, The Mastitis Laboratory, the dairy farmer and the local veterinary surgeon. This work is lead by the Leading Veterinary Surgeon who is appointed and authorized by The Food Inspection Directorate.

The combating of mastitis is divided into:

- a. Combating Str. agalactia
- b. Combating other types of mastitis.

A. COMBATING STR. AGALACTIA

This is based upon voluntary participation according to the wishes of the dairy farmer.

Herds are selected by means of detection of Str. agalactia under any of the following circumstances:

- a. In a farm bulk tank sample.
- b. In a milk sample submitted for laboratory analyse because of mastitis.
- c. In connection with quarter samples from a whole herd submitted for analyse because of an other form of mastitis.
- d. In a milk sample submitted for analyse by a practising vet. in connection with the treatment of a case of mastitis. (Finds of catalasenegative haemolytic colonies in home-grown cultures by the vet.)

Owners of dairy herds where *Str. agalactiae* has been found in any form of milk sample must not sell or transfer cows to other herds, participate with lactating cows in agricultural shows or any other kind of exhibitions where milking occurs. This ban is in force until The Directorate for Veterinary and Food or The Mastitis Laboratory informs the owner the herd is no longer positive.

B. Surveillance, prevention and combating of other forms of mastitis.

The practising veterinary surgeon is responsible for surveillance and advice regarding prevention and treatment of mastitis, based upon:

- a. The bulk tank SCC (the current and geometrical average)
- b. The calculated bulk tank SCC (based upon the individual cow's SCC from Milk Recording)
- c. The individual cow's SCC
- d. % of dry quarters
- e. The prevalence of mastitis.
- f. The incidence of mastitis.
- g. The results of bacteriological tests.
- h. The bacteriological profile compared with points a –f.

To enable an assessment of the udder health in a dairy herd requires knowledge concerning the owners threshold for treatment and the frequency of treatment.

Udder health problems should be discussed with the owner, after which a strategy should be planned and agreed upon.

As mastitis is of a complex nature it is necessary to operate on a broad field. A thorough examination of all relevant aspects i.e. housing conditions, environment, milking and the milking plant, feeding, hygiene etc. should be completed. It can be very beneficial to involve the local Milk Quality Adviser and Dairy Farm Consultant.

The pattern of infection can often be ascertained by means of the local vet's homegrown cultures. In some cases the results of samples from all four quarters, by means of " An Udder Health Hitlist" where the 10% of the herd with the largest probability for infection are selected, can be of a great help. An underlying staphylococcus problem can be revealed in this way, but it is worth remembering that in this kind of herd there can be also a high incidence of acute cases of mastitis caused by *E. coli*.

The strategy – plan of action – for a dairy herd must consist of clear and well-defined objectives for prevention and control e.g. a calculated SCC lower than 200.000, a dry quarter % under 2, a mastitis incidence per. month of under 3 cows out of a 100 etc.

The clinical examination of chronically infected cows.

Before the treatment of infected cows, a thorough examination is necessary to be able to make a diagnosis

This examination should at least include:

- a. Examination and palpation of the udder to ascertain induration and atrophy etc.
- b. Examination of the teats to ascertain pathological changes in the form of sores, trauma etc.
- c. Examination of the secretion from each quarter by using a strip cup or by means of a CMT- test (Indirect SCC)
- d. Taking quarter samples for bacteriological analyse.
- e. An assessment of the number of chronically infected cows by using the individual cow SCC – list from Milk Recording.

The prognosis and eventual strategy for treatment will be based upon these examinations and test results as well as the owner and vet's knowledge of the individual cow,

The clinical examination of acute cases of mastitis.

The prognosis of the vet. will be based upon:

- a. A comprehensive diagnosis including the daily milk yield of the cow (reduction), appetite, date of calving, SCC at the last milk recording session, parity, duration of symptoms (general state of health, the udder and the milk).
- b. An assessment of the cow's general state of health, temperature, function of the rumen, temperature of the skin, consistency of the dung, the mobility of the cow etc.
- c. An examination of the udder (rubor, tumor)
- d. A palpation of the udder (calor, dolor)
- e. An examination (sores, lesions, erosion/ eversion of the orifice, scar tissue in the test cistern/canal, hæmatoms) and palpation of the teats. (temperature of the tip of the teat)
- f. An examination of the milk (strip cup, CMT test, for abnormal appearance i.e. flakes, clots, watery, putric, flow patterns) (gram- infections do not give visible changes in the milk until 0-12 hours after the start of the infection, but often give clear flow patters in the strip cup.
- g. The taking of milk samples for culture evt. cow – side tests. (Bacteriological, biological, biochemical).

Relevant legislation:

1. Law no. 342 of 14/05/1992 The Law concerning milk, milk products, margarine etc. The Milk Law.
2. Law no. 351 of 02/06/1992 The Law concerning diseases and infections of animals.
3. Dept. Order no. 418 of 23/06/1993 The Department Order concerning the Production and Transport of milk.
4. Dept. Order no. 246 of 22/06/1999 The Department Order concerning combating of mastitis.
5. Dept. Order no. 757 of 10/08/2000 The Department Order concerning the alteration of the Memorandum concerning the Law on Diseases and Infections of animals.
6. Guideline no. 11140 of 27/03/ 2000 Guidelines for the showing of animals at Agricultural Shows, exhibitions and other similar gatherings of domestic animals.
7. Dept. Order no. 10 of 09/01/1997 The Department Order concerning the Grading and Payment Schemes of milk delivered to dairies and other similar industrial concerns.
8. Dept. Order no. 825 of 30/08/2000 The Department Order concerning the Law on the practice of Veterinary Surgeons.etc.
9. Dept. Order no. 304 of 11/05/1995 The Department Order concerning Health Advisory Agreements in Dairy and Pig herds.
10. Dept.Order of 11/05/1995 The Department Order concerning Drugs used for Veterinary Purposes.