

## **MASTITIS TREATMENT - A WELFARE ISSUE**

**J ERIC HILLERTON**, Institute for Animal Health, Compton

### **SUMMARY**

The overall problems surrounding the needs for treatment, the aims of treatment and the business and political objectives in dealing with clinical mastitis in the dairy cow are discussed. This paper describes the current and prospective situation as a general introduction to a series of papers reporting on current approaches and different means of treating clinical mastitis. It is argued that the clear objective and obligation of all involved is to produce the best quality raw milk possible but that in doing so the priority for all involved, from producers to consumers, must be the well-being of the dairy cow. This is enshrined in the, now accepted, International Dairy Federation objectives for treating clinical mastitis.

### **INTRODUCTION**

The incidence of clinical mastitis may be minimised by application of considerable effort but cases will still occur in any herd. These have to be dealt with for their own sake, the effect of the infection on milk quality and the consequences of increasing the prevalence of infection in the herd by failing to cure infections. In the short term, priorities for dealing with clinical cases may vary according to their impact but the bottom line must be how any case or episode of cases affects the individual milk production business. Increasingly this is about image and value where value is financial and political.

There is a growing pressure on the quality of means of milk production shown by tightening market requirements for milk quality, quality assurance schemes and, more lately, opposition to various technical developments not least application of antimicrobials in food production. The impact of changing social and political opinion on dairy production, especially udder health, has to be considered. This must include consideration of alternative methods but mostly should involve reconsideration of aims, methods and achievements to achieve practical and economic effectiveness.

### **TREATMENT OF CLINICAL CASES OF MASTITIS**

The intentions in responding to the clinical case of mastitis can be varied and often will vary only with practical matters such as the severity of the problem, simply a few clots or a very sick animal? Strategically this requires more thought to achieve a consistent and effective response. Treatment may be applied to be effective at three levels

- treating disease, often a minimal approach to restoring milk quality - a 'traditional' approach
- treating the infection with the aim of curing the infection,
- treating the signs of disease and their subsequent effects on animal well-being.

Treating disease only may extend from simply ignoring a mild case which resolves rapidly but at a cost of another sub clinically infected quarter. More likely the same effect will be achieved by use of an

*Proceedings of the British Mastitis Conference 1998, Axient/Institute for Animal Health, Milk Development Council/Novartis Animal Health, p3-8.*

udder rub or a minimal course of antibiotics, either likely to resolve 90% cases but cure the infection in many fewer. Treating infections to achieve a bacteriological cure is much more difficult but can be achieved (1). It often requires treatment beyond the label recommendations of use of intra mammary antibiotics. Sales of intra mammary tubes in the UK are approximately double what would be required to treat every case of clinical mastitis with the average recommended dose of three tubes. This only serves to show how outdated and unrealistic are the existing recommendations. There is a growing realisation that effective treatment may also involve medication or physiological applications to ameliorate pain, inflammation, dehydration etc. (2,3,4). Such approaches are often varied in need and specific in requirement, some may only be effective in treating self limiting infections such as some coliform mastitis.

## **CLINICAL MASTITIS IN CONTEXT**

There is fairly broad agreement that the incidence of clinical mastitis varies greatly but still averages 35-40 cases per 100 cows per year (5). It is uncertain if anyone includes summer mastitis or other dry cow cases in this total. However, given 40 cases per 100 cows and a national herd of 2.5M some 1,000,000 clinical cases occur each year. With each case costing £182-218 (6) the bill is approximately £200M annually. Considering the problem in context also involves the consequences of approaches to treatment.

Resolving the disease but not the infection leads to recurrence of clinical signs and/or contagious spread, increased prevalence of infection hence poor milk quality from higher Bactoscan and SCC, and increased risk of antibiotic contamination. It is necessary to consider that the 1M cases each year not only induce sales of 6.5M intra mammary tubes but also 6.5M tubes of dry cow products. Dry cow products were developed for two reasons, to prevent new infection in the dry period and to reduce the duration of existing infections. In the initial trials both aims were achieved with about 80% success (7). There is considerable international pressure to limit use of dry cow intra mammary antibiotics, they are seen as contributing to antibiotic resistance. The fairness of this needs to be considered separately. It is clear, however, that the need for such products and their ability to cure 80% existing infections is a measure of failure of treatment (and prevention) of disease during lactation.

The practicality of treating clinical mastitis as a disease has been that there may be 90% resolution of the disease but only 20-80% bacteriological cure (8,9) probably with half of the effect being due to a self cure. In all, a problem that takes as long to resolve if treated than if untreated (10). This return of milk to the bulk tank approach neglects much of any consideration of milk quality, a case of 'if it's white and runs downhill then its milk'.

## **REQUIRED STRATEGY**

Mastitis control methods must now be directed to achieving the best milk quality defined by a low Bactoscan and SCC, and no antibiotic residues. This translates to a lower prevalence of sub clinical mastitis, fewer cases of contagious mastitis, and more diligence against possible increased milk withholding times after treatment. Alternatives include better prevention or other means of treatment. It is important to note the limitations of residue detection. Methods in use only measure inhibition of microbial growth. More refined means of detecting actual antibiotics are increasingly available and likely

*Proceedings of the British Mastitis Conference 1998, Axient/Institute for Animal Health, Milk Development Council/Novartis Animal Health, p3-8.*  
to be applied with obvious effects. There is much current debate on ensuring minimising concentrations or complete absence of a whole variety of chemicals and bacteria from raw milk.

The implications of the drive for increasing milk quality are total bacteriological cure, 'SCC' cure and a low risk for milk contamination, actual or perceived. Low risk may mean less or better use of antibiotics or alternative treatments depending on the tests for residues in use. There is increasingly likely to be a conflict in achieving bacteriological and SCC cure by use of antibiotic treatment with residue limitation. It is unclear yet what the economic balance might be and this could be very important. Further pressure will come from political pressure on attempting to limit antibiotic use supposedly to prevent development of resistance.

## **RESISTANCE TO ANTIBIOTICS AND MASTITIS**

It is highly probable that confusion and misapportioning of blame exists by including use of intra mammary antibiotics as contributing in any way to an increase in resistance to antibiotics in potential human pathogens when antibiotics are used for therapeutic or preventive medicine in dairy cows. There is no substantiation that typical strains of bacteria causing mastitis in the dairy cow are particularly pathogenic for man. Such bacterial species have few, if any, mechanisms for transfer of resistance to other bacteria, as occurs with gut pathogens (11). The limited evidence on resistance patterns in mastitis pathogens indicates a decrease in antibacterial resistance over recent years (12).

If there is any risk then it may come from inappropriate management and undefined use of combination treatments. This might include feeding of milk containing antibiotics to calves which gives direct exposure, to relatively low levels of antibiotic, of those enterococci and Salmonella species known to have developed antimicrobial resistance, and to be capable of transferring such resistance. It could be envisaged that parenteral treatment could also contribute to developing resistance under certain pharmacokinetic conditions. Intra mammary antibiotic stays in the udder and diffuses poorly to other tissues, it is excreted predominantly in milk. Parenteral antibiotics are formulated to disperse into and accumulate in diverse target tissues but they cannot distinguish infected tissues from non infected sites. Hence, these are as likely to accumulate in gut as in the mammary gland. This leads to unnecessary exposure of those same gut enterococci and Salmonella species to antibiotic. Risk can also be minimised by appropriate treatment. Coliform mastitis rarely requires antibiotic treatment to deal with the infection whereas *Streptococcus uberis*, which is very sensitive to appropriate intra mammary antibiotics, is extremely poor at transferring any genetic material.

## **WHY AND WHEN TO TREAT**

The whole issue of treating mastitis raises for the milker, and the vet, a number of questions and concerns, some of which have been considered above. These are also a number of obligations to be taken into account.

It is necessary to consider obligations to

- the cow, to maintain its health and well-being
- the consumer via the buyer, to provide milk of the highest quality
- society, to work to the highest standards, sustaining longevity of techniques and conserving resources.

These matters are issues of debate within the International Dairy Federation (IDF) in an attempt to achieve consensus and understanding. The whole area of treating mastitis is being reviewed. There are widely different views and approaches eg in Denmark it is not recommended to use dry cow treatment.

In many cases part of the problem can be misunderstanding. Last year it was made clear that the intention in Sweden is to use aggressive treatment, where treatment is necessary (13). Discussion and debate are to achieve mutual understanding and consensus on achieving healthy cows. The outcome has to be good quality raw milk having a minimal level of bacteria (Bactoscan as low as possible), low SCC, no residues and produced by a herd with as low a prevalence (number of infected quarters) as possible. Generally the UK is good at this as comparative international data show (Table 1). Indeed the UK appears to provide the cleanest milk around.

There are a huge variety of ways of maintaining milk quality and all have adherents. What is important is to reach the quality standard necessary and meet all obligations. This may include effective and resilient use of antibiotic treatment by early, appropriate and aggressive treatment (1,14). There may be other preferred methods (15,16) and there may be additional targets including pain relief (4).

**Table 1.** Milk quality for selected countries

|             | Cell count<br>(*000 cells/ml) Limit | Bacterial count                   |   |
|-------------|-------------------------------------|-----------------------------------|---|
|             |                                     | TBC<br>(cells/ml)                 | Level<br>TBC<br>(cells/ml) Bactoscan<br>(impulses/ml) |
| UK          | ~165                                | 100,000                           | ~15,000   |
| Denmark     | 247                                 | 100,000                           | 8,400   |
| Holland     | 190                                 | 100,000                           | 1.4% >100,000   |
| New Zealand | 177                                 |                                   | ?   |
| Norway      | 124                                 | 80,000<br>1 <sup>st</sup> quality | 1.5% >80,000  |
| Switzerland | 101                                 | 80,000<br>(200,000 Bactoscan)     | 4.9% >200,000   |
| USA         | 350                                 | 100,000                           | ?   |

In the international marketplace there is a rapid need to develop strategies to be effective, meet political concerns and consumer attitudes, and to be sustainable. The objectives for therapy we have in doing so have been summarised and agreed unanimously by the International Dairy Federation and its 35 member countries (17). They are

**Objectives for therapy, applied to cases of clinical mastitis, in order of priority.**

1. To cure clinical mastitis and ensure the most rapid limitation of pain and discomfort to the infected animal.
2. To eliminate infection, prevent recurrence of disease and limit spread of infection to uninfected quarters of the same animal and the rest of the herd.
3. To restore milk quality, making it free from bacteria and reducing the leukocyte content, as rapidly and completely as possible.
4. To minimise the impact of the disease, and curative methods, on food production methods and consumers.
5. To maximise the durability and maintain the effectiveness of therapeutic methods.

The basic tenet of all of this is that we have to treat cows rapidly and effectively to minimise suffering. Whether as owner or keeper of the animals, contracted to care for the animals or a consumer of their output, the well-being of the animal is the priority. This has to expand and will expand as an economic and moral need for the farmer too. Some mastitis is inevitable and where it occurs it must be treated with the most effective means possible. The obligations of all involved in caring for animals, producing milk and consuming products must include the acceptance that treating mastitis is primarily a welfare issue, and that other matters must be secondary.

**REFERENCES**

1. MILNER P, K L PAGE & J E HILLERTON (1997) *Journal of Dairy Science* 80 859-863
2. BYWATER R J (1998) *Flemish Veterinary Journal* 66 Suppl 361-371
3. GREEN M L (1998) *In Practice* 20 128-133
4. FITZPATRICK J L, F J YOUNG, D ECKERSALL & A NOLAN (1998) *Proceedings of the British Mastitis Conference (this volume)*
5. BOOTH J M (1997) *Proceedings of the British Mastitis Conference, Stoneleigh, Genus/Institute for Animal Health/Novartis Animal Health/Milk Development Council*, pp 3-9
6. KOSSAIBATI M A & R J ESSLEMONT (1997) *The Veterinary Journal* 154 41-51
7. SMITH A, D R WESTGARTH, M R JONES, F K NEAVE, F H DODD & G C BRANDER (1967) *Veterinary Record* 80 504-510
8. CRAVEN N (1987) *British Veterinary Journal* 143 410-422

9. HILLERTON J E, A J BRAMLEY, R T STAKER & C H MCKINNON (1995) *Journal of Dairy Research* 62 39-50
10. CHAMINGS R J (1985) *Veterinary Record* 115 499-500
11. LACEY R W (1980) *Journal of General Microbiology* 119 437-442
12. DEVRIESE L A, F HAESEBROUCK, J HOMMEZ & R VANDERMEERSCH (1997) *Vlaams Diergeneeskundig Tijdschrift* 66 170-173
13. JONSSON P (1997) *Proceedings of the British Mastitis Conference, Stoneleigh, Genus/Institute for Animal Health/Novartis Animal Health/Milk Development Council*, pp 43-49
14. BIGGS A (1998) *Proceedings of the British Mastitis Conference (this volume)*
15. EGAN J (1998) *Proceedings of the British Mastitis Conference (this volume)*
16. HOVI M & S RODERICK (1998) *Proceedings of the British Mastitis Conference (this volume)*
17. HILLERTON J E (1998) *Bulletin of the International Dairy Federation No. 330*, 4-5