



## **TROUBLESHOOTING MILK QUALITY PROBLEM HERDS**

### *UTVRĐIVANJE PROBLEMA KOJI UTIČU NA KVALITET MLEKA*

K. R. Petrovski

Institute of Veterinary, Animal and Biomedical Sciences, Massey University  
Palmerston North, New Zealand

Veterinarians have a major role to play in the more sophisticated approaches needed to plan mastitis control and to manage milk quality. There are many tools available which range from obtaining good data to help understand the farm and its problems, easier identification of causative organisms and introduction of a preventive medicine approach as part of a cattle health plan tailored to the individual farm. Udder health is central to profitable milk production. Not only are there significant losses from poor udder health but there are now significant penalties for failing to achieve particular levels of milk quality required from the milk processors. These standards are designed to protect the consumer from undue risk and optimise product quality, shelf life and value. Each milk processor company has to set its own milk quality standards to ensure it is able to consistently produce dairy products that meet product specifications and local, national and international standards. Dairy herds having moderate to severe problems in the milk quality are facing serious economic losses. These dairy herds will have difficulty competing in the market, especially in the time of reduced milk prices. With this economic background the control of udder health has never been more important and the margin for error is minimal. Achieving high production of high quality milk is a challenge, as a single missed procedure in mastitis control or the hygiene routine, may result in a significant financial penalty.

Veterinarians usually become involved in the troubleshooting the problems herds, in one of the following circumstances:

- The milk processing plant reports a higher than permissible bulk milk somatic cell count (BMSCC). There are two general situations where the farmer will approach for help. The first is an acute BMSCC penalty situation. The farmer has acquired a penalty due to sudden onset of higher than permissible BMSCC, i.e. >400,000 cells/ml. The second situation is where the problem is chronic and BMSCC have been tracking up over the year (or years) and penalties are starting or in the horizon. A combination of both situations is also a possibility.
- The herd is experiencing a higher-than-normal incidence of clinical cases of mastitis or there are many recurrent cases.
- The milk processing plant reports others milk quality problems, such as a higher than permissible total bacterial count, a higher than permissible concentrations of inhibitory substances, etc.
- The herd is experiencing a higher than normal incidence of teat lesions.

Veterinarians have a good technical background in mastitis epidemiology, diagnosis and treatment allowing them to be a part of the team solving these problems. All of the above mentioned problems are likely to be associated with mastitis problem in a herd. Total bacterial count is associated with mastitis problem in approximately 20% in New Zealand; similar values are reported in Australia and the USA. Veterinarian involved in the milk quality investigations should ensure up to date with milk processor's developments and company trends.

The basic procedure when dealing with problem herds is the same, any variation being in terms of spread and intensity. As in many cases this should be treated as an emergency, reorganising of daily duty rosters is often indicated.

Not all clients will telephone the practice to seek advice when they have milk quality problem. Many farmers are not willing to accept defeat and often persevere with managing the disease/problem alone before eventually calling for help. This is largely due to a conspicuous failure of the dairy farmer to understand the true costs of mastitis and a false perception of the high costs of investigation.

### **Herd investigation**

Solving milk quality problems is similar to playing detective... the clues are in the records. The basic procedure is the same in all herd investigations, independently of the problem in the herd and consists of:

1. History taking
2. Herd visit
3. Diagnosis of the problem/s, causes and predisposing factors
4. Recommendation of appropriate control measures
5. Monitoring of progress

Before going deeper in the investigation, establishing the farmer's problem interpretation and goals for a particular farm is necessary. Some farmers will be happy enough to keep the existing problem under control, and they do not want to find out what underlying causes are. Other farmers want to improve the milk quality and mastitis management skills. If the farmer is unwilling to have a complete troubleshooting investigation undertaken and to improve his/hers mastitis management, then there will be little to be gained by carrying out the troubleshooting visit.

### **History taking**

The backbone of any disease investigation is collection of solid, reliable history and data. There are many history taking forms available from different sources (*i.e.* Countdown downunder investigation pack - you can access it at the following URL: [http://www.countdown.org.au/pdf/tn13\\_invpack\\_v7\(Jan04\).pdf](http://www.countdown.org.au/pdf/tn13_invpack_v7(Jan04).pdf)). Specific questions should include:

- When the problem started
- How it was discovered
- Are there any measures to control the problem already in place and by who
- Are there any management or other changes on the farm which occurred prior to the problem
- What are the normal management procedures etc.

In many cases other parties may already be involved in the case, and before the investigation is started it is necessary to find out if this is the case. There may be company personnel, milk quality specialists, milking machine technician, teat disinfectant producers and sales or similar companies already involved in the problem. In case of inhibitory substances problems drug companies should be also involved.

Concurrently with the history taking it is necessary to ask the herd owner to provide some data, such as

- individual somatic cell counts (if herd testing conducted on a farm),
- bulk tank somatic cell counts (milk processors data or monthly reports) – recently many milk processors worldwide have internet data-base that can be accessed by the dairy veterinarian with farmer's permission,
- milk plant quality reports (milk processors data or monthly reports),
- laboratory culturing results (if available),

- records of mastitis occurrence and treatment (farm records and from the vets – sales of drugs),
- records of purchased mastitis and dry cow products,
- culling records,
- milking machine test reports, etc.

It is important in the questioning to include all personnel involved in the milking procedure and to ask them individually what is in their opinion the cause of the problem. In many instances this will help to discover management problems or other failures, which may be over-looked or hidden by the person who is providing the answers, if only one person is interviewed. Careful discussion with the milking staff on the criteria for diagnosing mastitis and what treatment protocols have been applied on the farm is necessary. In some instances the change of incidence of mastitis in the herd is more a reflection of a change in criteria of case selection rather than a change in incidence. A milker can become sensitised to the occurrence of clinical mastitis and embark on a campaign of treatment which will effect results. Alternatively, there may be no system in place to diagnose mastitis. Recording and marking of affected cows is often inconsistent when the impermissible levels of inhibitory substances are a problem.

### *Herd visit*

Detailed preparation is essential to improve the efficiency of the troubleshooting visit. Visiting the herd during milking is invaluable. Many problems become apparent only when the milkers, milking systems and procedures are observed, particularly factors associated with milking machine and procedure, teat damage, cow flow/behaviour, cow hygiene, and teat disinfection. The initial visit may only identify which cows are affected, which procedures or milking machine problems are predisposing factors and if any other factors are involved. In this case, the exact sequence of observations and the specific tasks to be carried out depends on the problem. Visualisation, palpation, fore-stripping, CMT, aseptical collection of milk samples for culture  $\pm$  sensitivity or other procedures may be required. Usually an acute problem is associated with less than 10% of the cows. The aim is to identify and remove offender cows from supply until the problem is solved. There may or may not, be time to observe other aspects of milking behaviour and all environmental factors. Recording of all findings is essential.

Second visit where milking personnel are not distracted by identification and drafting affected cows may be necessary. During the second visit the cow's environment in total must be observed. To discover the unusual milking procedures is advisable to keep a distance for some time from the milkers, to let them relax and start with their normal milking behaviour. Many problems may be discovered only in this way, such as cups handling, under- and over- milking, incorrect disinfection post milking, etc. This is usually done during the second visit, reserving the first visit in discovering cows causing the problem.

If there is a high incidence of teat lesions the need for good light is essential. A head torch is ideal. Teats may be assessed by visualisation and palpation. Taking photographs may be invaluable for later discussion with the owner and for follow up purposes.

### *Diagnosis of the problem/s, causes and predisposing factors*

Rarely is there a single reason for a mastitis problem. Hence, the diagnosis of the problem is usually multi-factorial, and can be established in many cases on the basis of the history, herd data and herd visit. The aim is to discover all predisposing factors and causes of the problem although this may not always be possible. However, even partial listing of these factors will help in the next step of the problem-solving procedure. The diagnosis may cover a number of points including organisms involved and their source, milking machine malfunction, milking management issues, the age structure of the herd, under- or over- diagnosis of clinical mastitis by the herd owner.

Possibly the most difficult scenario is when a management change happened far enough in the past that most will not associate that change with the current mastitis problem.

Unfortunately this scenario is one of the most common reasons for a troubleshooting visit. A classic example is that farmers are often reluctant to associate mastitis problem with teat disinfection as current procedures may have been in place for a year or more before the cumulative effect finally results in BMSCC penalties.

It is crucial to establish the extent of the problem. This is based on a careful checking of mastitis records, anti-mastitis treatment usage and cell count data. The records, combined with knowledge of the farm, will often give good indications of the areas of weakness.

Mastitis may be linked to other management problems as well. For example, a farmer may be unable to cull chronically infected cows because of high number of empties due to poor fertility on the herd (very common in practice). Another example is when investigating mastitis problem it may be found that high lameness incidence is associated with low quality races etc.

### ***Recommendation of appropriate control measures***

The diagnosis should be communicated simply and effectively to the herd owners and all milking personnel. In an emergency situation (solving of grading problems) this may be initially done verbally or a self carboning book may be used to make notes in while on-farm.

However, a written report should be sent within a few days with all findings and recommended measures well described and documented. The report should be concise and written in easily understandable language, acceptable for the herd owners and milking personnel.

Removal of the affected cows from supply will lead to temporary relief of the penalties. It is important to prepare an action plan for affected cows. Problem herds experiencing an unacceptable rate of clinical mastitis are more problematic than herds with high BMSCC because clinical signs are often transitory. The affected quarters are treated with an antimicrobial drug and although a clinical cure will satisfy the farmer it may not necessarily result in a microbial cure. A sampling scheme should be implemented to secure milk samples from quarters with clinical mastitis prior to any therapy. Most herds in need of troubleshooting have shuffled resources to other endeavours and require an immediate response to stay legal or profitable. Many recommendations can be made without the aid of microbial culturing, but with no information on causative agents the risk of error is such that the problem may persist or even exacerbate.

Recommendations will depend on the causes and predisposing factors. In cases of high incidence of teat lesions, or penalties due to milk quality issue, changes in management techniques and procedures may be sufficient to lead to resolution of the problems.

It is challenging to identify the key risk factors leading to the presenting and underlying problems leading to penalties and focus on the 3-5 of highest priority. These should be discussed with the milking personnel and realistic level of expectations should be set. It is important to explain how quickly things will change, *i.e.* the speed of BMSCC problem solving in many instances will depend on the level of culling and it may take years to achieve the goals if the culling is low due to poor fertility performances.

### ***Monitoring of progress***

On-going monitoring is indicated and recommendations may change as the problem resolves. Short-term problem solving without adequately addressing underlying factors is counter-productive and will lead to decreased trust of the farmers to the vets.

Effort need to be spent in the investigation of problem herds aimed at preventing new infections rather than simply coping with the consequences.

To achieve the higher standards being demanded, an improved level of management, vigilance and attention to detail is required. This can be difficult to achieve as it involves an increased workload.

As subclinical infections become more relevant financially the use of the California Mastitis Test, individual cow cell counts and quarter cell counts become more important in the approach to udder health. Early detection of infection before visual changes occur in the milk is

currently difficult to achieve. There needs to be a better guide to the SCC of milk before it enters the tank. This is not easily achieved either.

### *Farmer's needs*

Farmer's requirements from a troubleshooting visit are generally:

1. Stop the penalties immediately.
2. Provision of explanations why the problem have occurred
3. Guidance in a logical pathway to a solution
4. Minimal changes in the milking management and labour requirements
5. Improvement of milking management to prevent recurrence
6. Provision of recommendations on long-term mastitis management
7. Value for money.

### **Example of troubleshooting procedures**

#### *Troubleshooting high bulk milk somatic cell counts case*

Any dairy herd that continually has BMSCC above 400,000 cells/ml has a problem. If more than 10% of the cows in the herd are having somatic cell counts of above 200,000 cells/ml warning bells should be on and investigation should be encouraged. It is also an indication of significant economic losses to the farm. The number of somatic cells is highly correlated with the number of cows which have a major mastitis pathogen intramammary infection. Other factors (such as age, oestrus, stress, declining milk production) are of short-term and result in relatively small increases compared to the effect of major mastitis pathogens.

The aim of a troubleshooting visit when high BMSCC is the presenting problem is to identify and remove cows with high individual cow somatic cells from supply and stop the penalties. Briefly the procedures and recommendations will be in the following lines:

In seasonal calving pattern systems penalties often occur in early lactation before herd test data is available. This is because of environmental mastitis problems. In year-round calving systems this will be rarely the case. Therefore, for cows with no recent herd testing data or freshly calved cows suspected of contributing large number of cells to the vat the easiest identification is by California mastitis testing (CMT). Where penalties occurs when most of the cows can be selected based on elevated somatic cells at the preceding herd testing will reduce the number of cows to be examined.

In some cases, poor screening of cows moving from the colostrum to milking mob is the major problem. Institution of good management to screen these cows may prevent the problem from continuing. On the other hand, the problem may actually be due to a high rate of new intramammary infections acquired around calving or through the lactation. Often under-diagnosis of high SCC cows in the rush to get cows into supply results in cows with high SCC entering supply in early lactation.

CMT testing takes time and requires some skill. It is expected milking time to increase by 50% during the troubleshooting visit due to CMT testing and drafting of offended cows. Additional labour units will be required from both, farm (family members etc.) and vets (skilled vet technicians or other vets etc.)

Prior to milking a brief explanation of what is going to be done to all personnel (milking and skilled) is essential, including the CMT technique, the scoring, marking and recording.

Cows are CMT'ed before application of the milking units and affected quarters marked. All scores by affected quarter/s, comments from the milking personnel about the history of offended cow, and other findings are immediately recorded in a hard copy form. Hand held Dictaphone may be additionally used.

Marked cows are not milked during general milking, are drafted out and then reassessed at the end of milking.

Generally, removing from supply 5 % of the high CMT-score cows is sufficient to prevent subsequent penalties. However, the number of offending cows is usually higher. Thus,

after removal of 5 to 10% of highest scoring cows and cows with multiple affected quarters, those with only one affected gland should be marked and recorded, but returned to supply from the following milking. If the BMSCC is still high at the next pick-up, these animals can be withdrawn from supply without having to retest the entire herd. If the BMSCC increases, the list of cows that went in prior to the last pick-up will indicate which cows to be re-tested with the CMT.

Dividing the herd into groups by age, production and/or stage of lactation may indicate where the weak points in the mastitis management are and they should be addressed.

At least 20 affected quarters should be sampled aseptically for culturing. This will provide invaluable information on epidemiology of the problem and selection of antimicrobials. If the results are inconclusive more sampling may be required to determine predominant pathogen. The decision which cows to sample, how many to sample and the interpretation of the results can be a challenge. Cows should be selected to answer questions arising from the troubleshooting investigation, such as are the same pathogens causing clinical and subclinical intramammary infections, are the heifers having the same pathogens as the old ones, are different pathogens in different stages of lactation, etc.

Treatment will depend on the total number of offended cows, severity of cases, farmer's willingness and previous history. Farmer may elect to treat some, or all of the cows, immediately. Alternatively, cows without clinical mastitis may be left until culture and sensitivity results are available. Some advocate treating only the cows with the highest CMT scores and sneaking as many of the low CMT scores cows back into supply as can be accommodated without penalties.

Cows with single positive quarters on CMT may be treated with intramammary cerates. Cows with two or more CMT positive quarters may be treated with a course of injectable penethamate hydriodide or tylosin in the interests of economy and labour.

Treated cows before rejoining the main herd should be re-tested, usually using CMT.

Whatever antimicrobial regimes will be accepted the likelihood of inhibitory substance penalties will increase and it is essential to ensure that all treated cows are milked separately from the main mob and that prescribed withholding periods are extended by two to three milkings or pooled milk from treated and untreated animals is tested prior to joining supply.

Some of the environmental pathogens are known to have high self-cure rates. Therefore, temporary withdrawing cows from supply and monitoring for self-cure by two daily CMT can be instigate.

Where the previous season's herd test data indicate that chronic subclinically infected cows were carried over into the current season, without dry cow therapy, *Staph aureus* infections are likely to be more prevalent. It is advocated in situation like this before deciding on a treatment programme to wait for the culture results. Client should be aware of the limited success of curing *Staph aureus* infections during lactation.

Culling older cows with previous history of high SCC last season or a history of recurrent mastitis should be advocated.

Some cows with only one recurrently infected quarter and high genetic merit can be selectively three tittered.

It is known that calf-suckling is highly efficacious in clearing some intramammary infections. Thus, transferring some cows into a calf rearing mob, and re-testing by CMT at the end of calf rearing will provide an opportunity to save some genetically valuable cows. However, these still CMT-positive are culled.

Other mastitis management procedures should be addressed as required (milking machine faults and maintenance, teat disinfection, housing, milking segregation, milking order, separate mobs, dry cow therapy, treatment administration, etc). Additionally milking procedures (pre-milking preparation, milking units attachment and removal, hygiene, under- and over-milking, etc). While the milking machine and teat disinfection faults are commonly regarded as urgent the rest are usually included in the long-term milk quality management and improvements. The recommendations will be highly influenced by the culture results, depending on the type of pathogen- environmental or contagious.

## Conclusions

Milk quality and mastitis are separate issues that have many interrelated areas. Therefore, dairy cattle veterinarian should be familiar with solving of milk quality problems on the farm. There is no reason why any dairy herd should not be able to maintain their BMSCC below 150,000 whole year round. This will require an organised approach to mastitis, written and implemented mastitis control programme. Tracking down the cause of milk quality problems is difficult and sometimes can be very frustrating. A team involving dairy advisor, milk quality specialist, milking machine testers, dairy sanitizers' and milk processor's representatives and a dairy veterinarian is often necessary to work together to underpin the problem on a particular farm and result in provision of a high quality dairy product for the consumers.

## REFERENCES

1. Anon. Countdown Downunder Technotes. Australian mastitis management programme. Version 2002.
2. Anon. Countdown Downunder Adviser Short Course. Australian mastitis management programme. 2007.
3. Beal JR. A veterinary approach to SCC and SPC grades. In: Proceedings of the Society of Dairy Cattle, Veterinarians of the NZVA, 5, 77-85, 1988.
4. Beal JR. Attacking milk quality problems due to mastitis. In: Proceedings of the Society of Dairy Cattle, Veterinarians of the NZVA, 118-129, 1997.
5. McDougall S. Milk quality management. In: Proceedings of the Society of Dairy Cattle, Veterinarians of the NZVA, 26, 211-231, 2008.
6. O'Grady L. The high SCC herd – a guide to mastitis investigation. Irish Veterinary Journal, 60, 248-251, 2007.
7. Ruegg P. Investigation of mastitis problem on farms. Veterinary Clinics of North America, Food Animal Practice, 19, 47-73, 2003.