13 Seek professional advice if problems persist

To recommend an effective plan to solve a client's mastitis problem, advisers must be confident that they have clearly defined the problem. This does not happen in a single step but requires sequential re-definition as additional information is assessed.

A clear problem definition describes:
- the nature of the problem, for example, whether it is rising bulk milk cell count, high clinical case rate, or poor teat condition;
- when it is occurring; and
- what bacteria are causing the problem in the herd.

It is also important to develop a good sense about what factors are contributing to the problem in a particular herd. A handy way of getting an overview of the issues faced by individual herds is to consider:
- The people involved, for example – Is there good communication and feed-back between team members? Are responsibilities for various tasks allocated to specific people? Are the protocols for various tasks well understood? Are there any tensions between staff, managers or owners? What other pressures are the managers facing?
- The cows, for example – Is it an older herd? Have cows of unknown mastitis status been introduced in the past couple of years?
- The dairy shed, for example – Is the plant and equipment old or new? Is it well maintained and regularly serviced?
- The environment, for example – Does it pose a particular mastitis risk for any reason?

Defining the problem is likely to require co-ordinated input from several disciplines – veterinarians, milking machine technicians, and other dairy advisers. (See flow chart on page 4.)

Once the advisory team has investigated and clearly defined the problem, the task is to develop a plan that works for the farm. This involves agreeing to a few key factors (usually 3-4) that must be addressed if progress on the problem is to be made, and then working with the farm team to establish specific actions for implementation.

This Technote provides a tool kit that advisers can use to gather relevant information when undertaking a full mastitis investigation. The Countdown Downunder Mastitis Investigation Pack includes checklists and recording sheets for use during farm visits. It also contains an Investigation Master Sheet to help collate, interpret and prioritise information, and develop a workable plan for the farm. An electronic version of the Countdown Downunder Mastitis Investigation Pack is available from the website www.countdown.org.au.

The Countdown Adviser Short Course gives advisers a wealth of up-to-date technical information and the opportunity to practise new investigation techniques.

Confidence – High

Because mastitis is a multifactorial disease, Countdown Downunder recommends a team approach by relevant professionals for solving problems.

Research Priority – Low

Warning levels are likely to be refined following feedback from advisers who conduct mastitis investigations.

13.1 Seek professional advice from your veterinarian, factory field officer or AMMTA-qualified milking machine technician if mastitis indexes are above warning levels.

Farmers are urged to seek professional advice if problems persist in their herds or if a warning sign exceeds a certain level. The warning levels given in the Countdown Downunder Farm Guidelines for Mastitis Control are based on extensive field experience (e.g. teat condition), economic penalties (e.g. bulk milk cell counts), commonsense (e.g. the presence of Strep agalactiae), and expert opinion (e.g. measuring mastitis spread using individual cow cell counts).

Background to the warning levels listed in Farm Guideline 13

Background	Factor	Warning level	
Technote 11.2	Bulk milk	Average for past six months above 250,000 cells/mL OR More than five consecutive 10-day periods above premium threshold	Herds with BMCC above this level would not receive premium payments for most of the lactation
Technote 4	Clinical case rate (in herds that do not routinely use forestripping)	More than five clinical cases per 100 cows in the first month of lactation OR More than two clinical cases per 100 cows in subsequent months of lactation.	This clinical case rate has been observed in 'problem' herds
Technote 5	Cultures	The presence of Strep agalactiae.	Strep agalactiae is highly infectious and, if it is present on the farm, stringent milking hygiene is required to avoid an explosive outbreak
Technote 12.3	Individual Cow Cell Counts	More than 10% of cows have peak cell counts over 250,000 cells/mL each month.	This estimate is an indicator of the spread of infection, especially in seasonally calving herds
Technote 9.1	Teat condition	Unacceptable teat condition that does not improve three weeks after changes are made to machines, management, the environment or disinfectant mix.	Teat condition reflects the quality of milking management, the dairy system and the environment

The warning levels in the Farm Guidelines indicate that a problem does exist.

Farmers who have participated in the Countdown Downunder Farmer Short Course are familiar with the concept of using 'triggers' for their herd – where they carefully monitor and follow-up selected events that exceed a pre-set level. An example of a trigger for a particular farm might be 'any bulk milk cell count above 250,000 cells per millilitre'. Triggers are often set at or below the warning levels, depending on the farm's goals.

Countdown Downunder strongly recommends advisers to use a team approach to trouble-shoot problems because a robust plan frequently requires the expertise of more than one profession.

Someone needs to take a lead role to activate and coordinate the advisory team (those involved in interpreting information and developing the control plan), and to keep other interested parties informed of progress.

One of the local advisers should co-ordinate the investigation.

The advisory team needs to reach early agreement on:
- What tests and observations are appropriate to investigate the problem;
- How they will organise the farm visits;
- How often and when they will consolidate and discuss their results; and
- How to interact with the farm manager at strategic points: such as ensuring the planned investigation meets their expectations, communicating the initial findings and discussing the control options.

Mapping out a timetable that is realistic and achievable, and sticking to it, is both satisfying and professionally stimulating for the team.

There is an extended advisory network to draw upon both within the regions and nationally (through Countdown-L). Consulting an experienced mentor at critical points in the investigation boosts the team's confidence and can help them reach agreement on difficult issues.

Contact details of dairy professionals from across Australia who have completed Countdown Downunder courses can be obtained from the website at www.countdown. org.au. This site also describes an e-mail forum, Countdown-L, for dairy advisers to discuss topical mastitis issues relevant to Australia.

Flow chart showing the general approach to investigating a mastitis problem

In some circumstances Boxes 2 and 3 may be done in reverse order.

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1. Describe the presenting problem

Describe the problem as the farmer sees it

Examine and interpret the available information and identify information gaps

Make your preliminary definition of the problem

Plan how to start gathering the next set of critical information

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2. Define the problem more specifically using milk culture results

- Interact with a vet to determine what milk cultures are available. If adequate milk culture results are not available, the vet should plan the detailed milk sampling strategy and organise sampling and transport of samples to the laboratory
- Interpret milk cultures to determine the bacteria causing the problem in the herd
- Consider the likely sources and modes of transmission of the bacteria in the herd

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3. Activate your advisory team

- Identify who needs to be involved in this investigation
- With the advisory team, plan relevant examinations using the Investigation Master Sheet
- Do the tests and analyse the results

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4. Collate and assess findings with the advisory team

- With the advisory team, collate and assess the results using the Investigation Master Sheet
  - Consider bouncing ideas off an experienced mentor
  - Identify further examinations, do them and assess the results
  - Agree to the key factors critical to resolving the problem (check against presenting and re-defined problem)
- Report initial findings to the farm owner and discuss options for plan development

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5. Develop a farm plan with the farm team

- Organise a farm meeting and involve the whole team in planning practical ways of addressing the key areas needed to resolve the problem for this herd
- Summarise them on a report [eg Farm Mastitis Action Plan]
- Activate processes, agree to triggers for action and set a date for review

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6. Review progress

- Measure progress in each of the key areas and make a date to review overall progress

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The Countdown Downunder Mastitis Investigation Pack

The Countdown Downunder Mastitis Investigation Pack consists of:
- the Investigation Master Sheet (Sheet A) for co-ordinating the investigation and formulating a plan of action; and
- 12 recording sheets (Sheets B to M) for gathering and interpreting relevant information.

This Technote contains a brief description of each element of the pack and how to use it. Investigators need to be familiar with how to use the pack before starting a farm investigation.

Early on in the investigation, the advisory team should determine what testing needs to be done to complement existing information and then allocate tasks to team members. The team should use the Mastitis Investigation Pack to ensure factors that may impact on the problem are checked and to collect and analyse data using the relevant recording sheets.

This approach often uncovers issues which are not directly relevant to the current problem. They are marked on the Investigation Master Sheet as 'different problem' and should be dealt with separately.

A completed Mastitis Investigation Pack for Felix Feelgood's herd is shown on pages 16-29.

An electronic version of the Countdown Downunder Mastitis Investigation Pack is available from the website www.countdown.org.au.

Use a new copy of the pack (27 pages) for each investigation.

Facesheet of the Countdown Downunder Mastitis Investigation Pack

Countdown Downunder Mastitis Investigation Pack

Read revised Technote 13 (February 2003) pages 5-15 for a guide to using these sheets and tips for efficient data collection

A1-7	INVESTIGATION MASTER SHEET
B1-5 Farm Profile	**H** Clinical Cases
C Milk Cultures	**I** Teat Condition
D Individual Cow Cell Counts	**J** Cow Behaviour Milking Time per Cow
E Milking Machine Dry Test	**K** Completeness of Milking Cluster Alignment
F Performance Tests of Milking Machines	**L** Teat Disinfectant
G Milking Routines, Teat Cup Slips	**M** The Environment

General approach to investigating a mastitis problem

A. Investigation Master Sheet (see example, pages 16-19)

The Investigation Master Sheet (7 pages) provides a process for identifying the key areas on which to base the action plan. It is the lynch pin of the investigation pack because it is used:

- by the advisory team to construct a clear, concise definition of the problem and to allocate tasks;
- by each team member to summarise their findings and identify practices that are not aligned with the Farm Guidelines; and
- as a focal point for deciding whether these practices are contributing significantly to the problem and identifying the key factors underlying the problem.

The Herd Mastitis Dynamics Chart (Sheet A7) enables advisers to construct a pictorial summary of how farm management is impacting on mastitis in the herd (see below). This enables the team to keep perspective of mastitis control in the herd while tackling the seasonal and high priority issues.

To enhance the likelihood of your investigation leading to a solution for a problem:

- Identify the factors you have rated as 3 or 4 in importance in the right hand column of the Investigation Master Sheet.

- Mark these on the Herd Mastitis Dynamics Chart (Sheet A7) according to their area of influence.

- Consider the Herd Mastitis Dynamics Chart in the light of the epidemiology of the major pathogen(s) in the herd.

- Allocate priorities to the factors most likely to effectively solve the problem.

- List these factors in the box on the front page of the Investigation Master Sheet (Sheet A1) and incorporate them in your report to the farmer.

An example of a completed chart is shown on page 19.

Herd Mastitis Dynamics Chart
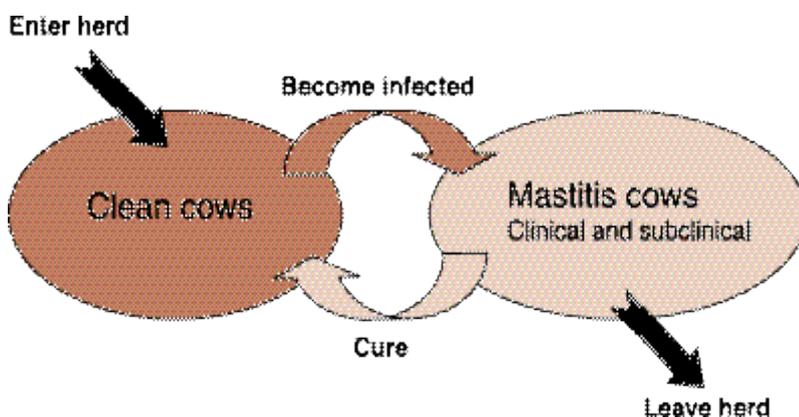
The mastitis status of the herd changes continuously depending on the rate that cows move from one category to another. Advisers can use this chart to demonstrate the effect of various factors on mastitis dynamics. Group mastitis investigation findings according to whether they influence the rate that:

- clean cows become infected;

- infected cows are cured;

- infected cows enter the herd; and

- infected cows leave the herd.

LACTATION

B. Farm Profile (see example, pages 20-22)

The Farm Profile is a 5-page questionnaire that is used to:
- summarise the presenting problem (Box 1 of the flow chart);
- establish existing information that is already available for assessment by the team; and
- suggest leads for advisers to investigate.

The first page of the Farm Profile gives advisers a 'big picture' overview of the client and the herd, and can be collected by any competent person in the business as details are factual and do not explore technical aspects of the problem.

Farm Profile B2-B5 are used to assess farm management practices that influence mastitis and need to be completed by one of the advisory team - usually a veterinarian. The questionnaire has been kept short so that it maintains focus and yields good quality information. Countdown recommends that advisers obtain the information by personal interview (either phone or face-to-face) and fill in the pages themselves. This ensures that questions are put into context and appropriate responses are received. It also provides an opportunity to follow up interesting comments with your own line of questioning.

Note: The Farm Profile is the only sheet in the Mastitis Investigation Pack to obtain information on Bulk Milk Cell Count trends, numbers of clinical cases, drying-off strategy and the culling policy for mastitis.

Use the left hand side of the Farm Profile Sheet B1 to organise the collection of information that is already available. This can be done before a farm visit to make the process of information gathering efficient.

Technote 4.3 describes important aspects of cow selection and milk sample collection, storage, transport, culture and interpretation.

When sampling a number of cows, do not collect samples at milking time. Preferably draft out cows at a morning milking and then sample them immediately before the afternoon milking. This allows sampling to be done in a clean environment.

C. Milk Cultures (see example, page 23)

A critical step in the development of a clear problem definition is to establish which bacteria are causing the problem in the herd (Box 2 of the flow chart). This can only be done by assessing an adequate set of milk cultures. A common error in mastitis investigations is to base the assessment on too few sample results, often because there is a real or perceived reluctance of farmers to pay for culturing. This is a false economy because, if the bacteria are not defined, the likelihood of a targeted and cost-effective solution is much reduced. It is usually the responsibility of the veterinarian in the team to organise and interpret the milk cultures. Clear communication with the farmer about the importance of this step is required.

The objective is to determine which bacteria are present in the herd and which are causing the problem. To make this decision it is important to have at least 20 effective milk culture results (excluding contaminated samples) and, to achieve this, milk samples should be collected from at least 25 cows.

If clinical cases are the presenting problem, samples should be taken from all cases as they are detected and prior to treatment. These samples can be frozen and submitted in batches. Some samples (or results) may already be available.

If high cell counts are the problem, selection of cows to sample is usually based on mastitis history or recent Individual Cow Cell Counts. In these circumstances it is important for the veterinarian to choose the particular cows rather than leave the selection to the farmer. Pick a range of cows: a mix of age groups including heifers, a mix of animals with recent and persistent elevations in cell count, and those with peak cell counts ranging from 250,000 to over a million.

Once the cows have been selected, the sampling strategy may be to collect 'composite samples' (a roughly equal volume of milk from each quarter into a single sample jar for each cow) or to examine each quarter with a cow-side test (such as a conductivity meter or Rapid Mastitis Test) and sample individual quarters that are positive. Quarter testing requires extra time at sampling but decreases the chance of 'no growth' or 'contaminated' results.

Milk Cultures Sheet C can be set up as a pre-prepared list of cows to sample. A separate copy of Sheet C should be used to track the information and results for each batch of samples.

D. Individual Cow Cell Count Analysis (see example, page 24)

Herd-level analyses of Individual Cow Cell Counts (ICCC) can be used to assess the apparent prevalence of mastitis in different groups of cows (for example different ages, stages of lactation or management groups), and estimate the rate of new infections occurring in the herd.

Most ICCC data on farms are available in print-and-paper form. Electronic data can nearly always be obtained from the herd improvement service involved.

Some herd improvement organisations provide a herd-level ICCC analysis. A number of specialist programs have been developed, both in Australia and overseas, to assist analysis and interpretation of ICCC data, but the most common approach is for the advisers doing the investigation to make some relatively simple assessments of the ICCC data by hand or with a spreadsheet.

The analyses summarised on Sheet D provide:

- Comparison of mastitis prevalence in different groups of cows
  The proportion of cows in different groups (for example, the autumn-calving cows) that have had any cell count above 250,000 cells/mL. This gives a guide to the likely prevalence of infection in the groups. Note, however, that it is often difficult to interpret data from small groups of cows.

- An estimate of the rate of new infections occurring in the herd
  The proportion of first lactation animals that have peak cell counts above 250,000 cells/mL. This gives an estimate of the new infection rate in the herd. As a guide, an unacceptably high new infection rate in the herd is suspected if more than 20% of heifers have a peak ICCC of above 250,000 cells/mL by the end of their first lactation. In seasonal-calving herds this can also be expressed as a warning if an extra 1% of heifers had a peak cell count above 250,000 cells/mL each calendar month.

- The number of persistent infections
  The proportion of cows with persistent mastitis infections (cell counts above 250,000 cells/mL in the current and the previous lactation). This provides a guide to the chronicity of the problem and the effectiveness of the last dry period mastitis management.

Analyses of ICCCs should be based on regular herd testing data, not on single 'spot' tests. It is recommended to have at least five ICCCs to determine the status of a cow during a lactation.

Technote 23 page 3 shows a herd analysis of ICCCs produced at each test day.

Technote 12 describes methods of analysing and interpreting ICCCs.

A cow is classed as infected or uninfected according to her highest (or peak) cell count taken during the lactation. In Australia, where *Staph aureus* and *Strep uberis* are the main pathogens, cows are designated as 'infected'if their ICCC ever exceeds 250,000 cells/mL. It is assumed that they remain infected throughout the lactation irrespective of the value of subsequent ICCCs.

E. Milking Machine Dry Test (AMMTA test or equivalent dry test) (see example, pages 24-25)

To be confident in the quality of testing and standard of reporting, Countdown Downunder recommends the use of technicians who are Australian Milking Machine Trade Association (AMMTA) qualified or competency tested by the National Milk Harvesting Centre to perform a dry test on the milking machine. This ensures the equipment is comprehensively tested, and that results are recorded on AMMTA or equivalent report forms and interpreted using the AMMTA specifications. Examples of other dry test procedures and recording forms that may be regarded as equivalent include the International Standard ISO 6690:1996 Annex E; the standard New Zealand machine test report form; or the Bou-Matic VIP System Analysis.

When assessing the impact that machines may be having on the mastitis problem (Boxes 3 and 4 of the flow chart), the advisory team should review the key points of the milking machine Dry Test report.

Revised Technote 25 (February 2003) lists the key points to review on a Dry Test report.

F. Performance Tests of Milking Machines (see example, page 26)

Milking-time machine tests provide a measure of the 'goodness of fit' between the milking herd and the milking equipment. These performance tests include:

- Assessing cluster components to ensure compatibility – so that cluster position and weight balance are good; liners fit shells and claw nipples and are suitable for the average teat size; and cluster air admission meets guidelines.
- Assessing the effectiveness of vacuum regulation – specifically, vacuum change at regulator, unit fall-off test, and vacuum undershoot and overshoot.
- Assessing vacuum stability in milkline and receiver.
- Measuring mean claw vacuum by wet testing or milking-time testing.

When assessing the impact that machines may be having on the mastitis problem (Boxes 3 and 4 of the flow chart), use the guidelines for performance tests given in the revised Technote 25 (February 2003).

These performance tests are designed to build on the results of the milking machine Dry Test and they often help to pinpoint the underlying causes of frequent liner slips (Sheet G), poor teat condition (Sheet I), poor cow behaviour or slow milking (Sheet J), or incomplete milking (Sheet K).

LACTATION

G. Milking Routines and Cup Slips (see example, page 26)

Milking Routines

This checklist for milking routines (Sheet G) is designed for advisers to fill in from their own observations in the shed at milking (don't give the sheet directly to staff to fill in). In most of the lists, one or more of the tick box lists may be appropriate.

Careful assessment of the milking routine often identifies factors contributing to the presenting problem (Boxes 3 and 4 of the flow chart). When it comes to developing a farm plan (Box 5), building good routines and communication with the on-farm team members is low-cost and motivational, as well as benefiting mastitis control.

Technotes 5 and 6 provide guides to interpreting milking routine observations.

Cup Slips

Because cup slips or falls occur randomly and infrequently in many herds, experienced observers usually listen and watch for these events while they are engaged primarily in recording other events (such as milking routines or cow behaviour). The rate of slips or falls per 100 cows milked can be estimated from the average number of cows per milked per hour if the time of the first and last recorded slip or fall was also noted.

Technote 6 page 7 lists the common causes of cup slips and falls.

A handy technique is to use a 'Post-It' note to record audible cup slips or falls. You can move this note page to the top of each recording sheet as you work.

H. Clinical Cases (see example, page 26)

The robustness of clinical case management can be assessed by looking at the quality of the clinical case records (Farm Profile Sheet B3) and using Clinical Cases Sheet H to check what is happening at milking, discuss issues with the milkers and assess the technique used for treatment of cases.

Technotes 4 and 10 describe recommended methods of detecting and treating clinical cases. Technote 8 gives a guide to hygiene requirements.

I. Teat Condition (see example, page 27)

Formal assessment of the herd's teat condition aids detection of any milking machine induced, management or environmental factors, or infectious agents, influencing teat and udder health (Boxes 3 and 4 of the flow chart).

Teat skin condition can be checked before milking. All other parameters on Sheet I should be assessed immediately after milking.

Revised Technote 9 page 12 (February 2003) gives a guide for making and interpreting teat observations in commercial herds.

Remember to exclude pigmented teats when assessing teat colour.

Technote 6 page 4 describes the types of problems that may be occurring for cows showing discomfort at different stages of milking.

J. Cow behaviour and milking time per cow (see example, page 28)

Cow Behaviour

A cow's behaviour is an indicator of her comfort or discomfort with the milking environment, milking routine and machine.

Observations are made at different stages during milking: whilst cows are in the stalls waiting to be milked, during cow preparation and cluster attachment; during the first 2 minutes of milking; and during the last 2 minutes of milking.

In herringbone sheds, cow behaviour and milking time per cow can be observed concurrently for each cow (working across the sheet). In rotaries, it is usually more efficient to observe different groups of cows.

See the tips on efficient data collection on page 14.

Milking Time per Cow

Three valuable pieces of information can be derived from careful measurements on a representative sample of cows:

- the proportion of cows exhibiting signs of delayed milk let-down (minimal if fewer than 10% of cows, or moderate if fewer than 20% of cows)
- the average milk flow time per cow (which can be compared with guidelines in Technote 6)
- the average length of the overmilking period per cow (minimal if the mean overmilking time is less than 1 minute per cow; moderate if between 1 and 2 minutes per cow).

Technote 6 page 5 gives the expected milk flow time for herds producing 10, 15 and 20 litres of milk per milking and situations that will increase the average cups on time per cow.

The results of a few careful time-measurements can provide a solid framework for advice on how to improve milking management. In addition, they will help to explain the underlying causes of new mastitis infections, frequent liner slips (Sheet G), poor teat condition (Sheet I), poor cow behaviour (Sheet J) or incomplete milking (Sheet K). For example, warning bells should ring if overmilking occurs in conjunction with pulsation failure (Sheet E).

K. Completeness of milking and cluster alignment (see example, page 28)

Completeness of Milking

Although there is conflicting information about whether under milking affects new infection rate, its measurement provides information about whether the milking machine and staff are operating optimally and may help uncover issues such as teatcup crawl (applicable to Boxes 3 and 4 of the flow chart).

If the herd is not milking out completely (under milking), this can be established by hand stripping at least 25 cows or 100 quarters at the end of milking.

Cluster Alignment

The effect of poor cluster alignment on completeness of milking can be demonstrated simply by manually aligning the cluster at about the time when milk flow from any cow has almost ceased. Hold the cluster squarely under the udder by manipulating the long milk tube - without putting additional downwards pressure on the cluster. Often, milk will start flowing again from one or more quarters into clusters that are poorly aligned.

A pattern of different strip yields from rear versus front quarters, or between quarters on the right versus the left side of udders, usually indicates a problem of poor cluster positioning or uneven weight balance between the four teatcups.

Teat Size

Visual assessment of herd teat size and shape is useful when liner selection is being reviewed.

Technote 6 page 6 gives a guide to assessing incomplete milking (this supercedes the milking time guide described for farmers on page 34 of the Countdown Downunder Farm Guidelines for Mastitis Control).

The 'Liners' FAQ sheet (February 2003) describes liner characteristics and how they affect milking performance.

L. Teat Disinfectant (see example, page 29)

Sheet L helps advisers check issues associated with use of teat disinfectant before application (Boxes 3 and 4 of the flow chart), from selection of the stock product through to mixing and storage. Issues of teat coverage are checked when assessing the milking routine (Sheet G of the Mastitis Investigation Pack).

The section of Sheet L on mixing is not needed for farms using a ready-to-use teat disinfectant product.

Use revised Technote 7 (February 2003) to interpret the information and identify any leads to follow up about post-milking teat disinfection.

M. The Environment (see example, page 29)

The environmental checklist helps advisers assess a herd's level of exposure to environmental contamination, especially at calving and immediately after milking. It is necessary to think about potential problem areas and physically inspect them at the most appropriate time of year, for example the calving paddock at calving time.

Assessment of udder contamination prior to milking is recorded on Sheet G.

New guidelines given in the revised Technote 9 (February 2003) for the numbers required to evaluate teat condition are as follows:

- In herds of up to 500 cows, assess all teats on at least 25 randomly selected cows, or 10% of the herd, whichever option provides the greater number of cows.

- In herds of more than 500 cows, assess all teats on at least 50 randomly selected cows.

Tips for efficient data collection during milking-time tests and observations

Getting the numbers right

A common limitation in mastitis investigations has been that sample sizes for milking-time observations have been too small. When sample sizes are too small, the professionals who collected the information have largely wasted their time and effort because it is impossible to draw confident conclusions.

Countdown recommends that the new guidelines for the number of observations to evaluate teat condition are also applied to other milking-time observations, particularly for cow behaviour and milk flow times per cow (Sheet J) and completeness of milking (Sheet K).

Efficient teamwork for data collection

According to anecdotal reports, many udder health advisers and milking machine technicians are investing four or more person-milkings to collect all the data required at milking-time to provide comprehensive recommendations. One pair of experienced technical people found that they needed two milking-time visits to complete most of the tests and observations. They each recorded their own data.

Some options that have been used to shorten this time-consuming, labour-intensive and expensive process are described below:
- Conduct a quick test of the regulator undershoot and overshoot before milking. This is a partial substitute for monitoring receiver vacuum during milking.
- Measure the mean claw vacuum, before milking, in 3-5 clusters using a flow simulator set at a controlled liquid flow rate of 5 litres per minute. This wet test is an acceptable substitute for measuring the mean claw vacuum on 6-10 real cows during milking. In fact, it is a better measurement in some ways because the simulator flow rate is known and is highly repeatable.

If the above options are adopted, then milkline vacuum stability is the only milking-time machine test that needs to be done during milking. This test should be conducted in the first 15 minutes of milking when milk flow rates are likely to be highest. The measurement can be made at any convenient empty stall for one rotation in a rotary dairy. In a herringbone dairy, the measurement can be made at any convenient milking unit and recorded while the first complete side of clusters is removed and re-applied.

In dairies where the milkline size and slope comfortably meet the current guideline tables for effective milkline capacity, it could be argued that the milking-time measurement of milkline stability is not necessary. Nevertheless, it does provide a neutral 'activity' for a visiting technician while the milking staff settle into their routine and forget about the visitors, before observations are made on milking routines, cow behaviour, etc. Furthermore, the actual milking-time performance test with all the 'warts', including operator actions, often gives extra insight and also allows correlation of events with measurements.

If a flow simulator is not available, then the measurement of mean claw vacuum is simplified greatly by pre-installing 3-5 T-pieces between the claw outlet and long milk tube. These T-pieces are capped when not in use. The vacuum recorder is connected to record mean vacuum at 30 seconds and 90 seconds of milking for one cow then it can be moved immediately to the next available milking unit without having to wait for the first cow to finish milking. One group of 3-5 cows can be recorded as soon as milkline vacuum stability has been measured. A second group of 3-5 cows can be recorded later in the milking.

Consider asking a member of the farm family to help with recording the data.

It should be possible to collect all or most of the data by using two persons at one milking (with the option for one person to return for a follow-up visit if necessary) by organising tasks along the following lines:

Before milking

Both observers should arrive at the farm at least one hour before milking. One person evaluates possible environmental factors. The more technically-oriented person assesses liners, measures Working Vacuum, regulator undershoot and overshoot, claw air vents (either hole size or individual claw air admission), mean claw vacuum with flow simulator, and/or pre-installs T-pieces.

During milking

Adviser One evaluates teat condition for the first two-thirds of milking and observes milking routines for the last third.

Adviser Two:
- Records milkline vacuum stability (15 minutes) and receiver vacuum (if necessary).
- Records mean claw vacuum (if necessary) on the first group of 3-5 cows.
- Observes cow behaviour and milking times per cow:
  – In a herringbone dairy, observe groups of 3-4 cows (for a total of 25 or more cows).
  – In a rotary dairy, it is more efficient to observe cow behaviour for 25 (or more) cows near the cow entry position, while noting the approximate stall position when milk starts flowing strongly into most claw bowls. When this average starting point for milk flow has been estimated, the observer moves to a convenient vantage point near the cups off position. A different group of 25 (or more) cows is observed to determine:
  * The average stall position at which milk flow slows or stops for the majority of cows
  * The average stall position at which most clusters are detached
  * Cow behaviour during the last 2 minutes of cups on.
  The total cups on time and average milk flow time per cow can be calculated by measuring the rotation time of the platform, including normal repeatable stoppages but not unusual events during the time of the observations.
- Listens for and records any audible cup slips and falls as they occur.
- Records mean claw vacuum (if necessary) on the second group of 3-5 cows
- Measures completeness of milking by hand-stripping all quarters of 25 cows preferably, dictating results into a tape recorder or with help from the teat evaluation assistant for the last third of available milking time. It is not necessary to continue stripping any quarter after it becomes obvious that the strip yield exceeds 100 millilitres. It is quicker and more efficient to stop, record the quarter as 'High', and move on to the next teat.

Follow-up visit(s)

If two milking-time visits are planned, it is well worth including one morning and one afternoon milking due to the differences commonly seen in cows' production level and changes in milking staff.

A2 Feb 2003 — Investigation Master Sheet

[Business name]

Does the farm operation match the Farm Guidelines?

B. Farm Profile

	TN	Yes	Unsure	No	Comments	How important is this to the problem?
The policy used to check thoroughly (purchased or borrowed) cows for mastitis meets the guidelines	21	✓			• Doesn't hard-test cull multiple clinicals	4
The culling policy for clinical and persistently infected cows meets the guidelines	15		✓		• No records. Something drives off too many of a time. Method of drying off inadequate	3
Management to drying-off and the Dry Cow Treatment strategy meet the guidelines	14		✓			1
Udder condition at calving (no excessive swelling or dripping) meets the guidelines	12	✓			• NEEDS RECORDS	4
Permanent and up-to-date records are kept on cows with clinical mastitis	4			✓		It is the problem [circled, Dave 14/11]
BMCCs have been below warning levels for the past 18 months	11	✓			• Always in tase	
Other						

C. Milk Cultures

	TN	Yes	Unsure	No	Comments	
Milk samples were collected from cows representative of the problem being investigated	1		✓		• Need more cultures from clinical cases	4
There are sufficient milk culture results to narrow the herd problem	13		✓			
Bacteria have been identified that could account for the herd problem	1,5	✓			• Staph aureus indicates cow-assoc mastitis	3
Other						

D. Individual Cow Cell Count Analysis

	TN	Yes	Unsure	No	Comments	
The new infection rate in heifers is acceptable (less than 1% additional heifers infected per month)	12		✓		• Doesn't hard test	3
Other						

Client.......... Joe Cooper

Key: 4 High and urgent / 3 High but not urgent / 2 Low / 1 Different problem

---

A1 Feb 2003 — INVESTIGATION MASTER SHEET

[Business name]

Advisory team

Name...... O.A.
Company.... in... Veterinary Clinic.
Phone......
Fax......
Email......

Name...... A.K.
Company.... Murray Goulburn Co-op
Phone......
Fax......
Email......

Name...... R.T.
Company.... Wathenberg Co-op
Phone......
Fax......
Email......

Presenting problem Date 22/10/02

High BMCC and high number of clinical cases

Re-defined problem

Chronic high BMCC due to clinical and subclinical infections with Staph. aureus.

Agreed key factors to resolve the problem
(Use **A7** to identify and allocate priorities)

1. Equipment — Pulsators/liners / cluster alignment
2. Teat disinfection
3. Culling policy — records / hard test
4. Cup removal — overmilking technique

Client: Felix Feelgood

A4 Investigation Master Sheet [Business name]

Feb 2003

Does the farm operation match the Farm Guidelines?

G. Milking Routines

	TN	Yes	Unsure	No	Comments	How important is this to the problem?
Cups go on clean, dry teats	5			✓	Dry but not clean. Often muddy teats washed but not dried	2 + 1
Cows have let-down by the time the cups go on	5			✓	Not always	2
Hygiene in the shed (wearing of gloves, stripping methods etc) will reduce the number of bacteria at the teat ends	5, 8			✓	Inadequate hosing down, cups hanging down to/pit floor (mud)	3 + 1
The technique used by all staff to remove cups is appropriate	5			✓	Don't allow cups to fall off. Once vacuum broken	4
Teat disinfectant adequately covers all teat surfaces	7		✓			4
The frequency of new cup dips is within the guidelines	6			✓	(PTO) Inadequate + only 10 ml	4
Other						

H. Clinical cases

	TN	Yes	Unsure	No	Comments	
The protocol for detecting clinical cases is appropriate	4, 10			✓	Under-diagnoses until BMCC too high, then over-diagnoses	3
All staff use the same protocol for detecting clinical cases	4, 10					
The protocol for treating clinical cases is appropriate	4, 10					
The way clinical cases are milked (hygiene, milking order etc) will minimise spread to other cows in the herd	4, 8			✓	No records	3
Other						

1 = High and urgent
3 = High but not urgent
2 = Low
0 = Not a problem

Client............. Feelgood

A3 Investigation Master Sheet [Business name]

Feb 2003

Does the farm operation match the Farm Guidelines?

E. Milking Machine Dry Test

	TN	Yes	Unsure	No	Comments	How important is this to the problem?
The liner can was recent enough to provide valid information on the current problem	25					
The capacity of the milking (size and slope) meets the current guidelines	25	✓				1
The vacuum and airflows meet the current guidelines (working vacuum, effective reserve, regulator allowance)	25 AMMTA specs			✓	Effective reserve too low due to pulsator airline leaks.	3
Pulsators operate within the current guidelines	25 AMMTA specs			✓	Need servicing or replacing	4
Liners, claw pieces and other rubberware are in good condition	6			✓	Liners need replacing. Other rubberware needs replacement	4
Other		✓				

F. Performance Tests of Milking Machines

	TN	Yes	Unsure	No	Comments	
Components, claws, components have been selected (filters fit shells and claw nipples, liners seem OK for average teat size, cluster air admission is OK)	25	✓			Some admission holes blocked	2 - 3
Vacuum levels and airflows meet standards and guidelines	25		✓			1
Pleat claw vacuum meets the guidelines	25			✓		1
Vacuum stability in milking and reverse meets the guidelines	25			✓	Air injector operates on before milking finished	2 - 3
Other		✓				

4 = High and urgent
3 = High but not urgent
2 = Low
1 = Different problem

Client............. Feelgood

A6 Investigation Master Sheet

[Business name]

Feb 2003

Does the farm operation match the Farm Guidelines?

How important is this to the problem?

4 – High and urgent
3 – High but not urgent
2 – Low
1 – Different problem

L. Teat Disinfectant Preparation

	TN	Yes	Unsure	No	Comments	
The product is registered by NRA	7					
Mixing rates, water sources and storage containers meet the guidelines	7				*Unnecessarily high concentration*	2
Rostime and contact times results are within acceptable ranges	1					
Other						

M. The Environment

	TN	Yes	Unsure	No	Comments	
Cows calve in a clean and dry environment	1				*Go back through muddy lane + yard*	2 + 1
Udders remain clean and dry in the three hour after milking	27				*Half cows stand on muddy track before milking*	2 + 1
Other						2 + 1

Client.......Feelgood......

A5 Investigation Master Sheet

[Business name]

Feb 2003

Does the farm operation match the Farm Guidelines?

How important is this to the problem?

4 – High and urgent
3 – High but not urgent
2 – Low
1 – Different problem

I. Teat Condition

	TN	Yes	Unsure	No	Comments	
Short term changes in teat condition (colour, swelling, firmness, openness) are within normal limits	9				*Near threshold of concern for firm teat ends*	4 (see liners, over-milking, pulsation)
Longer-term changes in teat skin condition and teat end / teat wall thickness are within normal limits	9				*30% rough + worn rough teat ends*	
Other						

J. Cow Behaviour, Milking Time per Cow

	TN	Yes	Unsure	No	Comments	
Cow disconfort is minimal (less than 10% of cows with kick response) at each of the four stages of milking	5, 6				*Cows uncomfortable in all stages, esp when over-milked*	3
The average milk flow time of the herd meets the current guidelines for their production level	6				*4-3 mins (?)*	1
Average over-milking time is acceptable (minimal : less than 1 minute, moderate : 1-2 minutes, excessive : 3 or more minutes)	5, 6				*Considerable over-milking. Don't know where milk flow stops*	4
Delayed let down in the herd is minimal (less than 10% of cows)	5				*26%*	2
Other						

K. Complaceness of Milking; Cluster Alignment

	TN	Yes	Unsure	No	Comments	
Less than 20% of quarters contain strip yields of 100mL or more	6				*Need to work out how to decrease under-milking*	3
Clusters hang squarely on udders	6				*Twisted milk and pulsator tubes*	4
Other						

※ Are not aware of when milk flow actually stops.

Client.......Feelgood......

LACTATION

A7 Feb 2001 | Investigation Master Sheet [Business name]

Countdown Downunder

Herd Mastitis Dynamics Chart
Technote 13 page 7

Major pathogen(s): _Staph. aureus_ (19/24 cultures)

Key control points:

Machines
- V. horn rubberware + liners (4)
- Pulsation (4)
- Effective Reserve - low (3)
- Blocked air admin 2-3 (4)
- Cluster alignment (4)

Routines
- Overmilking (4)
- A strip yield lined (3) balance b/testing
- teat spray coverage (4)
- rough cup removal (4)

Other
- no records (4)
- general hygiene (3)

140 heifers each year

Enter herd

Clean cows ↔ Mastitis cows (clinical + subclinical)

Remain Infected

Leave herd

haphazard culling policy (4)

Cure
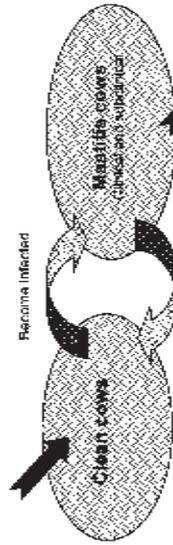
③ Blanket DCT last year, selective previously
③ Detection + treatment of clinicals

→ Need to herd test regularly ③

Other key issues:

Client: Ecofeed.

[Business name]

Countdown
Downunder

B2 Farm Profile
Feb 2003

Your problem

Discuss the problem – get down to what is the primary concern and when it occurs

Chronic high BMCC (5 years)
Unsuccessfully trying to treat way
out of problem

Define the problem – tick appropriate boxes (one or more)

- ☑ Advice
- ☑ Clinical review
- ☐ High ICCC count
- ☐ Feet condition
- ☐ Other (eg Biomodulation)
- ☐ Agisting
- ☑ During lactation
- ☐ At drying
- ☑ During lactation
- ☐ Other

People

Do you employ milking staff?   ☑ No   ☐ Yes

How many?   3

How many operators are in the shed at each milking?   2

Is the herd ever milked three times a day?   ☑ No   ☐ Yes

Cows

	How many first calvers in the herd? (Approximately)	How many mature cows in the herd? (Approximately)	Total
This year	112	278	~400
Last year	93	207	~300

Have any cows in your milking herd been introduced from external sources in the last 3 years?   ☐ No   ☑ Yes

If yes, please describe:

Date	Source	No. maiden heifers	No. cows	Total
Oct 00	Yards-T	—	✓	19
Sep 98	Jack H.	✓	—	8

Have you milked cows belonging to other herds in your dairy in the last 3 years?   ☐ No   ☑ Yes

If yes, when... Nov 00   3 weeks ago

Note any features about staffing issues and milking routine consistency that may impact on mastitis
Reluctance of employed staff to implement change

Is the age structure or replacement rate of the herd likely to impact on the level of mastitis or the herd and the management options?

What is the risk of introducing mastitis bacteria with cows from other herds?

What purchasing protocol are used in entry/exit against mastitis?

Date... 22/10/02

Client... Feelgood

[Business name]

Countdown
Downunder

B1 Farm Profile
Feb 2003

Available information – organise access to existing reports

Factory supplied......... MG

QA program .... MG Milkcare

The farm's regular vet......... Mike Mcarth

The farm's regular tech......... John Clarke

Other consultants......... No

Client details

Contact person......... Felix Feelgood

Phone.........

Role on farm......... Owner

Postal address.........

Clients description of the problem......... Elevated BMCC over last 5 years

BMCC

For   ☑ This season   ☐ Last season
From   ☑ Factory   ☐ Milk secretariat   ☐ Farm computer

BMCC tables attached

ICCC

☑ No   ☐ Yes   = tick when copy received

Available electronically?   ☐ From herd test centre   ☐ From farm computer

Herd test organisation

Date of last herd test......... Spot test last year

No. tests per year.........

Milk cultures   ☐ No   ☑ Yes   = tick when copy received

Number of samples......... 24

Collected when......... 21/10/02   13/11/02

Collected by......... O.A. and A.K.

AMMTA tests   ☐ No   ☑ Yes   = tick when copy received

Date of last machine test......... 21/10/02

Tested by (tech and co.)......... B.L. (Warrngul Co-op)

Clinical case records   ☑ No   ☐ Yes

Are they   ☐ Stored permanently   ☐ Kept temporarily

How far back do they go?.........

About the farm

Herd size......... ~400

Herd manager.........

Number of milking staff......... 5

Shed
- ☑ Herringbone – swing-over
- ☐ Herringbone – double-up
- ☐ Rotary
- ☐ Other

Plant
- ☑ Mixed brands
- ☐ Single brand
- Brand.........

No. units......... 40

Calving pattern
- ☐ Year round
- ☐ Split
- ☑ Seasonal

Sara (mth).........

Date.........22/10/02

Client......... Feelgood

Technote 13

page 20

Countdown Downunder

[Business name]

B4 Farm Profile
Feb 2003

Drying-off management

On average, how many litres were cows producing at the time of drying-off? _5-10_

Were the majority of cows in the herd likely to be producing between 5 and 12 L at drying-off?

Did you take any steps to control the level of production? ☐ No ☑ Yes

If yes, what approach was used?
☑ Change in milking frequency... _once_
☐ Change in routine.......
☐ Change in diet......
☐ Other...

Was the method used to dry off cows consistent with the Farm Guideline?

Did you use Dry Cow Treatment at the end of last lactation? ☐ No ☑ Yes

If yes, which cows were treated?
☑ All the milking herd (blanket)
☐ Selected cows

What product(s) were used?
Cepravin DC
(Dravirasta
selective)

☐ ICCC
☐ Clinical cases
☐ Other...

How many cows were dried off in each batch? _Stanela 30 Ra-sep 3-80_

What was the maximum number of cows dried off in any batch? _80_

How many people were involved in doing the DCT at each batch? _3_

How were the teats scarified? _Teat wipes_

Do the DCT records show:
☐ Cow ID
☐ Treatment date
☐ Product used

✱ _No records_

Good dry cow records are essential for managing milk quality at calving.

Were teats sprayed or dipped after treatment? ☑ No ☐ Yes

Were there any cases of clinical mastitis after drying-off? ☑ No ☐ Yes _Rot in Paddock_

Clinical cases after drying-off reflect the overall drying-off management from preparing the cow, techniques used to administer antibiotic, to hygiene post drying off

How were cows managed after drying-off? _dried bags dairy and checked daily_
when dried .

Date... _2/1/0_

Client... _Feelgood..._

Countdown Downunder

[Business name]

B3 Farm Profile
Feb 2003

Shed and equipment

Have there been any recent changes to the shed? ☐ No ☑ Yes

If yes, what... _Extended in 2000 (16→40 units)_

Check for any obvious faults relating to the shed plant and equipment that should be followed up

What type of liners are in the shells? _Dairy Master #14_

When were they last changed? _At Install (1/6/02)_

When are they due for changing next? _Currently changed every 12 months_

Udders at calving

How many heifers or cows had udder oedema (flag) at last calving? _?_

How many halfers or cows had tight udders that dripped milk? _?_

*Estimate how many cow milkings the liners will do:
– Herd size × No. milkings/day × No. days*

Tight udders dripping before, or risking many heifers at risk of new infection. Consider when choosing the dry cow strategy

Clinical cases

Do the clinical case records show:
☐ Cow ID
☐ Date
☑ Quarter treated
☐ Product used
☐ Result / outcome

✱ _No clinical records kept_

Are the calving dates recorded and available? ☑ No ☐ Yes

How many clinical cases have you had this season / year? _~100 cases ~50 animals_

How many cases were in heifers? _6-5_

How many cases occurred within 14 days of calving? _Most_

How many cases required a second course of treatment? _Most_

Use all the information in the clinical case section to assess the adequacy of the treatment protocol

A high number of cases in heifers is indication of new infection

*Calculation of rates from data:
At calving............. cases / 100 cows
During lactation........... cases / 100 cows
Compare the clinical case rate with the warning levels in Farm Guideline 13*

Culling for mastitis

Do you ever cull clinical cases of mastitis? ☐ No ☑ Yes

If yes, how do you decide which ones go? _After 3 clinical cases_

Do you use ICCC to decide which cows to cull? ☑ No ☐ Yes

If yes, how?

Compare with the culling recommendations in Farm Guideline 15. Warning bells should ring if somatone is culling high ICCC cows to control DMCC.

Date... _2/1/0_

Client... _Feelgood._

Countdown Downunder

[Business name]

B5 Farm Profile

Feb 2001

If an inspection of the feed pad or calving pad could be beneficial, schedule it in your diary for the appropriate time of year.

Environment

Are there areas around the farm that are likely to make udders muddy prior to milking?

	No	Yes
Laneways	☑	☐
Gateways	☑	☐
Areas around troughs	☑	☐
Entrance to the dairy	☐	☑
Exit from the dairy	☐	☑

Where do cows calve?
- ☐ Calving pad
- ☑ Paddock
- ☐ Other

Do you have a feed pad? ☑ No ☐ Yes

Are there any other points you would like to discuss about the problem?

- Muddy area at back of yard
- Dirty yard, wet Aug-Sept!
- Pulsators → vacuum speeds — Why?
- Repeat cases of mastitis — Why?
- High BMCC over number years.

→ In the last 9 days there have been 33 cows with clinical mastitis.

Day	Quality Test	Result
01-Jul	BMCC	359,000
11-Jul	BMCC	407,000
22-Jul	BMCC	433,000
02-Aug	BMCC	414,000
12-Aug	BMCC	420,000
23-Aug	BMCC	412,000
03-Sep	BMCC	435,000
16-Sep	BMCC	381,000
27-Sep	BMCC	398,000
07-Oct	BMCC	461,000

Date... 22/10

Client... Fred Speat

C Milk Cultures
Feb 2003 Technote 4 page 5

[Business name]

Countdown Downunder

	Cow ID	Age	Calving Date	Sample Date	Sample Type	Comments/ Sampling reason	ICOC Last Count	ICOC Peak last lactation	Results
1	948			22/10		Clinical cases			no growth
2	892			"		presented by farmer			S. aureus
3	C82			"		Sampled by			S. aureus
4	832			"		vet and F.O.			S. aureus
5	B41			"					S. aureus
6	D36 FR			"					S. aureus
7	C27 FR			"					no growth
8	945 RR			"					S. aureus
9	945 FL			"					S. aureus
10	754			"					S. aureus
11	C65 B			"					S. aureus
12	887 FL			"					S. aureus
13	BL			"					S. aureus
14	135 FR			5/11		Clinical case			S. aureus
15	135 FL			5/11		taken by farmer			S. aureus
16	106			14/11					Mixed skin
17	921			"					S. aureus
18	743			"		Clinical cases			S. aureus
19	A14			"		presented by farmer			no growth
20	622			"		sampled by vet			S. aureus
21	C76			"					S. aureus
22	105			"					S. aureus
23	A45			"					S. aureus
24	HH			"					mixed skin
25									

This batch of samples

Who took these samples ....

Dates submitted for culture ..23/10.. ..15/11..

Lab submitted to ..Gribbles..

The samples are ☐ Fresh ☑ Frozen

Sampling Reason (if mixed, then mark reason for individual cows in column)

☐ High cell count ....

☑ Clinical cases ..picked out by farmer..

☐ Other ....

Who selected cows ..farmer..

Sample Type (identify quarter in column)

☐ Composite samples

☑ Individual quarter samples

☐ Individual quarters after RMT or conductivity test

Results

Number of samples: 24

Staph aureus ..19.. Cocci ....

Strep uberis .... CNS ....

Strep ag .... Other ....

Strep dyst .... Mixed ..2..

E.coli .... Contaminated ....

Number of samples with no growth ..3..

Number with interpretable results ..19..

Date ..20/11.. Client ..Feelgood..

D Individual Cow Cell Counts
Feb 2003 Technote 12, 23

[Business name]

Countdown Downunder

NOT HERD TESTING!

Comparison of mastitis prevalence in different groups of cows

Group	No. cows with any cell count above 250	Total No. cows in group	Percent above 250
1st lactation heifers			
Mature cows			

Is any particular group of cows affected (eg different ages, stages of lactation or management groups)

Use the summary on the main never herd test to identify cows which have had any cell counts above 250,000 cells/ml

Estimating the rate of new infections in first lactation heifers

Herd Test Date	No. heifers with any cell count above 250	No. of heifers tested	Percent above 250

This percent of heifers that have had a cell count above 250 is an indicator of the new infection rate in the herd

Suspect a problem if more than 20% of heifers are infected by the end of their first lactation

Warning: in seasonal herds if percentage increases by more than 1% per calendar month

(Interpret with care when there are less than 40 heifers tested)

The number of persistent infections

No. cows with any cell count above 250	No. that ALSO had a cell count above 250 last lactation	Percent

Date ....

Client ....

MILKING MACHINE TEST REPORT FORM

AUSTRALIAN
MILKING MACHINE
TRADE ASSOCIATION
ABN 86 957 370 822

G Milking Routines, Teat Cup Slips
Feb 2003

Technote 5   Technote 6 pages 6-7

[Business name]

Countdown
Downunder

Don't wait for vacuum release before pulling cups off

Names of milking staff
Felix, Peter, Les

Others not present today ....

Cows usually enter the shed
- ☐ On their own
- ☐ With help   ☐ Backing gate
  - ☐ Dog
  - ☑ Operator
  - ☑ Poly-pipe

Comment ....

Most teats are clean and dry as cows enter the shed
- ☐ No   ☑ Yes *Today*

Teats are washed
- ☐ No   ☑ Yes

If yes, are they:
- ☑ Washed only if muddy   *Very*
- ☐ Washed as part of shed routine

how .... *Hose*

There are sufficient functional hoses to enable adequate washing
- ☐ No   ☑ Yes

If washed, teats are dried ☑ No ☐ Yes

If yes, how? ....

Pre-milking teat disinfection is used
- ☑ No   ☐ Yes

Comments ....

The contamination of teat ends was checked with a damp teat wipe immediately before cups on
- ☑ No   ☐ Yes

If yes, result ....

Everyone wears clean gloves at milking
- ☐ No   ☐ Yes   ☑ *Some do*

Cups are put on when the teats are plump with milk
- ☐ No   ☐ Yes   ☑ *Sometimes*

The cluster is weighed down (by hand or brick) to finish milking...
- ☐ Never   ☑ Some times   ☐ Most cows

At cups off, the vacuum is released by...
- ☑ Kinking long milk tubes or using snap clips
- ☐ Pulling the button
- ☐ Automatic Cup Removers
- ☐ Other ....

After vacuum is released...
- ☐ Most cups drop away in 2-3 secs without help
- ☐ Some need assistance to get the cups off
- ☐ Most cups hang for 4-5 seconds or longer
- ☐ Removal by ACR's is satisfactory

Effectiveness of teat disinfectant coverage was assessed by:
- ☑ Visual inspection
- ☑ Towel test
- ☐ Spray pattern

Comments *Inadequate - especially on front teats. Some cows missed*

Any recent changes?
Has anything about the milking routine changed in the last 6 months?
....
....

Any staff changes in the last 6 months?
....
....

Other comments / observations
....
....

Mark teat cup slips here
HHH 11

Number of cup slips recorded   7
Number per 100 cows   1.8

How do you (the adviser) rate the ...
consistency of the milking routine in this shed
understanding of the protocol for various activities by all staff

The opportunity for spread of mastitis in this shed through...
physical transfer is...
impacts is...

Date *4/11*
Client *Feelgood*

H Clinical Cases
Feb 2003

Technotes 4, 10

[Business name]

Countdown
Downunder

Detection

Practices routinely used by milkers to detect clinical mastitis are...
- ☑ Visual inspection of the udder
- ☐ Palpation of suspect quarters
- ☐ Stripping of suspect quarters
- ☑ Regular stripping of fresh cows
- ☑ Routine stripping of the whole herd
- ☑ Frequent inspection of filter socks
- ☑ Other *BMCC*

Clinical cases are usually detected at...
- ☐ Cups on
- ☑ Cups off   *(7/10)*

All workers know the protocol used to identify clinical cases for treatment in this herd
- ☐ No   ☑ Yes   ☐ Don't know

In your opinion (as the adviser), clinical cases are likely to be...
- ☑ Missed   ☐ Usually detected   ☑ Over-diagnosed

Milk samples are collected from clinical cases prior to treatment
- ☐ All   ☐ Some   ☑ None

Treatment

The treatment routine for clinical cases includes...

fully stripping quarters out before infusing antibiotic   ☐ No ☑ Yes
milking quarters out fully at every milking   ☐ No ☑ Yes
sterilising teat ends   ☐ No ☐ Yes
hygienic infusion technique   ☐ No ☐ Yes ?
post-treatment teat disinfection   ☑ No ☐ Yes

The treatment protocol includes...
A full course of treatment   ☐ No ☑ Yes

Products used
1) *Orbenin LC*
2) ....
3) ....
4) ....

comments on selection
....

comments on effectiveness
Working well - happy

Identification / Hygiene

Cows with clinical mastitis are identified by...
- ☐ Leg bands
- ☐ Tail bands
- ☑ Spray paint
- ☑ ID written on whiteboard   *Sometimes*
- ☐ ID written in diary
- ☐ Other ....

Every milker, including relief staff, is familiar with the system used to mark treated cows
- ☐ No   ☑ Yes   ☐ Don't know

Clinical cases are...
- ☑ Milked last   *if large numbers*
- ☑ Milked into a test bucket   *if 2-3*
- ☐ Other ....

If a test bucket is used...
- ☐ it has a separate cluster
- ☑ the cluster is adequately washed between cows   ?

In your opinion (as the adviser), the opportunity for spread of mastitis from clinical cases in this herd is...
- ☐ Low   ☐ Medium   ☑ High

Date *4/11*
Client *Feelgood*

Teat Condition
Technote 9

Feb 2003

PAGE 2 OF 2

[Business name]

Countdown Downunder

Cow ID	Skin condition Normal, Dry Lesions, Haemorrhages (FL FR BR BL)				Colour Normal, Pigmented Red, Blue (FL FR BR BL)				Swelling at base Normal Swollen (FL FR BR BL)				Teat end firmness Normal Firm (FL FR BR BL)				Orifice openness Closed Open (FL FR BR BL)				Teat end No ring, Smooth Rough, Very rough (FL FR BR BL)			
1							(R)	(R)															R	R
2 Warts	D	D	D⃝	D																				R
3	D	D	D⃝																					
4 Warts			D⃝																				R	R
5					P	P															R	R		
6																								
7						P	P	P									O	O						
8																								
9	D	D	D	D																	R	R		
10																					R	R		
11							P																	
12																								
13 Warts			L⃝		P	P	P																	
14	D	D	D	D⃝																				
15																					R	R		
16 Warts			L⃝																					
17																								
18						P							F	F	F	F							R	R
19																								
20																					R	R	R	
21															F	F								
22																								
23															F	F							R	V
24	D	D	D	D																				R
25																					√			

Lesions (%) ≈ 4% Haem (%) ≈ 0%
Red or Blue (%) 2/180 < 1%
Swollen (%) ≈ 2% Firm (%) = 15% Open (%) ≈ 2%
Rough (%) ≈ 28% Very rough (%) ≈ 2%

Date 4/11   Client Feelgood

← Identify quarters Left, Right, Front, Back at the top of columns

If an observation is missed place a cross (X) in the table

If you leave 'normal' findings as blanks in the table, tick here ☑

J — Cow Behaviour
Technote 6 page 4

Milking Time per Cow
Technote 6 page 5

[Business name]

Countdown Downunder

Cow ID	Count Kicks and Steps involving the rear legs			
	In stall waiting to be milked	At preparation / cluster attachment	In first 1 mins of milking	In last 2 mins of milking
1	II	III		
2	THI	III I		
3			NII	
4			THI III	THI II
5		I	II	4II
6	I			
7				I
8				I
9				I
10		III		III
11				
12				
13				
14				I
15			II	
16				I
17				
18				
19				
20	I		III	
21	I		II	4III
22			III	THI I
23				I
24				
25				
Total no. cows	5	4	6	13
Cows having a Ki/St response	21.7 %	17.4 %	26.1 %	56.5 %

Cow ID		Clock time (00:00)				Milking time per cow (mins)		
		1. At cups on	2. True flow starts	3. Flow ends	4. At cups off	Delayed flow (1-8)	Flow time (3-2)	Over milking time (4-3)
1		0	19	4.50	5.20	0.19	4.31	0.30
2		0	19	6.00	6.30	0.19	4.31	1.40
3		0	58	5.15	8.00	0.58	4.17	2.45
4		9	14	4.03	8.11	0.05	3.49	4.08
5		0	7	12.50	13.05	0.07	12.43	0.15
6		0	3	5.45	7.00	0.03	5.42	1.15
7	3 THI	20	34	5.00	7.00	0.14	4.26	2.00
8		1.08	2.37	5.50	7.00	1.29	3.13	1.10
9		2.13	2.20	9.00	9.00	0.07	6.40	0
10	3 THI	0	15	7.00	7.29	0.15	6.45	0.29
11		25	40	3.15	7.41	0.15	2.35	4.26
12		49	50	5.30	8.10	0.01	4.40	2.40
13		1.00	1.22	3.33	7.51	0.22	2.11	4.18
14		0	1	3.50	13.51	0.01	3.49	10.01
15		12	13	3.14	14.05	0.01	3.01	10.51
16		29	40	4.11	14.16	0.11	3.31	10.05
17		0	18	3.35	9.05	0.18	3.17	5.30
18		18	25	3.38	5.29	0.07	3.13	1.51
19		33	50	4.31	9.20	0.17	3.41	4.49
20		12.08	12.25	17.14	17.14	0.17	4.49	0
21		0	50	4.00	12.18	0.50	3.10	8.18
22		16	20	4.00	12.31	0.04	3.40	8.31
23		22	35	6.16	12.38	0.13	5.41	6.22
24								
25								

Proportion of cows with delayed let-down (>20 seconds)	26 %
Average milk flow time per cow	4.3 mins
Average duration of over milking	4 mins

Date 4/11   Client Feelgood

K — Completeness of Milking
Technote 6 page 6

Cluster Alignment

[Business name]

Countdown Downunder

Cow ID	Strip yields per quarter (mL) L: less than 50 mL, M 50-100 mL, Hi more than 100mL			
Identify quarters →	FL	BL	FR	BR
1	L	L	L	H
2	H	L	M	L
3	H	H	H	H
4	M	H	H	M
5	H	L	L	H
6	L	L	M	H
7	M			
8	L			
9	L	L	L	L
10	L	L	L	L
11	M	L	L	L
12	L	L	M	M
13	L	L	L	L
14	M	L	L	L
15	L	L	H	L
16	H	M	H	L
17				
18				
19				
20				
21				
22				
23				
24				
25				
No. quarters	16	14	15	14
Quarters yielding more than 100 mL (as a fraction)	4/16	2/14	4/15	3/14
Percent of all quarters		22 %		

Cluster alignment

Do clusters hang squarely on nearly all udders? ☑ No ☐ Yes

If no, do clusters appear to be:
☑ Twisted ☑ Because of long milk tube positioning relative to udders
☑ Because the long milk tubes and pulse tubes are twisted
☐ Pulling or dragging on the udder
☐ Because the long milk tubes are too long or too short
☐ Because the stainless steel droppers are too long
☐ Due to the lack of easy adjustment for udders of different heights
☐ Due to incorrect positioning of milkline inlets or Automatic Cup Removers

Estimated Teat size and shape (based on visual assessment only)

Teat size in the herd is:	In length, the teats tend to be:	In width, the teats tend to be:	In shape, teat ends tend to be:
☐ Highly consistent	☐ Short	☐ Narrow	☑ Rounded
☐ In-between	☑ Average	☑ Average	☐ Pointed
☐ Very variable	☐ Long	☐ Wide	☐ Square-ended
		☐ Funnel-shaped	

Date 4/11
Client Feelgood

L Teat Disinfectant
Technote 7

Feb 2003

[Business name]

Countdown Downunder

The stock product (as purchased)

Brand name _Uddersan_   Volume _20L_

Purchase date _14/10_   NRA approved! ☐ No ☑ Yes

Product type ☑ Concentrate to mix with water ☐ Ready-to-use

The active ☑ Iodine _20_ gm/L
☐ Chlorhexidine _____ gm/L
☐ Other
_____ gm/L

Contains emollient? ☐ No ☑ Yes If yes, concentration _100g/L_

Storage on farm

Product stored out of direct sunlight? ☐ No ☑ Yes

Product container is sealed at all times? ☐ No ☑ Yes

comments _In vat room in dairy_

Product expiry date _4 Sept 2004_

Application

Applied by ☑ Spray   For ☑ Whole season
☐ Dip   ☐ Part season

If spray, the delivery method is by..... ☑ Hand held trigger bottle ☐ In-line wands
☐ Portable pressure system ☐ Automated

The spray nozzle delivers a stream ☐ Angled ☐ Vertically ☑ Horizontally

Volume of prepared teat disinfectant used per cow:

$$\frac{\text{Volume used per milking } 4600 \text{ mL}}{\text{No. cows milked } 380} = 10 \text{ mL/cow}$$

Mixing - do not complete the unboxed area if using a Ready-to-use product

Teat disinfection mix (as applied)

Quantity mixed in each batch _1_ litres

The mix

Concentrate _1/3_ litres

Water _2/3_ litres

Added emollient _N/a_ litres
(name) _____

Calculated active in mix _0.66_ %

If available, tested active _____ %

Calculated emollient in mix _____ %

The water used

Source: ☐ Tank ☐ Spring
☐ Town ☐ River
☑ Bore ☐ Channel or dam
☐ Other

Via hot water service! ☑ No ☑ Yes

Treated with any chemicals? _no_

Water been tested? ☐ No ☑ Yes

If available, tested hardness _310_ ppm

tested alkalinity _240_ ppm

The routine

Who mixes the solution? _Felix or Les_

Are components measured accurately! ☑ No ☐ Yes
by eye

How often is the mix made? _every milking_

Do the containers keep the prepared mix clean? ☐ No ☑ Yes

Any recent changes?

Has anything changed in the last 6 months!
(product type, application, mixing, operators...)

Any other comments _2 x 1L bottles mixed at start of milking and refilled during milking_

Date _4/11/02_

Client _Feelgood_

M The Environment
Technote 1 pages 6 - 8
Technote 27

Feb 2001

[Business name]

Countdown Downunder

Calving area checklist

The calving areas were inspected
☑ No ☐ Yes Date _____

Cows have the opportunity to calve in clean and well-drained areas
☐ No ☐ Yes ☑ Don't know

The calving area does get overcrowded
☐ Regularly ☐ Sometimes ☐ Never

When answering this, consider:
☐ The size of the area _____ ha
☐ The maximum number of cows calving on any one day _____ cows
☐ The length of time that the cows tend to stay in the calving area _____ days
☐ Whether cows tend to concentrate in certain spots (feed points, camps etc)
☐ Any special strategies used to manage the calving area _____

Heifers calve in the same areas as the cows
☐ Usually ☐ Sometimes ☐ Never

Yards, lanes and waterways

Yards and lanes were inspected
☐ No ☑ Yes Date _4/11_

When cows come into the milking area
☑ Most udders are clean and dry
☐ Many need pre-milking preparation

Laneways or gateways are likely to be contributing to udder soiling
☐ No ☑ Yes ☐ Don't know
around entrance and exit to yard

Cows can enter dams, channels or other waterways
☐ No ☐ Yes ☑ Don't know

Cows use parking bays before or after milking
☐ No ☑ Yes _immediately before entrance to yard_

Sprinklers are used to keep cows cool in hot weather
☐ Sometimes ☑ Never

The feed pad

Is a feed pad used?
☑ No ☐ Yes

If yes
It has been inspected
☐ No ☐ Yes Date _____

The pad is used:
☐ Routinely after milking
☐ Seasonally
☐ At calving
☐ Part of the year
☐ Other _____
☐ Other _____

The pad is used by:
☐ Cows only
☐ Heifers only
☐ Heifers and cows
☐ Other (eg those at risk of milk fever)

How deep and liquid is the surface of the pad?
_____
☐ Cows' udders are likely to get soiled
☐ Cows stay relatively clean

Draw maps or diagrams wherever appropriate

Date _4/11/02_

Client _Feelgood_

Confidence – High

A clear written report is less likely to be misinterpreted by the farmer and other professional advisers, and more likely to be implemented correctly.

Research priority – Moderate

A better understanding of how advisers can package and deliver their services in a way that encourages farmers to adopt the recommendations and implement change on their farms is needed.

It is increasingly incumbent on professionals to document their work carefully. Most advisory services document recommendations and actions taken during client interactions as standard practice. Written records are invaluable to help resolve problems and disputes.

13.2 Record problems and actions taken.

The aim is to develop a workable plan for the farm: formulate the plan with the on-farm team, write a clear report, ensure the required activities are detailed on a wall chart or some other visible checklist, and schedule follow-up.

To increase the likelihood of your recommendations being adopted, it is important that clients see the suggested changes as relevant, offering real rewards (preferably financial), and not too complex for the available resources (Gardner 1990). A plan that they build themselves, with guidance from an adviser, is more likely to be workable and implemented.

Providing a clear written report

The Investigation Master Sheet in the Countdown Downunder Mastitis Investigation Pack is used by the advisory team to collate and prioritise findings and re-define the problem until solutions can be recommended. More steps are then needed to convert the findings of the investigation into do-able steps to promote implementation on farms. This process is usually achieved through written reports to the owner/manager and through meetings of the farm staff and adviser(s) where the team members develop an approach suitable for their herd and allocate appropriate resources.

Clear written reports provide a permanent record of the problems and recommendations for the owner and are more likely to be implemented correctly. They may form the basis of discussion at future visits and are necessary when other professionals advise the farmer. Reports should contain:
- The specific objectives of the original visit.
- The salient points of the investigation.
- The agreed list of what must be done, by when, and who is responsible.
- Arrangements for follow-up.

Because excessive detail buries important points, a short (preferably single page) report is recommended. Report writing doesn't have to be an onerous task. Time invested in setting-up a customised template (e.g. on word processing software) will help to structure and simplify the process. As an example, the advisory team's first report to Felix Feelgood (following the mastitis investigation on his farm) is shown on the next page.

It is important to encourage the owner and staff to record relevant information as they implement the plan. To avoid the need to keep extra records it may be possible to incorporate some of this within the Quality Assurance records on the farm.

Following-up

The report must indicate what areas need to be tackled after the immediate changes have been made in order to maintain progress. Specifically, it needs to clearly state what the tasks ahead are, when they should be discussed in more detail, and who should be involved.

Key papers

Gardner I. Reporting disease outbreaks. In: Post Graduate Foundation in Veterinary Science Proceedings 144, Epidemiology at work, University of Sydney, 1990:29-42.

Report of a mastitis investigation for Felix Feelgood

20 November 2002

Dear Felix,

Report of Mastitis Investigation conducted in October / November 2002

Thank you for the opportunity to conduct a mastitis investigation in your herd.

The problem

Your herd has had a high BMCC (usually between 300,000 – 600,000) for the last five years and many clinical cows are repeatedly infected despite your best attempts at treatment.

Our investigation

Our understanding of the mastitis and milk quality problem in your herd is based on information provided by you and observations made on the farm between 22 October and 14 November. Our technical findings and interpretation are summarised in a Mastitis Investigation Pack that will be kept on file at .... vet clinic for future reference.

Milk cultures confirmed that the problem in your herd is caused by the bacteria Staph aureus. This infection can spread to uninfected cows at milking – see pages 3, 27 and 37 of the Countdown Farm Guidelines. Many cows with chronic Staph aureus infections cannot be cured by antibiotics – page 58 of the Farm Guidelines explains the value of culling these cows from the herd.

Major factors contributing to the problem in your herd

Factors promoting spread of infection between cows in your herd that are of special concern to us are:

* those that reduce teat health in the herd - badly functioning pulsators, old or worn liners, and over milking;

* those that increase the number of Staph aureus at teat ends - inadequate teat disinfection, not wearing gloves especially when dealing with suspect clinical cases, poor cup removal technique (forcing bacteria into the teat canal beyond the reach of teat disinfectant) and retaining chronically infected cows in the herd.

Our action plan

Many of the immediate actions relate to changes in the milking shed as discussed and agreed to by the farm team at the meeting yesterday. These are summarised below:

Farm Guideline	What to change	Who's involved	By When	Done
6.1 (page 33)	Install new pulsators and correct cluster alignment	John Clarke	Immediately	
6.3 (pages 35-36)	Change liners every 2,500 milkings	Felix	Immediately	
As per Milkcare	Start keeping a permanent written clinical case record	Felix	Immediately	
Fact Sheet G (pages 103-104)	Prepare 20 mL of teat disinfectant per cow for each milking, measuring the quantities of Uddersan and water	Felix, Les	Immediately	
4 (pages 20-24)	Only treat cows when changes in milk persist for more than 3 squirts (wear gloves!)	All milking staff	Immediately	
5.7 and 5.8 (page 30)	Reduce over milking and change the cups off technique	All milking staff	Within one week	
7.6 (page 39)	Ensure all teats are adequately covered with teat disinfectant at each milking	All milking staff	Within one week	
5.2 (page 27)	Foremilk strip ALL cows when there are clots on the filter or a sharp rise in BMCC (wear gloves!)	All milking staff	As appropriate	

It was great to see how the milking staff (especially Peter and Les) picked up on why some changes were required to the current routine and what could be done in your shed. However, it is important to keep in mind that we will only start to see benefits once the chronically infected cows are removed from the herd. In early January, we need to spend about half a day assessing the herd and generating a culling list.

At the next farm meeting, scheduled on 11 February, we will check that progress is on track, consider some of the longer term changes that are required (including a dry cow strategy for the herd and the benefits of milk recording), and update the action plan accordingly. Please feel free to contact us if you have any further inquiries before then.

Regards,

Your advisory team