Dairy Australia

Countdown

Your Levy at Work

Countdown

Farm guidelines for mastitis control

Contributions (first edition):
Pauline Brightling
Graeme Mein
Jakob Malmo
Diane Ryan

Contributions (second edition):
Rod Dyson
Mark Humphris
Jakob Malmo
Graeme Mein
Rob Moyle
Erika Oakes
John Penry
Zoe Vogels
Peter Younis

Photo Acknowledgements:
Jakob Malmo
John Penry

Publisher:
Dairy Australia Limited

ISBN 978-0-9924204-1-3

Countdown enquiries:

Dairy Australia
T: +613 9694 3777
E: enquiries@dairyaustralia.com.au
Level 3, HWT Tower
40 City Road, Southbank VIC 3006

The information and guidelines set out in this publication were originally compiled and developed by the Australian Mastitis Advisory Council, an unincorporated association funded by the Dairy Research and Development Corporation (an organisation that preceded Dairy Australia).

The editing team for the second Edition would like to acknowledge the contributions to this publication from Dairy New Zealand's SmartSAMM program and Animal Health Ireland's Cell Check program under their individual MOUs with Dairy Australia.

Dairy Australia
Countdown
Your Levy at Work

Countdown

Farm guidelines for mastitis control

Foreword 1998

Pat Rowley CMG
Chairman
Australian Dairy Industry Council

Milk quality is an essential element of the Australian dairy industry's competitive edge. The industry aims for a 'clean, green and healthy' image for milk, and udder health is a key component.

The European Union now requires milk and milk products for human consumption to have a cell count of less than 400 000 cells/mL and this sets an international benchmark for all dairy exports. Cell count status may be a significant factor in limiting access to some export markets.

Mastitis is also important because clinical and subclinical mastitis reduce milk production and farmers lose when they have to treat clinical cases, or cull cows because of mastitis, and face additional labour and effort to prevent antibiotic residue problems.

The Australian Mastitis Advisory Council (AMAC) is made up of representatives of dairy farmer and processor peak bodies (Australian Dairy Farmers' Federation [ADFF] and Australian Dairy Products Federation [ADPF]) and of farm adviser professions and industry groups who have an interest in udder health. DRDC has provided most of its financial support. AMAC has been endorsed by ADIC as the industry forum for issues concerning mastitis and related milk quality.

AMAC has initiated a program called Countdown to help farmers and their advisers achieve profitable mastitis control.

This book is the first publication from Countdown. It contains the set of farm guidelines for udder health control which promotes best practice using currently available information. To maximise benefits to farmers, reduction of milk cell counts, clinical cases and culling are all addressed.

The Technical Group of AMAC (Pauline Brightling, Graeme Mein, Jakob Malmo and Diane Ryan) drafted the recommendations and edited comments from more than 50 veterinarians, other advisers and farmers throughout Australia. The result is an example of maximising resources from research and the practical aspects of farmers' experiences.

I recommend we all use 'Countdown: Farm Guidelines for Mastitis Control' for Australian dairy farmers' to guide the udder health activities and keep the count down, and the profit up, on our farms.

Pat Rowley CMG
Chairman
Australian Dairy Industry Council

Foreword 2013

The Australian dairy industry has a strong commitment to produce high quality products that are nutritious and safe. Consumers world-wide are demanding greater levels of transparency around food production and the on-farm management of mastitis, milk quality and animal welfare are key components that ensure the competitiveness of Australian dairy in the marketplace.

Australia's Countdown Downunder Farm Guidelines for Mastitis Control were first published in 1998. The publication encompassed all of the evidence-based best practice for mastitis control available at the time and has been widely used by farmers and advisors. Around 11,000 copies of the original publication have been circulated.

The guidelines have been an essential resource helping farmers improve their bottom line by reducing new mastitis infections and lowering bulk milk cell counts in their herds. This in turn has beneficial effects for cow welfare.

The second edition of the guidelines have been updated to include new evidence-based science and to support both the 'Cups on, cups off' farmer training course and the recently released Countdown Mastitis Toolkit App for smartphones.

The new guidelines also incorporate relevant information from both the Dairy NZ SmartSAMM program and the Animal Health Ireland Cell Check program. Both programs utilised the Countdown resources towards their own development in recent years.

Countdown 2020 is the dairy industry's flagship program to help farmers and their advisors achieve profitable mastitis control. This program acknowledges the support of the Australian Milk Quality Steering Group which represents the community of interest in milk quality through the Dairy Moving Forward Framework.

We hope these guidelines provide you with all of the information you need to enhance udder health on your farm making milk harvesting more efficient, increasing your profits and reducing costs.

Ian Halliday
Managing Director
Dairy Australia

Ian Halliday
Managing Director
Dairy Australia

Contents

What is Countdown 2020?

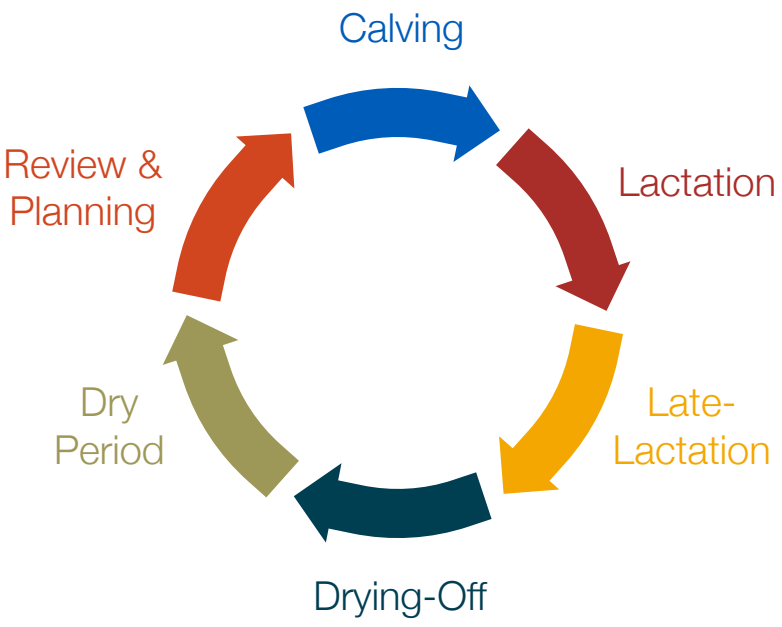
The information in this resource has been prepared for the Australian mastitis program Countdown 2020. This program is the national udder health program for the Australian dairy industry.

More than $150 million is lost to Australian dairy farmers each year through poor udder health. Mastitis is the major cause of this loss. Mastitis reduces milk yield and leads to poor quality milk. Together, these factors erode the milk income received by farmers. In addition, antibiotic therapy used to overcome udder disease adds to dairy farmers' costs and requires strict monitoring to prevent residues entering the milk.

The Countdown plan consists of a set of recommendations to assist dairy farmers with profitable control of mastitis.

- **What has to be done.**
- **Why it should be done.**
- **How to do it.**
- **How to check that it has been achieved.**

Each guideline also has a Technote which summarises the experimental and observational data that underpins it. The Technotes are presented in a separate manual designed especially for dairy service providers (including veterinarians, factory field officers, milk recording field personnel and milking machine technicians). They provide the rationale for the component of the plan, background information and bibliographic references for key research papers and articles for further reading.



What are Countdown's goals?

The dairy industry must have a clean and healthy image to meet the demands of national and international customers seeking better quality milk through verifiable milk quality standards.

Mastitis degrades milk quality and diminishes the dairy industry's ability to compete in international markets.

Countdown 2020 has a defined national goal which is based on an individual farm's annual average bulk milk cell count:

- **By 2017 at least 70% of Australian dairy farms supplying milk with an annual average Bulk Milk Cell Count (BMCC) of less than 250,000 cells/mL.**

Australian dairy farmers can make significant gains through improved udder health. Quality payment incentives exist in all states for milk with lower cell counts.

Further, healthier cows produce more milk. They are less likely to be lost through culling or to incur treatment costs. Fewer clinical cases of mastitis mean less frustration for farmers and a reduced risk of antibiotic contamination of milk products.

What is mastitis?

This section provides information about mastitis and defines various terms related to mastitis. Mastitis is inflammation of the mammary gland. In cows it is usually caused by bacteria which have entered the teat canal and moved to the udder. The bacteria multiply and cause a mastitis infection which results in an inflamed udder.

What are the types of mastitis?

The main types of mastitis are:

- Cow-associated (or contagious) mastitis.
- Environmental mastitis.

Bacteria which cause **cow-associated (or contagious) mastitis** mostly live inside udders or on teat skin. They are spread from infected cows.

Cow associated (or contagious) mastitis

Cow associated (or contagious) mastitis	
Habitat	Inside udders or on teat skin.
How spread	Contamination from infected milk.
When spread	Milking time.
Bacteria	*Staph aureus* *Strep agalactiae*
Comments	*Staph aureus* are a major cause of mastitis in Australia. They are difficult to cure, especially during lactation, so prevention is essential. *Strep agalactiae* are very sensitive to penicillin, so treatment has a relatively high cure rate.

The main bacteria causing contagious mastitis are **Staph aureus** and **Strep agalactiae**. Transmission of these bacteria between cows and quarters usually happens at milking time by contact with infected milk. This spread can occur from splashes or aerosols of milk during stripping, by milk on milkers' hands or teatcup liners, and by cross flow of milk between teatcups.

Staph aureus can invade udder tissue and live inside cells. They often form pockets of infection (microabscesses) that are protected from antibiotics by scar tissue.

The Strep agalactiae bacteria tend to locate in duct areas of the udder where antibiotics are effective. Strep agalactiae is very sensitive to penicillin, so there are relatively high cure rates.

Bacteria which cause **environmental mastitis** are widespread in a cow's surroundings – soil, manure, bedding, calving pads and water, or on body sites of the cow other than the mammary gland. Housed cows are generally at greater risk than grazing cows.

Environmental mastitis

The main bacteria are **Strep uberis** and **E. coli**. A number of bacteria like E. coli are often grouped together and called **coliforms**. These bacteria are not particularly well suited to life in the lactating udder and often the infections do not persist.

Coliforms

Most environmental mastitis cases are seen in the period immediately before, to a few weeks after, calving when cows are very susceptible to infection because their natural defence mechanisms are low.

High numbers of environmental mastitis bacteria may contaminate teats, especially if udders are wet and exposed to mud and manure. This often happens when cows and heifers are on the ground during calving.

Environmental mastitis	
Habitat	The cow's environment, eg manure, soil.
How spread	Contamination from infected environment; can be introduced with intra-mammary tubes if teat ends are not sterile when treatment occurs.
When spread	Mainly at drying-off and around calving time; most cases seen at calving or early lactation.
Bacteria	*Strep uberis, E. coli, coliforms, Pseudomonas.* Many others occur occasionally.
Comments	Often causes very severe or acute clinical mastitis. *Strep uberis* usually responds to treatment, but can be difficult to cure. *Coliforms* do much of their damage through toxins released after the bacteria die. Antibiotics may not be needed. Do not usually persist in lactating udders. *Pseudomonas* a virtually impossible to treat and cows that survive must be culled.

What are the forms of mastitis?

The forms and signs of mastitis vary, depending on the bacteria causing the infection and the immune response of the cow towards the bacteria.

Most cases of environmental mastitis are clinical (in all forms) but subclinical cases do occur too.

Cases of mastitis caused by **Staph aureus** can be seen in all the various forms of mastitis.

Strep agalactiae does not produce black (gangrenous) mastitis but can occur in all the other forms.

Staph aureus, refer page 3

Strep agalactiae, refer page 3

Forms of mastitis	Cow	Udder	Milk
Severe clinical mastitis	Extremely ill and depressed, may die.	May become gangrenous (black mastitis).	May initially look normal although the cow is obviously sick, but soon becomes abnormal, often watery and blood stained.
Acute clinical mastitis	May or may not be sick.	Hot, swollen and painful.	Abnormal and can be discoloured and contains clots and/or blood.
Clinical mastitis	No observable changes.	Shows little change.	Abnormalities are seen.
Mild clinical mastitis	No observable changes.	Shows no abnormalities.	A few clots or flakes occur.
Chronic mastitis	No observable changes.	Lumps may be felt.	Mild changes, such as wateriness.
Subclinical mastitis	No observable changes.	No observable changes.	No observable changes but significant changes in milk composition.

Why is mastitis control important?

National and international buyers of our milk products are demanding ever increasing standards. If Australian dairy farmers want to satisfy the buyers by producing the finest milk products, they must control mastitis.

A higher financial gain can be achieved from increased production, higher payment for quality milk, and reduced costs of treatment and culling.

Fewer clinical cases of mastitis means there is less frustration for farmers and less risk of antibiotic contamination of milk or meat products.

Cells in milk

When bacteria enter the udder, the cow responds by sending large numbers of white blood cells to the mammary gland and into the milk. The white blood cells surround and destroy bacteria. They are one of the most important defence mechanisms the cow has to fight udder infection. There are also a small number (about 2%) of cells shed into milk from the udder tissue. All these cells are from the cow's body – they are not bacterial cells.

Body cells

Body cells are sometimes called **somatic cells** (somatic means 'body'). The number of somatic cells does not increase after the milk leaves the cow, no matter how poor the filtration or cooling.

Somatic cells

Cell counts in cows with Strep agalactiae may be extremely high, and occasionally there are also enough bacteria shed in the milk to raise **Total Plate Counts** (or Bactoscan Counts). Total Plate Counts assess the number of bacteria in milk, not cells in milk.

Total Plate Counts

The concentration of all body cells in milk is called its **cell count**. Cells can be counted from individual cow samples and vat samples.

Cell count

A sample of milk taken from all four quarters of a cow shows the concentration of cow body cells. The sample is usually taken at a Milk Recording (Herd Testing) visit. It is referred to as an **Individual Cow Cell Count (ICCC)** or **Somatic Cell Count (SCC)**.

Individual Cow Cell Count (SCC)

Somatic Cell Count (ICCC)

The concentration of cells in milk varies throughout a milking, so the sample used to measure ICCC should be collected throughout the milking.

The concentration also varies between morning and evening milkings, especially with unequal milking intervals. Evening milkings are higher.

The ICCC is an indirect way of estimating the likelihood of subclinical mastitis in a cow. Uninfected cows generally have ICCC levels of below 150,000 cells/mL. If a cow has had any ICCC above 250,000 during a lactation (a peak of 250,000 or more) she is likely to still be infected at drying-off and require **Dry Cow Treatment**.

Dry Cow Treatment, refer page 8

Different infecting bacteria may cause different ICCC patterns. Subclinical cases of **Staph aureus** may have cell counts that rise and fall, showing an irregular pattern during lactation. ICCCs in cows with **Strep agalactiae** may be extremely high. Strep agalactiae infections are easier to treat than Staph aureus; so higher cell counts do not always indicate that cows are harder to treat satisfactorily.

Staph aureus, refer page 3

Strep agalactiae, refer page 3

Stress may increase ICCC levels in cows, but the greatest increases are seen in infected cows. Elevated ICCC levels which are not associated with infection may occur for up to 20 days after calving.

Elevated ICCC levels may also occur in late lactation when milk volume is low and cells are 'concentrated'. Cows producing less than 5 L/day are likely to have abnormal milk composition, including elevated cell count.

The concentration of cow body cells that occurs in milk from all cows going into the vat is called a **Bulk Milk Cell Count (BMCC)**. The BMCC is an indirect way of estimating the level of subclinical mastitis in the herd.

Bulk Milk Cell Count (BMCC)

As an approximate guide, each 100,000 cells/mL indicates about 10% of cows are infected. Vat samples for BMCC should be collected via the drip sample which is taken when the vat is being emptied. This ensures that the milk sample is well mixed.

A series of BMCCs should be assessed to see both the level and the trend for a herd. In herds with BMCCs below 200,000, a sudden increase (of 10% or more) may indicate that a clinical case has been missed.

Guides on BMCC levels	
Below 150,000 cells/mL	Excellent mastitis cell count control.
150,000 to 250,000	Good (below 250,000 is the level for premium payment in most dairy companies; some use 200,000).
250,000 to 400,000	Moderate mastitis and cell count control.
Above 400,000	Warning: This milk is not considered fit for human consumption by the European Union and may lead to significant export restrictions.

Colostrum

Colostrum (sometimes called 'beastings') is the thick, yellow, sticky secretion that is present in the udder prior to calving. It contains high levels of protein antibodies which form the basis of the calf's initial immunity.

After calving, colostrum is replaced by normal milk secretion, but some is still present for up to eight milkings, even though the milk looks relatively normal by then. This colostrum milk must not be put in the vat. Fresh cows should be kept in a 'colostrum mob' until eight milkings have passed. Induced cows may have colostrum present for longer, and should be in the colostrum mob for at least 10 milkings.

Dry Cow Treatment

Dry Cow Treatment (DCT) is a formulation of antibiotic prepared for administration into the udder immediately after the last milking of a lactation. It is designed to remain in the udder in concentrations high enough to kill mastitis bacteria for a period which depends on the product used (approximately between 20 and 70 days). The prolonged time of exposure to antibiotic and the formulation enhance penetration and give an increased chance of curing infections embedded deep in the udder.

DCT may also be useful in reducing the number of new infections which occur in the early part of the dry period, before the teat canals seal.

DCT may be used in all cows within a herd (called **Blanket Dry Cow Treatment**) or only in cows which have been selected as likely to be infected (called **Selective Dry Cow Treatment**). If Selective DCT is used, the most common way of selecting cows to treat is by analysis of their **Individual Cow Cell Counts** throughout the lactation.

These decisions are discussed in Guideline 14 – Decide dry cow mastitis strategy and Fact Sheet C – Guide to choice of Selective or Blanket DCT.

Export Slaughter Interval

An Export Slaughter Interval (ESI) is the period following treatment when cattle are unsuitable for processing for some export markets. A list of ESIs for veterinary chemicals can be found on the reverse side of the **National Vendor Declaration form**.

Blanket Dry Cow Treatment

Selective Dry Cow Treatment

ICCCs, refer pages 6–7

National Vendor Declaration form, refer page 10

Hand-held conductivity meters

Normal milk contains a small amount of salt which allows an electric current to pass through it. When udder tissue is damaged, more salt leaks into the milk and it becomes more able to conduct the current – its 'conductivity' rises. There are several hand-held meters on the Australian market that enable farmers to check conductivity of milk in each quarter of a cow. They are used to find damaged quarters that have normal-looking milk – quarters with **subclinical infections** or very **early clinical cases** before the milk changes are visible.

The natural conductivity level of milk varies a lot between cows, and at different times during milking for each cow. To find a damaged quarter, it is best to compare between quarters in the same cow at the same time, rather than look for a particular absolute conductivity level. The quarter which is significantly higher than the others is most likely to be affected.

A single reading for a cow is not a very accurate way of deciding whether to use **Dry Cow Treatment**. It is better to have a number of readings throughout lactation.

If a very early clinical infection is suspected by increased conductivity only, check the quarter again at the next milking. It is usually not appropriate to treat cows based on conductivity results alone.

Forms of mastitis, refer page 5

Dry Cow Treatment, refer page 8

Maximum Residue Limit

The Maximum Residue Limit (MRL) is the maximum concentration of an agricultural or veterinary chemical that is permitted in food (for dairy farms this means milk or meat from cows or calves). MRLs may vary between countries and are set by the national regulatory authorities responsible for food safety.

Milk fever

Milk fever is a disease of mature dairy cows which usually occurs just before, or soon after, calving. It occurs when there is a sudden reduction of calcium level in the blood, and is also called 'hypocalcaemia'. Loss of calcium into the colostrum, insufficient absorption of calcium from the gut, and insufficient mobilisation of calcium from the bones can all contribute to low blood calcium levels. Cows with milk fever become weak, may go down, be unable to rise, and die if untreated. Injected calcium is a rapid cure in most cases.

In the past, preventive management of milk fever sometimes involved leaving milk in the udder of fresh cows, but this predisposes to mastitis. Current practices for milk fever control involve manipulation of diet of cows before and at calving to maximise calcium availability.

Milk Quality Payment Schemes

Most dairy factories in Australia pay farmers different rates for milk of different **BMCC** quality (often as part of milk quality payment schemes which also include a number of other factors such as **Total Plate Count**). Milk supplied with a BMCC below a specified threshold (eg 250,000 cells/mL) qualifies for a premium in addition to the standard price. Milk with a BMCC above a specified threshold may lead to a penalty below the standard price. In some states there is a ceiling BMCC above which the factory will not collect the milk.

Bulk Milk Cell Count, refer page 7

Total Plate Count, refer page 6

Milk culturing

A milk sample can be processed so that the bacteria that are present can be identified. This involves a laboratory spreading some of the milk on sterile plates covered with particular growth factors, incubating the plates for defined periods and assessing the bacterial colonies that grow. This is called milk culturing.

Refer to Fact Sheet A – Milk cultures, on page 99

National Vendor Declaration form

The National Vendor Declaration (NVD) is a nationally recognised form filled out by farmers selling cattle. It provides a history of the animals' exposure to agricultural and veterinary chemicals. This allows an abattoir to slaughter an animal with confidence that violative residues will not occur, and that compliance with hormonal growth promotant restrictions for export markets will be achieved. Farmers selling for slaughter or feedlotting have the option to complete an NVD. Failure to do so severely reduces buyer competition, as many abattoirs and feedlots will not buy cattle without one.

Oxytocin

Oxytocin is a hormone produced in the cow's brain in response to the stimulus of her calf sucking, or the anticipation of milking. It travels via the bloodstream to the udder where it causes special muscle cells to contract. These contractions squeeze milk into the milk ducts so that it can be removed from the udder. This process is called milk '**let-down**', and oxytocin is often called the 'let-down hormone'.

Let-down

If cows are anxious or uncomfortable, let-down may fail. Oxytocin can be administered to help cows achieve let-down and to aid more complete removal of milk in inflamed udders.

Oxytocin is available as an injectable drug (brand names of oxytoxin products currently available in Australia are: Butocin Oxytocin Injection, Oxytocin Injection, Oxytocin-S and Syntocin). These are Schedule 4 drugs and can only be obtained through your veterinarian.

Rapid Mastitis Test

Rapid Mastitis Test (RMT) is sometimes called Californian Mastitis Test (CMT). This is a 'cow-side' test that is useful in detecting subclinical mastitis by estimating the cell count of the milk. It does not give a numerical result but enables the milk to be categorised into one of five scores according to how much gel reaction there is when a reagent is added to it.

The test can be carried out during milking. A small amount of milk from each quarter is squirted into separate dishes on a paddle, and an equal amount of reagent is added to each. The solution is swirled to mix it, and the amount of gel reaction estimated (from none to almost solidified). It is a cheap and relatively easy test that gives a result at a quarter level. It requires some experience to read quickly and efficiently.

Udder oedema

Udder oedema (sometimes called ‘flag’) is swelling which occurs under the skin of the udder, and sometimes along the belly, in cows prior to calving. It mostly occurs in heifers at their first calving, but can occur at subsequent calvings. The swelling may be great enough to prevent easy milking and may interfere with the cow moving about. Udder oedema is principally caused by changes in blood flow to the udder, where fluid drainage is compromised. Once milking is started, the volume of the udder is reduced and oedema fluid is usually cleared.

Withholding period

The withholding period (WHP) is the minimum period of time which must elapse after the last use of a drug or chemical before the sale of a treated animal or product such as milk, for human consumption. (The exception is the WHP for milk after use of **Dry Cow Treatment**, where the WHP is the time that must elapse after calving before the milk can go into the vat, provided the specified minimum dry period has occurred.) Withholding periods are set to ensure that when a drug or chemical is used in accordance with the directions on the label, no residues will exceed relevant Australian **Maximum Residue Limits (MRLs)**.

Dry Cow Treatment, refer page 8

Maximum Residue Limit (MRL), refer page 10

Glossary

Bulk Milk Cell Count (BMCC) – the number of white cells per mL of milk for the whole herd.

Blanket Dry Cow Treatment – where DCT is used in all cows within a herd.

Cell count – number of white cells per mL of milk

Clinical mastitis – mastitis which can be detected by visible signs. These include heat or swelling of the udder, milk of an abnormal colour or watery appearance and milk containing lumps/clots.

Colostrum – is the thick, yellow, sticky secretion containing antibodies that is present in the udder prior to calving.

Dry Cow Treatment (DCT) – a formulation of antibiotic prepared for administration into the udder immediately after the last milking of lactation.

Drying-off – a management technique of ceasing to milk cows that are still lactating.

Emollient – a compound used to soften or condition teat skin. Added to teat spray/dip.

Export Slaughter Interval (ESI) – the period following treatment when cattle are unsuitable for processing for some export markets. For advice on the ESI, contact the relevant company before using a product.

Individual Cow Cell Count (ICCC) – the number of somatic cells per mL of milk indicator of udder health and milk quality (see somatic cell count).

Induced cows – cows which are stimulated to calve early using a corticosteroid injection.

Intra-mammary – within or into the mammary gland.

Lactation – the secretion of milk from the mammary glands.

Mastitis – Inflammation of mammary gland tissue, usually due to a bacterial infection.

Mastitis Focus report (MFR) – gives farmers an overview of mastitis control in their herd.

Milk culturing – a lab test to identify milk-borne bacteria. Involves spreading milk on sterile plates covered with growth stimulants, then incubating the plates to see what grows.

Milk conductivity meter – a device that measures the change in milk conductivity (increase in salts in response to infection and inflammation).

Milk fever – a sudden reduction of calcium levels in the blood, usually occurs just before or after calving.

Minimum dry period (MDP) – the amount of time that must elapse between treatment of a cow with a dry cow product and her calving date.

Oxytocin – a hormone that is produced in the brain that is essential to milk let down in the cow.

PCR (polymerase chain reaction) – the amplification of a specific DNA sequence; the basis for some molecular tests eg Milk mastitis PCR test.

Rapid mastitis test (RMT) – a 'cow side' test which is useful in detecting subclinical mastitis by estimating the cell count of milk. Also known as the 'Californian Mastitis Test' (CMT).

Selective DCT – where DCT is only used in cows which have been identified as likely to be infected with mastitis.

Somatic cells – Body cells are also called somatic cells (somatic means body). Cells with mastitis, this refers to white blood cells in milk.

Somatic cell count (SCC) – the number of somatic cells per mL of milk, indicator of udder health and milk quality.

Teat stripping – removing the last of the milk in the teat by hand, after machine milking.

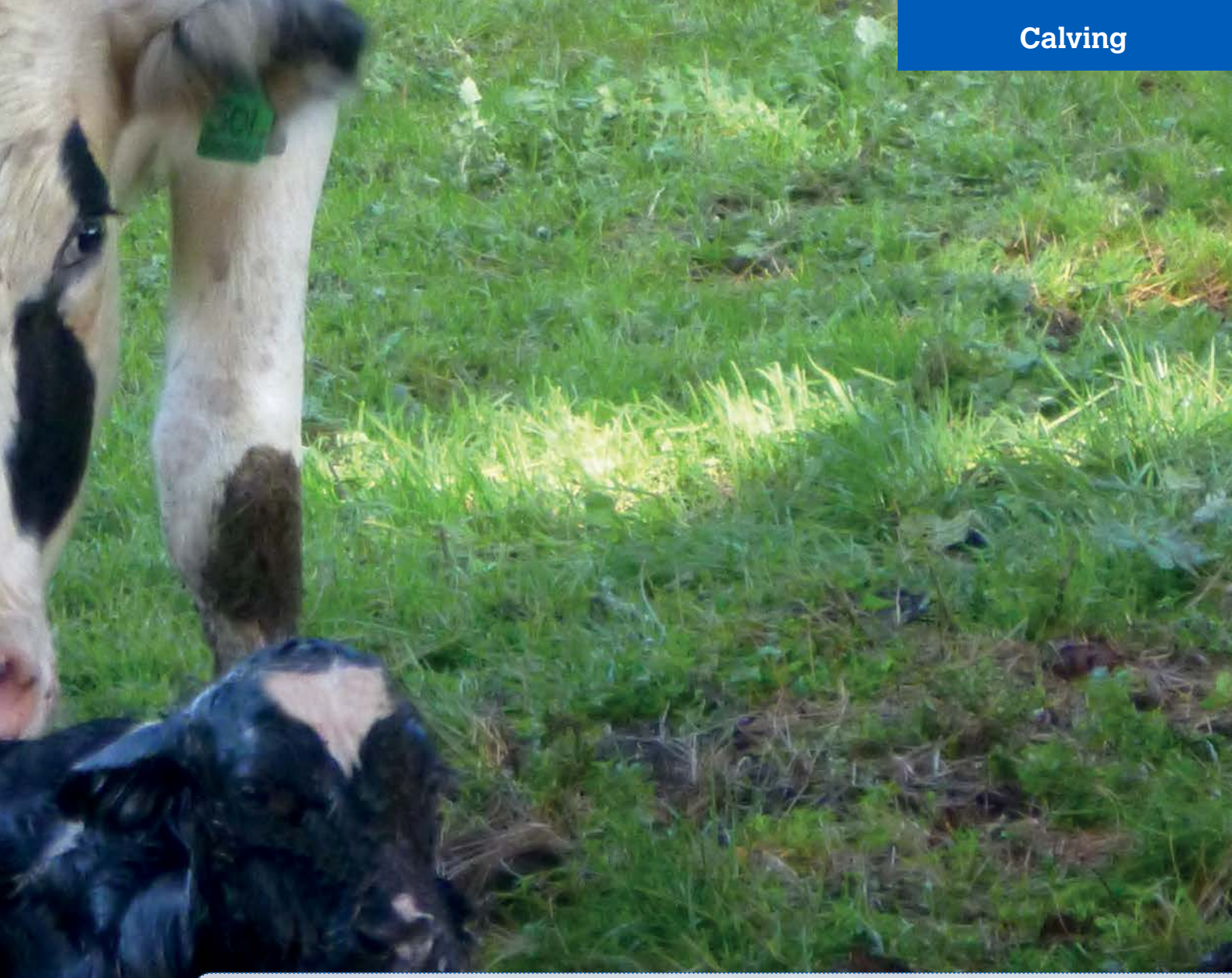
Subclinical mastitis – mastitis infections which cannot be detected by visible signs. These are detected through other tests, such as ICCC/SCC, RMT, Milk conductivity.

Teat sealant – Used at dry-off to provide a physical barrier to protect uninfected cows from bacteria during the dry period. Not an antibiotic.

Teat spray/dip – used post-milking to disinfect teats. Usually iodine, chlorhexidine, acid anionic compounds or hydrolysed linseed fatty acid.

Udder oedema (flag) – swelling which occurs under the skin of the udder and sometimes along the belly prior to calving.

Withholding period (WHP) – the minimum period of time which must elapse after the last infusion or injection before the sale of a treated animal or animal product for human consumption.



Calving

Two weeks before calving to two weeks after

GUIDELINE 1

Reduce exposure to environmental mastitis bacteria

- **Calving environment**
- **Induced cows**
- **Milk fever**
- **Milking fresh cows**
- **Premilking preparation**

Cows are very susceptible to infection around calving because their natural defence mechanisms are low. New infections occur, and subclinical infections which have persisted through the dry period may flare into clinical cases. Induced cows are even more vulnerable to mastitis infections because their immune systems have reduced efficiency at that time.

Around calving, the udder is often filled with milk for relatively long periods without the flushing effect of being milked. Bacteria may enter the end of the teat, particularly if high udder pressure opens the teat canals. They can then multiply and establish infections. High numbers of environmental mastitis bacteria may contaminate teats, especially if udders are wet and exposed to mud and manure. This can happen easily when cows and heifers are on the ground during calving.

Because of the high incidence of mastitis in the first month after calving, special care in this period will pay off.

1.1 Calve on clean, dry pasture or on a clean, dry calving pad.

Pasture or pads for calving must have minimal manure contamination. If more than two pats of manure are present per square metre, it is not clean enough for calving cows.

The calving area should be sheltered and well drained. Avoid pugging and mud. If water is visible on the surface or in your gumboot prints, it is not dry enough for calving cows.

If possible heifers should be calved separately from the main herd. Heifers are more likely to be bullied and be forced to calve in the less suitable areas.

1.2 Monitor the number of cases of mastitis occurring, especially in freshly calved heifers. This is an indicator of the state of the paddock.

If three or more cases have occurred in the last 50 calvings, you should move the springers to a new area, or renovate the pad.

1.3 Bring cows into the dairy as soon as possible to milk out and check – certainly within 24 hours of calving.

A new calf cannot suck all the milk from a fresh cow. Do not leave cows standing in the paddock dripping milk – bring them into the dairy, check udders, machine milk and disinfect teats (dip or spray).

Milking animals within 9–12 hours of calving reduces mastitis by almost 50%.

Milk out completely – use **milk fever** control methods such as dietary control (not incomplete milking) to prevent milk fever.

Cows dripping milk before calving may also benefit from being milked. Make sure their calf receives fresh colostrum once the cow calves.

1.4 Take special care with high risk cows.

Some cows have a higher risk for mastitis, in particular heifers. They spend longer on the ground during calving, and their teats have greater exposure to bacteria.

Any cows which have been induced or are sick are also at higher risk for environmental mastitis as their immune system is suppressed.

Use the cleanest, driest paddocks for high risk cows.

Apply teat spray to high risk cows that show signs of bagging up. Don't let them drip milk in the paddock.

1.5 Take care with premilking preparation of udders

Special care should be taken at the first milking to fully clean and dry the teats, and check for signs of mastitis in the udder and foremilk.

✓ **Heifers are more likely to be forced into less suitable areas to calve and should be calved separately from the older herd animals.**

✓ **Incidence of mastitis at calving is a good measure of the success of drying-off, dry period and pre-calving management.**

Milk fever, refer page 9

Refer to Guideline 5 – Use good milking technique and a consistent routine, page 31

GUIDELINE 2

Take care with two-year-old and freshly calved cows

- **Milk let-down**
- **Milking out**
- **Training heifers**
- **Udder oedema**
- **Dripping milk and gentle handling**

After calving, cows are often uncomfortable with swollen udders and may be more difficult to move, handle and milk out completely. For young cows calving for the first time, the milking routine is a new and different experience.

It takes about two weeks for most heifers to establish a quiet, reliable response to milking.

Milking staff must be patient and as gentle as possible during this period. This is important to maximise production, minimise milking times and minimise risks of injury to milkers and animals. Extra labour may be required in seasonal herds.

2.1 Choose the heifer pre-calving management that is most suitable for the herd.

Some practical and highly effective ways to prevent mastitis in heifers include:

- Using Internal Teat Sealant (ITS) approximately 4 weeks before the planned start of calving.
- Spraying teats with teat disinfectant 2–3 times per week for the last 3 weeks before calving if transition feeding practices allow.
- Picking up calves twice daily and milking animals within 9–12 hours after calving.

The choice of strategy for an individual herd will depend on:

- Gap in performance between incidence of clinical mastitis and Countdown trigger levels.
- Availability of infrastructure for safe administration of Internal Teat Sealants to heifers pre-calving.

Udder oedema in a freshly calved cow.

Udder oedema, refer page 12

Clinical mastitis trigger levels:

Herds experiencing more than 5 cases of clinical mastitis per 100 heifers within the first 2 weeks of lactation (or 3 cases per 50 heifer calvings) should consider ways to reduce heifer mastitis more proactively. Discuss options and potential costs with your veterinarian

2.2 Consider training heifers in the milking area before calving.

The first two weeks of milking can be made a lot easier if heifers are trained prior to calving. Start with walking to the dairy yard and building up to turning on machines and walking them through the platform. Take this opportunity to teat spray.

2.3 Take your time moving and milking heifers and freshly calved cows – don't rush.

This minimises injury to udders and teats, and contributes to cows being comfortable during milking and better milk letdown.

Encourage the co-operation of the animal by gentle husbandry.

2.4 Attend to two-year-old cows with severe udder oedema (flag).

If heifers are tight with udder oedema prior to calving, milk them out and use saved colostrum for their calves.

If they are very uncomfortable, seek veterinary advice. Prevention is better than cure, so discuss heifer nutrition with your adviser to ensure diet doesn't contribute to severe flagging.

2.5 Ensure all quarters of all cows are milked out.

Ensure there is milk let-down at each milking, particularly in heifers. Use let-down hormone (**Oxytocin**) if necessary.

Avoid both under milking and over milking.

✗ **When test buckets are used at or below the height of the claw in high or mid-line sheds, there is a risk to teat health because of higher claw vacuum.**

✗ **Unexpected noise and movement can cause cows to be fearful, interfering with milk letdown. Ensure all staff follow a calm and consistent routine when handling stock.**

Oxytocin, refer page 11

Refer to Guideline 5 – Use good milking technique and a consistent routine, page 31

Countdown triggers for action from Mastitis Focus

Clinical case rates at calving (first 14 days in milk): trigger is more than 5 clinical cases per 100 cows calved

During lactation (day 15 in milk and beyond): trigger is more than 2 clinical cases per 100 cows in milk per month

New infection rates (subclinical and clinical): trigger is more than 5 cases per 100 cows in milk per month

GUIDELINE 3

Check that milk is suitable to go in the vat

- **Dry Cow Treatment**
- **Colostrum milk**
- **Internal Teat Sealant**

For milk quality reasons, all cows should have their **colostrum** milk withheld from the vat for at least eight milkings after calving (10 milkings for induced cows). For cows that have received **Dry Cow Treatment** (DCT), a withholding period for milk after calving is specified for each product.

All DCT products are registered with a specified **Minimum Dry Period** after treatment. If a cow calves in less than this time, withholding periods for milk and calf meat may be much longer than in the usual situation.

Different arrangements are in place for farmers that supply colostrum to the dairy company. Refer to your dairy company's colostrum supply agreement for more information.

Colostrum milk, refer page 8

Dry Cow Treatment, refer page 8

Refer to Fact Sheet D – Guide to withholding periods after use of Dry Cow Treatment, page 107

Countdown Mastitis Toolkit app – Antibiotics withhold calculator

3.1 Ensure each cow has exceeded her Dry Cow Treatment Minimum Dry Period before putting her milk in the vat or selling her calf.

Accurate record keeping is critical for withholding period management and preventing DCT residues.

All DCT products are registered with a specified Minimum Dry Period after treatment. If a cow calves within this time, withholding periods for milk and calf meat may be much longer than in the usual situation. Always read the label and follow withholding periods. Consult with your veterinarian if you have any questions.

3.2 For cows treated with an Internal Teat Sealant (ITS), at the first milking strip each treated quarter 10–12 times.

This removes the bulk of the teat sealant so that it does not come into contact with the milklines or rubberware. This step is necessary even if calves have sucked prior to the first milking.

✗ **It is possible for antibiotic residues to remain in containers. Always use separate utensils for calves destined for sale.**

✗ **Milk from cows treated with Internal Teat Sealants must be omitted for the first 8 milkings to minimise vat residue risk.**

3.3 Ensure that milk from the colostrum phase (first 8 milkings) is not included in the vat (10 milkings for induced cows).

Feed this milk to replacement heifers rather than bobby calves where possible. Feeding this milk to replacement heifers minimises the risk of antibiotic residues from Dry Cow Treatment in bobby calves. It also provides good nutrient intake for heifers even after the antibody absorption period has passed.

GUIDELINE 4

Rapidly find, treat and record clinical cases in freshly calved cows

- **Antibiotic contamination**
- **Antibiotics**
- **Bacteria spread**
- **Cluster handling**
- **Colostrum milk**
- **Marking systems**
- **Mastitis herd**
- **Milk culture samples**
- **Record system**
- **Stripping**
- **Swollen quarters**
- **Veterinary advice**
- **Withholding times**

Early detection and treatment of **clinical mastitis** cases in the calving period reduces the risk of severe cases developing. It also reduces the likelihood of infection being passed to other cows, and the development of chronic infections.

Clinical cases which are missed can markedly increase the **Bulk Milk Cell Count** because they produce very high numbers of cells.

A case of clinical mastitis which requires treatment occurs when there is heat, swelling or pain in the udder, or there are changes in the milk (wateriness or clots) that persist for more than three squirts of milk.

By recording cow identity and drugs used for all cases, numbers of clinical cases and responses to treatment can be monitored. Your herd has a significant problem if there are more than five clinical cases per 100 cows in the first two weeks of lactation, or two clinical cases per 100 cows in subsequent months of lactation.

Milk cultures are recommended to identify which bacteria are involved if a herd problem emerges. A sterile sample must be taken before treatment is started for each case.

More than 80% of clinical mastitis cases in Australia are caused by Staphs or Streps which should be treated with antibiotics.

It is also very important to remove infected milk from the udder by stripping out. Sometimes use of let-down hormone (**Oxytocin**) is helpful especially with hard, swollen quarters.

Clinical mastitis, refer page 5

Bulk Milk Cell Count, refer page 7

4.1 Look for swollen quarters and check for heat and pain in all freshly calved cows.

Cows with suspect udders should have their udders felt, or palpated, to check for hardness, heat and swelling. Foremilk should be stripped and checked for signs of mastitis.

4.2 Check milk from all quarters of freshly calved cows every milking while they are in the colostrum phase (first 8 milkings, or 10 milkings for induced cows).

Changes can be hard to assess in milk in the first few days after calving. Look for watery milk, clots or flecks, yellowy brown colours or blood. Sometimes with severe mastitis, such as mastitis caused by **E. coli**, visible changes are not obvious in the milk.

Comparing between quarters in the same udder is helpful to spot discolouration. Check the quarters you think are normal first. Milk containing infection may be spread during this procedure, so avoid splashes or sprays of milk aerosol.

Gloves should always be worn during milking and especially when checking cows for mastitis. A good practice is to disinfect gloved hands after stripping a cow with clinical mastitis, or better still, change to a fresh set of gloves.

4.3 Collect milk samples for culture to identify the bacteria involved.

It is good practice to take a milk sample in a sterile fashion from all clinical mastitis cases before you start treatment.

Milk culture samples are recommended to help identify which bacteria are involved.

The right technique must be used to collect samples, otherwise the samples will be contaminated by bacteria from the outside of the teats.

Milk samples can be collected from clinical cases before starting treatments, and stored frozen. A selection of these samples can be sent to the laboratory at a later date if:

- Cows are not responding to treatment eg more than 20% of cases are receiving a second course of treatment.
- If concerned about the number of clinical cases occurring during calving eg exceeding 3 clinical cases in the past 50 calvings.
- If concerned about the number of clinical cases during lactation.

✓ **The quarter will need to be treated when there is heat, swelling or pain in the udder, or milk changes (wateriness or clots) persisting for more than three squirts of milk.**

Milk sampling for culture

Refer to Fact Sheet A – Milk cultures, page 99

4.4 Select the antibiotic to be used – consult your veterinarian.

Work with your veterinarian to develop standard treatment protocols for your herd. Issues to be assessed include:

- Bacteria previously cultured and antibiotic responses in your herd.
- Assessment of likely bacteria in this particular case.
- Withholding periods of the products available.

In some circumstances, injectable antibiotic may be beneficial. Never use **Dry Cow Treatment** for clinical cases.

Always read the label on the antibiotic product.

4.5 Administer the treatment as recommended.

Strip out the quarter fully before infusing antibiotic into the quarter. This may be assisted by injecting 2–3 mL of Oxytocin into the muscle before you commence stripping.

Ensure that teats and gloves are clean.

Scrub the end of the teat with 70% alcohol before inserting the tube.

Disinfect the teat afterwards.

4.6 Use the full course of antibiotics (as specified on the label).

Only treat the quarters that are affected.

Check all quarters every milking during the full course.

4.7 Milk the quarter out fully at least every milking.

Stripping out infected milk from clinical quarters improves cure rates. Frequent stripping (three or four times per day) removes debris from the quarter.

Use of let-down hormone (Oxytocin) may be helpful in removing milk from hard, sore quarters.

4.8 Clearly mark treated cows.

Set up a system that works for you and ensure that all regular and relief milking staff are familiar with it.

Systems for temporary identification of treated cows should be highly visible, easy to apply and to remove. The mark should be durable enough to last for the full treatment and withholding period of the drug. Different colours or marking codes may be used to signify when withholding periods are complete.

E. coli, refer page 4

✓ **Keep treatment protocols simple. Large numbers of different treatment products are rarely needed. Using many different treatments increases the risk of mistakes.**

Refer to Fact Sheet A – Milk cultures, page 99

Dry Cow Treatment, refer page 8

✓ **Marking a cow is best done prior to treating. It's better to mark and not treat the cow than to treat and not mark her.**

4.9 Record all details.

Clinical case records are essential to track mastitis control in your herd, and improve management. These records will enhance and improve the quality of a Countdown Mastitis Focus report.

Quality Assurance programs require that details of all antibiotic treatments administered be recorded.

A clear, easily seen record should be kept in the shed for quick reference during milking. A whiteboard can be helpful. On-farm computer systems also make record keeping easy.

4.10 Observe withholding times for milk and meat.

Read the label of the drug used and calculate the correct withholding period for each treatment. Make sure the date when the milk can be returned safely to the vat is obvious to the milking team eg on the farm dairy whiteboard and in the shed diary.

4.11 Discard milk from all quarters of cows that receive treatment.

Some antibiotic will be absorbed into the bloodstream and passed out in the milk from the normal quarters. The risk of antibiotic contamination is too great to include it in the vat.

4.12 Make a particular effort to minimise spread of bacteria from infected cows to other cows.

Draft out clinical cases and milk them last.

Run a separate mastitis herd if you can.

Use gloves when milking mastitis cows.

If mastitis cows are not milked last as a separate group, use a separate, good quality cluster for mastitis cows on the test bucket. Mark the cluster with some red tape to remind all people milking that it is only to be used for mastitis cows.

Rinse and then sanitise the cluster after milking each mastitis cow. Remove the long milk tube and run water through the cups and claw bowl for 30 seconds. Then dip the cluster and your hands in a disinfecting solution such as 1% Iodophor. Disinfectants take time to kill bacteria, so don't touch any other cluster or cow for at least 20 seconds. Drying hands on a paper towel after this will also help reduce the bacteria that still remain.

Countdown Mastitis Toolkit app – Withhold period calculator

Refer to Fact Sheet B – The correct way to give intra-mammary treatment, page 104

Examples of marking systems:

- Ratchet-type plastic tail tags.
- Tail tape on the tail.
- Velcro bands above the hocks or on the legs.
- Paint (tailpaint, enamel or non-scourable spray paint) on the udder or legs.

Refer to Fact Sheet E – Records to keep on clinical cases of mastitis, page 110

4.13 Consult your veterinarian for advice about the following options if a clinical quarter fails to respond by the end of a full course of treatment (as listed on the label):

- Repeating the same treatment.
- Trying a different antibiotic .
- Drying-off the quarter (provided it is not hot or swollen).
- Drying-off the cow.
- Culling the cow, after the withholding period for meat has expired.
- Culturing the pre-treatment sample or re-sampling the quarter.

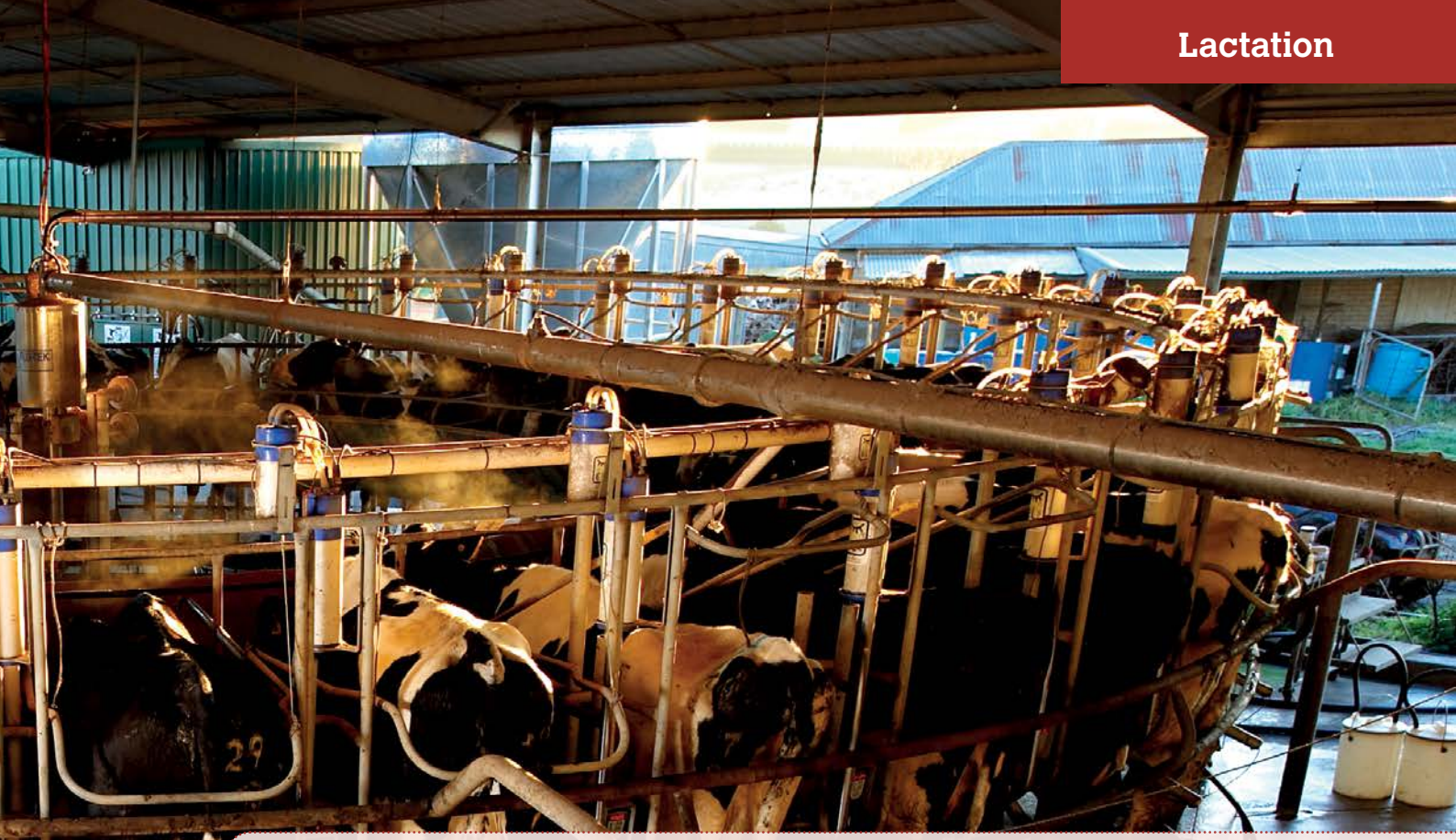
Do not use drugs in any way other than specified on the label. Don't change the dose rate or dose frequency specified on the label. This will change the **withholding period** required.

If drying-off a quarter, stop milking it and monitor the quarter to ensure it does not become hot and swollen. If it does, strip it out again.

Do not use Dry Cow Treatment in a quarter when you are continuing to milk the other quarters. Dry Cow Treatments are not registered for use in lactating cows. Some antibiotic will be absorbed into the bloodstream and passed out in the milk from the normal quarters, so there is a high risk of antibiotic contamination of the vat.

If culling the cow, check that the withholding period for meat has elapsed for all drugs used.

Withholding period, refer page 12



Lactation

GUIDELINE 5

Use good milking technique and a consistent routine

- **Calm cows**
- **Clean, dry teats**
- **Foremilk stripping**
- **Good stockmanship**
- **Machine stripping**
- **Teatcups on**
- **Teatcups off**

During lactation, cow-associated mastitis bacteria such as **Staph aureus** and **Strep agalactiae** are transmitted between cows during milking.

Occasionally Strep uberis (normally classified as environmental bacteria) can also be transmitted between cows during milking.

Milk from one infected quarter is spread to the teat skin of other quarters and cows by milkers' hands, teatcup liners and cross flow of milk between teatcups. Damaged teat ends are particularly susceptible. Malfunction or poor use of the milking machine can contribute to transmission of infection.

Prevention of infection involves: keeping cows calm and teat ends healthy; careful use of machines that are operating well; disinfection of teat skin after milking.

Staph aureus is a major cause of mastitis in Australia. It is difficult to cure, especially during lactation, so prevention is essential.

Staph aureus and Strep agalactiae, refer page 3

5.1 Ensure that cows enter the milking shed willingly by use of good stockmanship.

Calm cows defecate less frequently, kick the cups off less often, have a better milk let-down and move through the dairy more easily than stressed and anxious cows.

Cows that are fearful produce adrenalin that prevents milk let-down. Minimise fearful experiences in the dairy such as yelling, use of sticks, dogs or electrified backing gates.

× Beware of applying cups before milk let-down. When teatcups are applied too soon, milk flow into the claw bowl slows or ceases after 15–20 seconds of initial flow. Full flow restarts 60–90 seconds after cups on and milk letdown has occurred

5.2 Consider foremilk stripping for all cows in their first month of lactation.

Fore-stripping is the single most effective way to detect clinicals. Consider fore-stripping all cows in their first month of lactation in periods of high risk. (For example, if the clinical case rate is high, or when **Bulk Milk Cell Count** is approaching a penalty threshold.)

Routine fore-stripping of cows in the first month of their lactation also helps to accustom cows to having their teats touched and provide an effective 'signal' for milk let-down.

If done poorly, however, fore-stripping contributes to the spread of bacteria from teat to teat via milkers' hands. Good milkers will take care to avoid ever getting milk on their hands while foremilk stripping.

An effective technique is to squeeze the base of each teat between the thumb and the first two fingers, then pull gently downwards. If no clots, flecks or other abnormalities appear in the first two squirts, move to the next teat.

Some milkers reduce the time (and the risk of injury) by fore-stripping only one or two teats per cow per milking eg the left quarters at morning milkings and the right quarters at evening milkings

Foremilk stripping

Bulk Milk Cell Count, refer page 7

5.3 Put teatcups on clean, dry teats – wash and dry dirty teats.

Teatcups should only go on to clean and dry teats. Mastitis risk is a 'numbers game' where the risk of infection is reduced by keeping bacterial numbers low on or near the teat-end. This is especially important at times of high risk (eg in early lactation, or during muddy periods) or in herds that may be at higher risk of mastitis (eg high producing herds or when cows are on feeding areas).

Milking wet teats is unacceptable, both for risk of mastitis and milk quality issues. Avoid wetting the udder – just wet the teats if they need to be washed.

Always use clean, low pressure water to wash dirty teats.

✓ As a rule of thumb if its clean, cup it. If its wet and dirty, wash and dry it.

Refer to Guideline 27 – Fix areas that make udders muddy, page 95

Teats are rarely dry when teatcups are put on if they are simply left to 'drip' dry. Effective drying is achieved with single use paper towels or suitable woven cloths (such as 'Chux' towels). Each cloth must only be used for one cow per milking. Cloths should then be placed in disinfectant solution, washed and wrung out before the next milking. Never use rags.

Minimise hair contamination by trimming or flaming hair on udders.

Trim cows' tails. Completely remove the long hair on the end. Repeat twice a year if necessary.

If teats are dirty, check that laneways and areas around troughs, gates and the entrance to the shed are draining adequately and not contributing to dirty teats. Do repairs if necessary.

Avoid allowing cows to stand in wet, manure laden yards before and after being milked.

5.4 Put teatcups on when teats become plump with milk.

Consistent routines help stimulate a good let-down, which generally makes the milking process more comfortable for the cow, more efficient for milk extraction and more time-efficient for the milker.

Putting cups on too soon usually results in teatcups crawling during the first minute of milking. When teatcups crawl early in milking, milk harvesting is less complete and less efficient near the end of milking.

The optimum time to apply teatcups is 60–90 seconds after the cow's teats and udder are first touched by the milker, or the sights and sounds of milking and the predictability of a calm, consistent milking routine have stimulated good milk let-down.

Choose a set of procedures that allows or (preferably) requires each milker to be absolutely consistent at every milking.

In herds which have good milking routine without physical stimulation of the teats, the simplest way to match the timing of cup application with milk let-down is to delay the time of cups–on by about 30–60 seconds. For example, on rotaries the cups–on operator could move one cow further round.

5.5 Eliminate machine stripping from your

× Previous thinking that undermilking reduces milk yield, increases mastitis and increases ICCC is no longer supported. The greatest risk for teat damage appears to be when cows are routinely over milked with a poorly adjusted milking machine.

milking routine.

Do not use weights on clusters to speed up milking. These affect balance and increase liner slippage, which increases the risk of mastitis.

Avoid allowing a few slow milkers to slow down the entire row/platform. Remove their cups before they have completed milking – they don't produce less milk or develop more mastitis if cups are removed early. Consider culling slow milkers.

5.6 Allow minimum air to enter cups when attaching clusters.

The milk carrying capacity of the milkline is reduced by the air admitted when teatcups are attached or removed.

To minimise air leakage through teatcups:

- Ensure that teatcups match claws correctly (so cups hang over claw inlets properly).
- During milking, balance the cluster carefully, and lift each teatcup with a 'kink' in the short milk tube until the moment of attachment.

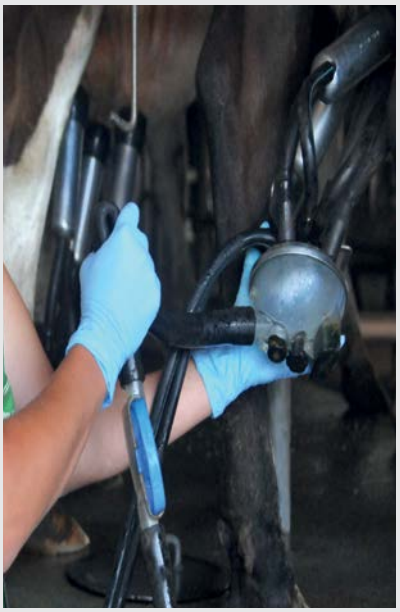
5.7 Take teatcups off by cutting the vacuum and allowing them to slip free of the teats. Do not break the vacuum at the mouthpiece lip of the liner.

Air entering at the cup mouth, because of liner slip or rough cup removal, causes vacuum fluctuation in the cluster. Milk droplets may be thrown back against the teat ends. These impacts carry bacteria into the teat canal where they are beyond the reach of a teat disinfectant.

Bacteria that gain entry to the teat canal at or near the time of cluster removal pose a greater risk of infection, leading to clinical or subclinical mastitis, because there is much less chance they will be flushed from the teat canal by milking flowing from the teat.

5.8 Select the end-of-milking point that is appropriate for the herd.

- Aim to milk most cows as completely as possible, within a reasonable time, at every milking. This can be achieved with maximum ACR threshold settings of 400 mL/min for herds milked once or twice daily.
- Aim to milk all cows out as evenly as possible. Uneven milk-out leads to residual milk being left in the udder, which makes the udder become more uneven. This reduces ease and efficiency of milking.
- Don't wait around for slow cows to finish. This means removing clusters from the slowest 20% of cows before they finish milking. In a 20-a-side Herringbone, don't wait for the last 2 or 3 cows; on a rotary, select a platform rotation time and set a strict policy that 'no cows goes round twice' unless there is a specific reason.
- Excessive overmilking, coupled with a poorly adjusted machine, can quickly lead to teat damage, and in turn, to mastitis.



Taking off cups by kinking long milk tube and cups falling away by gravity.

Refer to Guideline 6 – Monitor and maintain milking machine function, on page 36

GUIDELINE 6

Monitor and maintain milking machine function

- **Air vents**
- **Changing teatcup liners**
- **Cow behaviour**
- **Cup slips**
- **Daily checks**
- **Milking machine technician**
- **Milking time guides**
- **Monthly checks**
- **Pulsators**
- **Receival can**
- **Regulators**
- **Vacuum gauge**
- **Vacuum reserve**
- **Weekly checks**

Milking machine equipment has been designed to harvest milk efficiently and maintain healthy teats. Teats are attached to milking machines for 50–100 hours per lactation.

Machines that are not functioning correctly can contribute to new mastitis infections by:

- Spreading bacteria from teat to teat and from cow to cow.
- Damaging the teat ends and natural defence mechanisms of the teat canal.
- Causing impact of bacteria-laden droplets into the teat canal, especially towards the end of milking.

The most common reason for milking machine problems is inadequate routine maintenance of mechanical components and rubberware. A series of regular, systematic checks gives a simple method of finding problems and guiding preventative maintenance.

If more than one person milks in your shed, it is important to assign these checking tasks to particular people, and ensure that the right person is alerted to any problems that are found or suspected. Daily and weekly checks should be conducted by milking staff as part of their regular list of responsibilities. The monthly checks should be done by the herd owner or manager or other skilled observer.

6.1 Use daily, weekly and monthly guides to check machine function.

Daily, weekly and monthly checklists are provided on the following pages

Daily checks

- Check the air admission holes (air vents). If the air vent is blocked, the claw bowl fills with milk and leads to more cup slip, slow or incomplete milking, and difficulty removing clusters even after the vacuum is cut off. Remove any debris with the probe designed for the task – avoid using drill bits or other tools that may enlarge the holes.
- Read the vacuum gauge. Tap the face of the gauge to ensure that the needle isn't sticking.
- Listen to pulsators. The sound of air entering the external air port should be both regular and intermittent. It should be the same sound for all pulsators.
- Watch milk entering the receival can. Flow should be even, without flooding or slugging.
- Check teats as the cups come off at the end of milking.
- Look for discolouration (reddish, bluish or purplish teat skin colour).
- Look or feel for swelling or hardness at the top, middle or end of the teats.
- Examine teat openings for signs of cracking, sores or teat canal lining pulled out of the opening.
- Observe if teats are unusually sensitive to touch.
- Check cow behaviour. Are cows nervous and uncomfortable when teatcups are put on or removed from teats, or during milking?

Daily checks	✔
Check air admission holes (air vents)	
Read the vacuum gauge	
Listen to pulsators	
Watch milk entering the recieval can	
Check teats as cups come off	
Check cow behaviour	

Check for blocked air admission holes

Typical vacuum level recommendations are:

High line	46–48 kPa
Mid line	44–46 kPa
Low line	40–44 kPa

Countdown Mastitis Toolkit app – Teat assessment calculator

Weekly checks

- Check rubberware (liners, short milk tubes, pulse tubes etc.) for holes or splits. Damaged liners and pulse tubes will affect milking out .
- Check for twisted liners and liner condition.
- Align marks on mouthpiece and stem of liner, or place your thumb in each liner.
- Look particularly for distortion of the mouthpiece lip or holes in the short milk tube. Split liners lead to fluid between the liner and the teatcup shell.
- Check filters on pulsator airlines especially on rotary dairies where the filters are close to the feeders.
- Check filters on the vacuum regulator and clean or replace.
- Listen to the regulator(s). It is normal to hear air being admitted to the regulator. If air cannot be heard, it may indicate that the machine is leaking air. However, if a variable speed drive is fitted, the regulator should not be regularly admitting air.
- Check oil level and oil drop rate if the vacuum pump is oil-cooled. Check water levels and flow rates if vacuum pump is water-cooled.
- Check drain valves on pulsation airline. If milk is found in the drain point, look for split liner(s).
- Check teat ends for cracks or sores. As a general rule, consult your advisor if more than 5% of cows have teat end sores or cracks.

Weekly checks	✔
Check the twisted liners	
Check liner condition	
Check filters on pulsator airlines	
Listen to the regulator	
Check vacuum pump oil	
Check pulsation airline drain valves	
Check teat ends	

✕ **Depending on the design, liners should be removed from the jetter system after washing to reduce mouthpiece distortion.**

Monthly checks

- Check effective reserve and regulator function. Effective reserve is an airflow measurement of the spare or reserve pump capacity that is available to maintain stability of the receiver vacuum when extra air enters the system during milking. All systems should be able to accommodate 1 milking unit falling off (2 units in systems with more than 32 bails). During this test, check that the regulator closes or almost closes. The hiss of air entering the regulator should be greatly reduced when the cups are opened. If this does not happen, check the regulator filter and clean if necessary. If cleaning does not improve the regulator response, call your AMMTA milking machine technician.
- Check for rubberware that is perished or outside manufacturer's guidelines. Cracked and perished rubberware is harder to keep clean, and may cause a downgrade in milk quality. Distortions of the mouth piece lip can affect milking and washing processes.
- Check if jetters are distorting the liner mouthpiece.
- Measure completeness of milking and milking times. If cups are applied before milk let-down, these average milking times should be extended by approximately one minute.
- Count cup squawks and slips requiring correction by milker. A running tally over 15 minutes of milking provides a guide. To assess machine function, exclude cows with very poor udder conformation which always have cups slip.
- Preferred machine function no more than five slips per 100 cows.
- Machine requires service more than 10 slips per 100 cows.

Monthly checks	Your figures this month
Check effective reserve and regulator functions	
Measure completeness of milking and milking times	
Count cup squarks and slips requiring correction by milker	

Completeness of milking

Completeness of milking is assessed visually or preferably by hand-stripping at least 25 cows immediately after cups off.

Incomplete milk-out exists if more than 20% of quarters produce strip yields of 100ml or more.

Uneven milk-out exists if more than 20% of quarters in the same position (eg back right quarter) produce strip yields of 100ml or more, and the total number for this quarter is noticeably higher than for other quarters.

Milking time guide

(Time in which 80% of cows should have completed milking)

- 10 L/milking should milk in 6.3 minutes.
- 14 L/milking should milk in 8.0 minutes.
- 18 L/milking should milk in 9.5 minutes.
- 20 L/milking should milk in 10.2 minutes.

6.2 Call a milking machine technician if you observe any abnormalities in the dairy shed during your daily, weekly or monthly checks.

Arrange a visit by a technician to correct the problem you have observed:

- Cows appear to milk slowly or incompletely.
- Teatcups slip or fall frequently.
- Teat condition is poor.
- Cows appear nervous or uncomfortable.

A technician should:

- Ensure vacuum levels and airflows are appropriate for machine.
- Check pulsation.
- Service faulty pulsators.
- Correct all faults promptly.

Vacuum recordings made during milking can be helpful in pinpointing some machine faults.

You should receive a full written report on a current industry standard report form from your milking machine technician service.

Refer to Fact Sheet F – Milking machine test report form example, page 112

✓ **Milking time performance testing is the only way to accurately assess milking plant function during milk flow and under milking conditions**

6.3 Change liners at regular intervals.

Teatcup liners are designed to flex and squeeze the teat during each pulsation. This is essential to massage the teat and maintain its blood supply. When fitted into a correctly matched teatcup, the liner should be stretched 5–15% more than its original length.

As soon as they start work, liners begin to lose tension, absorb fat and hold bacteria. Once they have been used for too many cow milkings, the deterioration is sufficient to reduce the speed and completeness of milking, increase teat end damage, and increase spread of mastitis bacteria.

The effective life of liners is influenced by the characteristics of the materials they are made from, and the storage, cleaning and use they experience. Most manufacturers recommend that rubber liners are used for 2000–2500 cow milkings, after which they should be changed. Some manufacturers also specify a time of 4–6 months as the maximum recommended life for liners under tension and exposed to sun, heat, chemicals and ozone. The recommended life for silicone liners is 5,000 cow-milkings.

Countdown Mastitis Toolkit app – Liner life calculator

Measure liner life in 'cow milkings'.

When liners are changed, estimate when the next 2500 cow milkings (or manufacturer's recommendation) will have occurred, and mark the date to replace liners on your calendar.

Guide to estimating number of days for 2500 cow milkings:

$$\text{Number of days} = \frac{2500 \times \text{number of milking units}}{\text{herd size} \times \text{number of milkings per day}}$$

For example:

A herd of 120 cows (herd size) milking twice per day (milkings per day) in a 12 unit swingover shed (milking units) would take 125 days (number of days).

$$\text{Number of days} = \frac{2500 \times 12}{120 \times 2} = \frac{30{,}000}{240} = 125 \text{ days}$$

Countdown Mastitis Toolkit app – Liner life calculator

GUIDELINE 7

Use post-milking teat disinfection – spray or dip every teat at every milking

- **Application**
- **Dip cup cleaning**
- **Disinfectants**
- **Emollients**
- **Ingredients**
- **Iodine**
- **Operator technique**
- **Water quality**

Bacteria in milk from infected quarters may contaminate the skin of many other teats during milking. For example, after a liner has milked an infected quarter, bacteria may be transferred to the next 5–6 cows milked with that cup.

After milking, bacteria multiply on the teat skin and may extend into the teat canal. If the whole surface of each teat is disinfected immediately after milking, this spread can be minimised. Teat disinfection also helps to keep teat skin supple and healthy.

Teat disinfection after milking reduces by 50% new infections due to cow associated bacteria such as **Staph aureus**. It is one of the most effective cell count and mastitis control measures available, but it only works if it is done thoroughly.

Teat disinfectants must be diluted to the correct concentration for use. The active ingredients often lose their disinfectant ability with time after mixing, and if you include additives to improve skin condition (emollients) these may reduce disinfectant activity. Any contamination with milk and other organic material also reduces activity. Correct mixing each day is best to get maximum performance.

Some emollients (eg bloat oil) are not suitable for use with particular disinfectants.

Failure to cover the whole teat of every cow at every milking is the most common error in teat disinfection.

Staph aureus, refer page 3

7.1 Use a registered teat disinfectant.

The Australian Pesticides and Veterinary Medicines Authority (APVMA) is a government authority responsible for the assessment and registration of pesticides and veterinary medicines. They maintain a list of registered teat disinfection products on their website.

Use this checklist to select a teat disinfectant for your farm:

- Effectiveness – Generally a part of registration, although professional advice may be required.
- Suitability for your farm water – See Guideline 7.3
- Occupational health issues – such as staff skin reactions.
- Teat skin reactions.
- Visibility on teat skin.
- Price per cow per milking.
- Shelf life – will the quantity be finished prior to expiry?
- Milk residues – a condition of registration and on label use.

Farmers using unregistered products risk applying ineffective treatments, having chemical residues in milk or meat, and causing harm to the environment, human health or animal health.

Further, use of registered products in a way that is contrary to the label ('off label', eg using post milking teat disinfectant before milking) should only be done under veterinary supervision.

Ready To Use (RTU) teat disinfectants contain water of high quality and reduce the risk of poor quality water affecting the performance of farm mixed disinfectants.

7.2 Mix a fresh batch every day.

Fresh batches should be made up regularly, at least daily.

The stability of working dilutions of teat sprays are affected by dilution rates, water quality, ambient temperature and emollients, to name a few.

Refer to Fact Sheet G – The correct way to mix teat disinfectant, page 116

7.3 Use water of very high quality.

A number of water quality issues can alter effectiveness of teat disinfectants:

- Alkalinity greater than 500 ppm.
- Hard water (high concentrations of calcium and magnesium).
- Organic matter, which can inactivate the disinfectant.
- Contamination with Pseudomonas bacteria which are not sensitive to certain disinfectants.
- Presence of chlorine in the water.
- Presence of iron or manganese from bore water.

Cooled water from the hot water service is a good source.

River or dam water or water from tanks with high organic matter content is unacceptable because of the inactivation of the disinfectant.

7.4 Ensure the dilution gives at least 0.5% iodine for Iodophor products. Mix other products according to the label directions.

7.5 Maintain teat condition – emollients (such as glycerine) may be added to improve teat skin condition.

Glycerine is a preferable teat skin emollient to bloat oil or emulsified paraffin (white oil) products. Although bloat oil or paraffin is relatively cheap, it does not mix with water and it has to be shaken frequently to avoid it 'separating out'.

Other good emollients include glycan, sorbitol and lanolinated esters.

Never use bloat oil (or any white oil) in chlorhexidine disinfectants.

Do not use any emollients with chlorine disinfectants.

Do not exceed 10% glycerine for regular use. Higher levels may interfere with killing power of the disinfectant. If teat condition is particularly bad or irritation of teat skin has occurred with a change in chemical use (eg with change of teat disinfectant or teatcup liners) glycerine concentration may be increased to 20% but for no more than two weeks.

✓ **Use of a RTU product avoids the risk of poor mixing and poor water quality.**

Pseudomonas, refer page 4

7.6 Spray or dip the whole surface of all teats after every milking throughout lactation.

Ensure the whole teat surface is covered with disinfectant. All the teat surface touched by the teatcup liner must be covered. A drop of teat disinfectant seen at the end of the teat does not indicate adequate coverage.

Spray upwards from beneath teats, not from the side.

Do not spray cows as they walk past.

Dipping is more reliable than spraying for getting complete coverage.

7.7 Check operator technique.

Check that at least 20 mL of prepared teat disinfectant is being used per cow per milking if spraying (10 mL per cow per milking if dipping). Adequate volume alone, however, does not ensure teats are being covered.

Check spray pattern of spray units. Spray on the pit wall or hold a sheet of white paper 10 cm from spray and spray it like you would a teat. Hollow ring spray patterns miss the teat. If required, change or service nozzles.

Check the 'far sides' of teats of at least some cows after spraying or dipping every day to ensure they have been covered.

7.8 When dipping, clean out dip cup as teat dip gets low – don't just top up the dip.

Minimise the amount of milk or other organic material that accumulates in the dip cup. Clean out immediately if there is dirt or manure dropped into the cup, and wash out the dip cup every milking.

✓ **Use a paper towel to check coverage. After spraying with disinfectant, wrap a piece of paper towel around the barrel of the teat, then carefully remove and examine the wet or stained area. All of the teat barrel should be covered.**

✗ **Where an auto teat sprayer is used, ensure coverage is satisfactory with the paper towel test or a visual assessment.**

✓ **Do a quick check. Are you using 20mL per cow per milking, eg 20mL x 200 cows = 4000mL or 4 litres per milking.**

Checking teat disinfection spray pattern.

GUIDELINE 8

Practise good hygiene during milking

- **Cluster techniques**
- **Disinfectant use**
- **Milk splashes**
- **Separating infected cows**

Bacteria are present in milk from all infected quarters. They are spread to other quarters and cows by splashes or aerosols of milk that occur during stripping, by milkers' hands, teatcup liners and by cross flow of milk between teatcups.

Keeping hands, gloves and the milking area under the cows as free as possible from dirt and contaminated milk will help to reduce the risk of transferring bacteria from cow to cow.

Low pressure, high volume washing water should be used to wash away manure. High pressure hoses should NOT be used directly beneath or around cows, as these can create aerosols of bacteria-laden droplets.

Clinical cases and chronically infected cows are a source of infection for healthy, young cows – if these mastitis cows are milked last, the risk of spreading infection is markedly reduced.

If clinical cases are not milked last, using a separate cluster for mastitis cows on the test bucket also reduces the risk of spread from contaminated liners.

8.1 Avoid splashes or sprays of milk aerosol. Never get milk on your hands.

Gloves should always be used especially when searching for or dealing with clinical cases of mastitis. Good milkers learn to avoid getting milk on their hands.

A bare hand is more difficult to clean and disinfect during milking, than a gloved hand.

Gloves also protect hands from the drying effects of dirt, water and manure.

Try to keep gloves clean during milking – rinse off dirt regularly and disinfect after stripping a clinical case.

Change them if they become torn, and replace gloves after each milking.

8.2 Use running water and disinfectant solution to remove infected milk from gloves, liners and other equipment.

Rinsing with running water for about 30 seconds provides a physical wash. Then dipping in a disinfecting solution such as 1% Iodophor or spraying with 70% alcohol provides a sanitising effect.

Disinfectants take time to kill bacteria, so don't touch any other unit or cow for at least 20 seconds. Drying hands on a paper towel after this will also help reduce the bacteria that remain.

8.3 Draft out clinical cases where possible, and milk them last. Run a separate mastitis herd if you can.

Cows under treatment with antibiotics should also be milked last, in a separate mastitis herd, once the vat has been disconnected from the milkline.

The whole milking machine should then be washed with a full hot water wash to remove any residues of milk contaminated with bacteria or antibiotics.

If it is not possible to run a separate herd, make sure that treated cows are well marked, that they are drafted out of the herd at each milking, and then milked last, once the delivery line has been disconnected from the vat.

✓ **Electronic identification systems may allow automatic drafting so cows can be managed as a single herd yet milked separately.**

Bulk Milk Cell Counts, refer page 7

8.4 Use a separate cluster for clinical mastitis cows milked with the herd and clean thoroughly between each cow.

Mark the cluster with some red tape to remind all people milking that it is only to be used for mastitis cows.

Rinse and then sanitise the cluster after milking each mastitis cow.

8.5 Consider identifying high cell count cows and milking them last, preferably by running a separate herd.

Refer to Guideline 4 – Rapidly find, treat and record clinical cases in freshly calved cows, page 23

Cell counts, refer page 6

GUIDELINE 9

Manage teat sores and cracks

- **Disinfection mix**
- **Machinery check**
- **Mud problems**
- **Teat ointments**
- **Teat skin**
- **Teat sores**
- **Veterinary advice**
- **Water access**
- **Washing teats**

Healthy teat skin is easier to keep clean, minimises preparation before milking, and minimises the risk of new infections occurring.

Mastitis is a numbers game – greater numbers of bacteria near the teat end increases the risk that bacteria will enter through the teat canal. Rough or damaged teat skin and teat sores provide sites where bacteria become lodged, and multiply.

Teat skin condition is affected by exposure to mud and water, by faulty milking machines and poor milking practices, and by infectious organisms.

Water and mud strip the protective natural oils from the skin, leading to cracks on teats (and also on milker's hands). Cracks and teat sores are painful and lead to poor cow behaviour during milking, with increased kicking, stomping and defecating, as well as poor milk let-down.

9.1 Assess teat skin and teat ends every milking.

Maintaining healthy teat skin is vital for successful prevention of mastitis.

Factors or organisms that affect the teats of dairy cows fall into one of three broad categories:

- Milking induced (ie faulty machines or milking management).
- Environmental (eg water, mud, windy cold conditions, sunburn).
- Infectious (ie viral or bacterial infections).

These changes can produce short, medium or longer term changes in teat condition.

Regular checks of teat condition are recommended in all herds to pick up and identify emerging issues and take action.

Countdown Mastitis Toolkit app – Teat gallery

9.2 Reduce mud problems by maintaining clean and dry trough areas, farm tracks, laneways, gates, and entrances and exits to the dairy area.

If wet and muddy conditions cannot be avoided for lactating cows, and the rate of new clinical cases starts to increase, teats should be washed and dried before each milking.

Slow the milking process down and/or use an extra person in the milking team to ensure teats are washed and dried before cups are attached.

9.3 Ensure cows don't have access to creeks, dams and watercourses.

9.4 Minimise use of water on cows in the dairy.

Ideally, teatcups should only go on to clean and dry teats.

Avoid wetting the udder – just wet the teats if they need to be washed.

Always use clean, low pressure water to wash dirty teats.

9.5 Check teat disinfectant mix, particularly emollient concentrations.

The addition of 10% emollient, such as glycerine, to teat disinfectant helps improve teat skin condition. If required, glycerine may be used at 20% for short periods – not more than two weeks.

9.6 Check important machine factors.

Check vacuum level.

Check pulsators.

Check liner suitability and age.

9.7 Avoid the use of teat ointments, especially those that come in tubs or jars.

Teat ointments which are dispensed by repeated dipping into a jar become easily contaminated with bacteria and may spread infection.

9.8 Seek advice from your veterinarian if problems persist.

If more than 5% of cows have teat damage, seek professional help

✕ **Be mindful of water splashing on udders from fixed wash hoses that rinse cups on rotary dairies.**

Refer to Guideline 7 – Use post-milking teat disinfection, page 42 and Fact Sheet G – The correct way to mix teat disinfectant, page 116

Refer to Guideline 6 – Monitor and maintain milking machine function, page 36

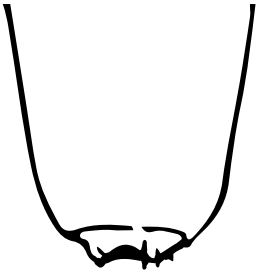
✓ **Having a Countdown trained adviser score at least 10% of the herd or 25 randomly selected cows (whichever is the greater) provides a more accurate assessment of herd teat condition.**

Search Countdown trained advisers at: dairyaustralia.com.au

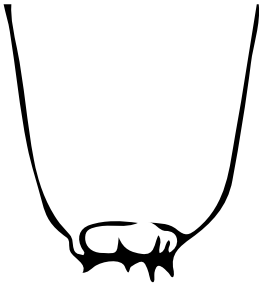
Countdown Mastitis Toolkit app – Teat assessment calculator

Normal teat side view after milking

Normal teat end view after milking.



Rough teat end after milking.

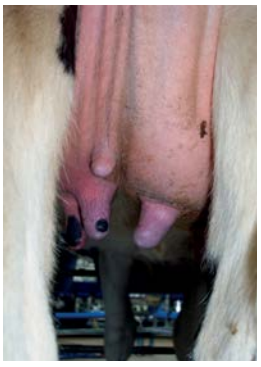


Very rough teat end after milking

Open teat orifice after milking.

Petechial haemorrhages after milking.

Ringing at teat base after milking.



Blue teat after milking.

GUIDELINE 10

Rapidly find, treat and record clinical cases

- **Abnormal milk**
- **Checking suspect cows**
- **Clots on milk filter**
- **Foremilk stripping**
- **Increased bulk milk cell counts**
- **Milk samples for culture**
- **Swollen quarters**

Throughout lactation, milking staff must keep a close watch for mastitis cases. Finding cases can sometimes be a challenge, especially in large herds, but the effort is worth it.

If clinical mastitis cases are missed, they pour millions of cells into the vat and can significantly increase Bulk Milk Cell Count. Rapid detection and treatment of cases means fewer chronic infections develop, and there is less chance of infection being passed to other cows.

A case of clinical mastitis which requires treatment occurs when there is heat, swelling or pain in the udder, or there are changes in the milk (wateriness or clots) that persist for more than three squirts of milk.

You need records of clinical cases and treatments to assess individual cows for culling and to monitor herd mastitis. Your herd has a significant problem if there are more than five clinical cases per 100 cows in the first two weeks of lactation, or two clinical cases per 100 cows in subsequent months of lactation.

Milk cultures are recommended to identify which bacteria are involved if a herd problem emerges. A sterile sample must be taken before treatment is started for each case.

10.1 Monitor daily Bulk Milk Cell Counts (if available).

A sudden increase may indicate one or more missed clinical cases. If your **Bulk Milk Cell Counts** are usually less than 200 000, a 10% increase may indicate a missed clinical case.

Bulk Milk Cell Count, refer page 7

10.2 Check for swollen quarters and quarters that don't milk out.

Both cups-on and cups-off operators should be looking for swollen quarters at every milking. Cups-off operators may see 'strings' of mastitis hanging from teat ends.

Staph aureus, refer page 3

10.3 Watch for clots on the milk filter.

Check the filter after every milking, before washing the plant.

If there is a separate mastitis herd, check before these cows are milked.

Learning to assess the nature of the material on the milk filter (reading the filter) can be very useful.

Know how to recognise the difference between mastitis clots and clumps of Internal Teat Sealant. Clumps of teat sealant will smear or spread out when rubbed.

If there are any clots on the filter, examine suspect cows at the next milking.

Check the filter again at the next milking. If clots are still present, perform a close examination of all cows at the subsequent milking.

Checking the milk filter.

10.4 If close examination of cows is required, check every quarter of 'suspect cows' for clots before applying the machines.

Refer to Guideline 5.2 – foremilk stripping, page 32

Suspect cows include:

- Cows which have not milked out.
- Cows which have recently had a case of mastitis (check clinical records for last month).
- Cows known to have had a high Individual Cow Cell Count (check last Milk Recording sheet).
- Recently calved cows, cows with teat damage or sores.

Refer to Guideline 12 – Use Individual Cow Cell Counts for management decisions, page 57

Stripping foremilk involves squirting a few streams of milk preferably onto a black surface. Milk containing infection may be spread during this procedure, so avoid splashes or sprays of milk.

Gloves should always be used. Good milkers learn to strip without getting milk on their gloves.

Look for clots, watery or discoloured milk that persists for more than three squirts.

Quarters with a few small flecks only in the first three squirts may be left untreated and checked again next milking. If these flecks continue every milking, consider taking a milk sample for culture and check the Individual Cow Cell Count history.

Rapid Mastitis Test, Individual Cow Cell Counts or hand-held conductivity meters are useful for identifying subclinical mastitis. Current knowledge does not support the treatment of subclinical mastitis during lactation.

For cows that are not sick, treatment should only occur when visible changes are present in milk (The exception to this may be if Strep agalactiae is the infecting bacteria. The use of treatment protocols in this situation should be done after, consulting your vet).

10.5 Check every quarter of every cow for abnormal milk before applying machines in the next milking, if the cause of the clots is not found in the suspect cows.

Use the technique for stripping foremilk described in Guidelines 5.2 and 10.4. If in doubt, recheck the cows again next milking.

10.6 Send milk samples for culture to establish the organisms involved in the herd, if concerned by the number of cases.

If you have had more than two cases per 100 cows per month in the past two months, or are concerned about the type of clinical cases of mastitis occurring, it is worthwhile checking the organism involved.

Samples for mastitis culture can be frozen and stored, so taking samples from all cases and freezing them allows you to send them for laboratory examination later, if necessary. Frozen storage of more than about four weeks reduces the chance of obtaining a positive culture result.

10.7 Treat and record clinical cases as recommended by the guidelines in this Countdown publication.

10.8 Consider daily foremilk stripping, especially at high-risk times such as during outbreaks of clinical cases.

Hand-held conductivity meters, refer page 9

Strep agalactiae, refer page 3

Refer to Fact Sheet O – Surveillance systems for clinical mastitis, on page 136

Refer to Fact Sheet A – Milk cultures, on page 99

Refer to Guideline 4 – Rapidly find, treat and record clinical cases in freshly calved cows, page 23, and Fact Sheet E – Records to keep on clinical cases of mastitis, page 110

Refer to Guideline 5 – Use good milking technique and a consistent routine, page 27

✓ **To reduce workload spread the foremilk stripping over two milkings. Check the left quarters at one milking, and the right quarters at the next.**

GUIDELINE 11

Monitor Bulk Milk Cell Counts

- **Checking trends**
- **Clinical cases**
- **Seeking advice**

The BMCC is an indirect way of estimating the level of subclinical mastitis in the herd. Each 100 000 cells/mL indicates approximately 10% of cows are infected.

A series of BMCCs should be assessed to see both the level and the trend for a herd.

In herds with BMCCs below 200 000, a sudden increase (of 10% or more) may indicate that a clinical case has been missed. Herds with higher BMCCs have much more fluctuation of BMCCs on a day-to-day basis because there are so many infected quarters.

11.1 Check Bulk Milk Cell Counts when they arrive, to see if they have risen.

Ask your factory to send each **Bulk Milk Cell Count** when it is available.

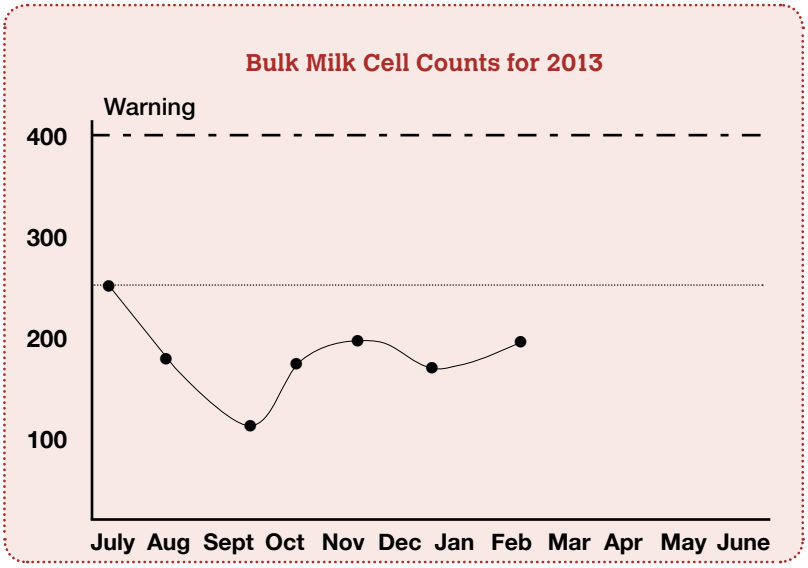
Use a graph to help watch out for rising trend changes.

Bulk Milk Cell Count, refer page 7

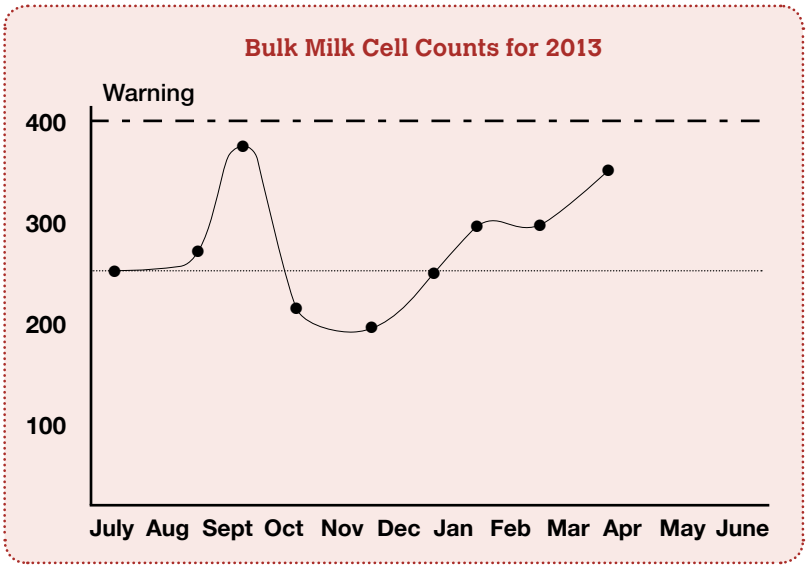
11.2 Consult with your factory field officer or veterinarian if close to, or in receipt of, Bulk Milk Cell Counts which would downgrade milk.

11.3 Check for clinical cases – undetected clinicals can cause Bulk Milk Cell Counts to rise.

If your Bulk Milk Cell Counts are usually less than 200 000/mL, a 10% increase may indicate a missed clinical case.



As you receive Bulk Milk Cell Counts from your factory, plot them on a graph like this one.



This graph shows a 'spike' in September and a worrying trend of increasing BMCCs from December. If your graph shows this type of trend, consult with your factory field officer or veterinarian.

GUIDELINE 12

Use Individual Cow Cell Counts for management decisions

- **Chronically infected cows**
- **Infection spread**
- **Seeking advice**
- **Monitoring heifers**

Regular ICCCs enable you to monitor udder health over each lactation. They also give you an option for **Selective Dry Cow Treatment**, and allow you to assess the contribution of individual cows to **Bulk Milk Cell Count** problems if they arise and create a preferential culling list

Recent Australian evidence shows that it is usually not economic to treat high cell count cows with antibiotics during lactation, unless these cows have **Strep agalactiae** infections.

Selective Dry Cow Treatment, refer page 8

Bulk Milk Cell Count, refer page 7

Strep agalactiae, refer page 3

12.1 Consult your veterinarian or factory field officer for advice on management of cows contributing high numbers of cells to the vat. Take action if Bulk Milk Cell Count premiums are being lost or you are approaching penalty levels.

Management options may include:

- Finding and excluding undetected clinical cases.
- Excluding high ICCC cows from supply – this is a short term solution only.
- Drying-off individual quarters of specific cows and making her a '3-teater'.
- Drying-off individual cows early.
- Culling high ICCC cows.
- Treatment if *Strep agalactiae* is identified as a problem in the herd.

12.2 Consider milking chronically infected cows last to avoid contaminating other cows.

In some herds it is often feasible to manage the high ICCC cows in a separate herd and milk them last.

Some electronic identification and drafting systems may allow high ICCC cows to be drafted out before milking, and milked last

12.3 Watch for evidence of spread of infection in the herd by checking the percentage of cows and heifers with increased cell counts each month.

Heifers are likely to be clean of contagious mastitis bacteria at calving, and so can be an 'indicator group' for spread of infection.

Cell counts are a guide to infection status of individual animals, and will only give a guide to infection spread. Where contagious mastitis bacteria are concerned (especially **Staph aureus**) fluctuations in cell count occur in infected animals, and a peak cell count over the season should be used. A reduction in cell count in tests later in lactation does not necessarily mean that the infection has cleared up.

In herds with satisfactory mastitis control, no more than 1% additional heifers should have a peak ICCC of greater than 250 000 cells/mL each month.

For example, if 10% of heifers have a peak cell count of greater than 250 000 cells/mL in November, no more than 11% should have a peak cell count of 250 000 cells/mL by December.

12.4 Check the new infection rate on your Mastitis Focus report.

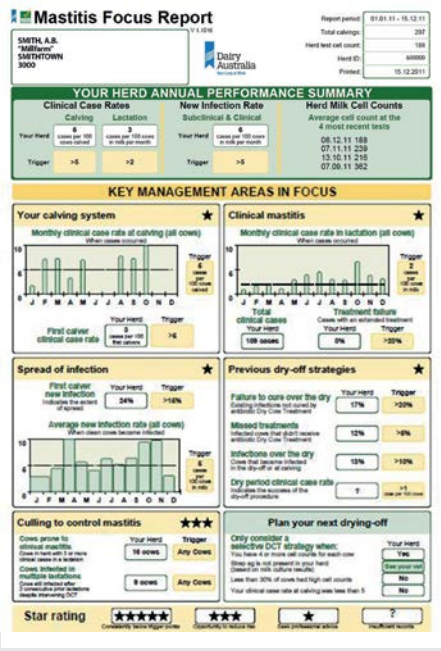
The spread of infection graph indicates how quickly infection is spreading to clean cows. This is usually not obvious as most mastitis infections are subclinical.

The new infection rate can only be measured in herds that participate in herd testing. Accuracy is further increased if clinical mastitis and Dry Cow Treatment records are uploaded to your herd test provider database.

✓ **Enrol for a minimum of bi-monthly herd testing, which generally equates to four herd tests per lactation.**

Staph aureus, refer page 3

✗ **A single ICCC (eg from a spot test) needs to be interpreted with caution. An ICCC pattern over time more accurately assesses the status of an individual cow.**



Refer to:
www.mastitisfocus.com.au

GUIDELINE 13

Seek professional advice if problems persist

- **Acting on warning levels**
- **Preventative action**
- **Recording problems**

Assistance in investigating and solving mastitis and milk quality problems is available in all dairying regions. A team approach is often required because solutions require the expertise of a number of professionals. Countdown is providing training in these skills for veterinarians, milking machine technicians and dairy field officers throughout Australia.

Factor	Your figures	Warning level, seek help
Bulk milk		Average for past six months above 250,000 cells/ml **or** More than five consecutive 10-day periods above premium threshold.
Clinical case rate		More than five clinical cases per 100 cows in the first two weeks of lactation **or** More than two clinical cases per 100 cows in subsequent months of lactation.
Cultures		The presence of Strep agalactiae or Mycoplasma.
Individual cow cell counts		More than 1% extra cows and heifers peak cell counts over 250,000 cells/mL each month.
Teat condition		Is unacceptable and does not improve three weeks after changes are made to machines or disinfectant mix.

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

Regular checking of key indicators provides an early warning of problems. Seek advice and put into action the advice you are given.

Countdown trained advisers have additional skills to be able to assess mastitis risk through the Countdown Mastitis Investigation Pack

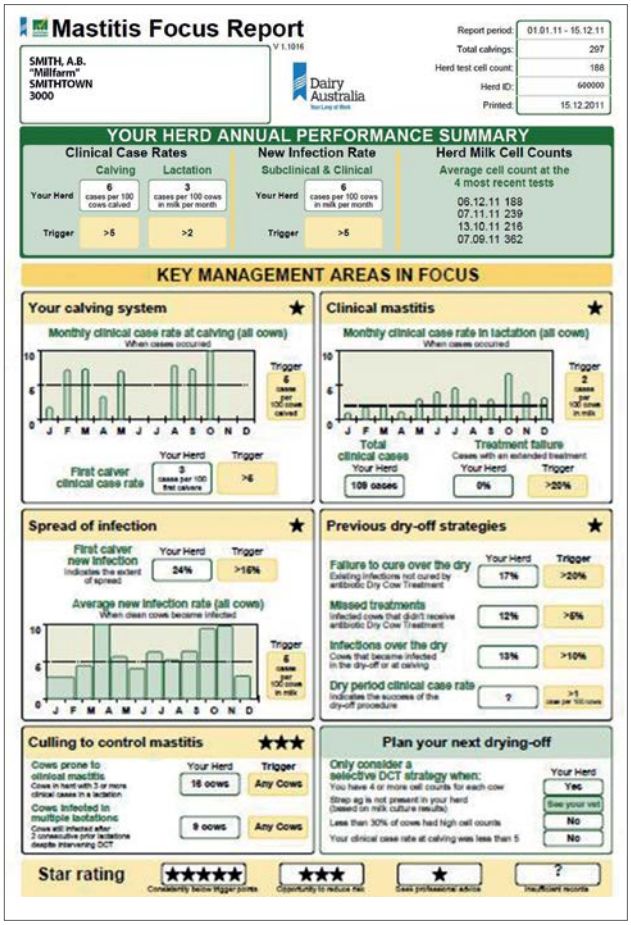
13.2 Record problems and actions taken.

Work with your advisor(s) to review changes in mastitis indicators over time.

It's easier to draw up an appropriate action plan if you have good records for you Countdown advisor to go through.

13.3 Obtain a Mastitis Focus report for the herd

Check your Mastitis Focus report after each herd test or after uploading clinical mastitis records. The report uses clinical mastitis treatment records and individual cow ICCC data to give an overview of udder health in your herd, and help identify problem areas and risks as well as track progress after management changes.
www.mastitisfocus.com.au



✓ **A Mastitis Focus report will provide an overview of udder health in your herd. It helps identify problem areas and potential risks as well as tracking progress after making management changes.**

Late Lactation

Last 2–3 months of lactation. Continue all recommendations from lactation period and the following:

GUIDELINE 14

Decide dry cow mastitis strategy

- **Blanket DCT**
- **Collecting data**
- **Dates to dry-off**
- **DCT choice**
- **DCT storage**
- **High cell count cows**
- **Selective DCT**
- **Veterinary advice**

Drying-off dates

After each lactation, dairy cows require a dry period which is sufficiently long to allow the udder tissue to repair and rejuvenate. Many of the cells that produce milk are removed and replaced again before the next calving. A minimum of six weeks (preferably eight weeks) is recommended between drying-off and calving.

14.1 Use expected calving dates to make a list of drying-off dates, ensuring that all cows get at least six weeks (preferably eight weeks) dry period.

In seasonal herds it is often practical to plan to dry-off batches of cows.

14.2 Consider drying-off high cell count cows early to help lower Bulk Milk Cell Counts.

These cows may jeopardise milk quality, especially in seasonal herds.

Other considerations (eg body condition score, production levels, feed availability) may also indicate that earlier drying-off dates are appropriate for some cows.

Use Dry Cow Treatment (DCT) in these high cell count cows if they are to be kept for the next lactation.

Bulk Milk Cell Counts, refer page 7

Refer to Fact sheet C – Guide to the choice of selective or blanket DCT, page 106

Dry Cow Treatment

Dry Cow Treatment is used to:

- Treat existing infections which have not been cured during lactation
- Reduce the number of new infections which may occur during the dry period

Dry Cow Treatment is a formulation of antibiotic prepared for administration into the udder immediately after the last milking of a lactation. It is designed to remain in the udder in concentrations high enough to kill mastitis bacteria for a period which depends on the product used (usually between 20 and 70 days). The prolonged time of exposure to antibiotic and the formulation enhance penetration and give an increased chance of curing infections embedded deep in the udder.

Dry Cow Treatment also protects udders from new infections in the dry period. Research in New Zealand has shown that this occurs directly through the antibiotic presence soon after drying-off, and indirectly by promoting the formation of the natural keratin plug which seals the teat canal.

Dry Cow Treatment products do not protect against some environmental bacteria which may be introduced into the udder if administration is not done very cleanly. These environmental bacteria may cause severe clinical mastitis.

14.3 Collect data to assess herd mastitis level.

You will require:

- Bulk Milk Cell Counts for the last six months.
- Individual Cow Cell Counts. At least three ICCCs are needed, spread through the current lactation for all cows to be dried-off. It is unreliable to use milk recording ‘spot test’ to select Dry Cow Treatment.
- Records of clinical cases.

Individual Cow Cell Counts, refer page 6

14.4 Plan to use Dry Cow Treatment in all appropriate cows in the herd.

Use Selective Dry Cow Treatment if possible, or Blanket Dry Cow Treatment if necessary. Seek advice from your veterinarian.

If using Blanket DCT, treat all quarters of all cows.

If using Selective DCT, treat all quarters of all cows with a peak ICCC of above 250,000 cells/mL during the current lactation, and all cows which have had a clinical case in the current lactation.

Do not omit to treat first lactation cows if indicated – they have the best cure rates.

Do not treat cows which are to be culled after drying-off.

Do not treat blind quarters or quarters that have not been milked for some time after being made 3-teaters.

Refer to Fact Sheet C – Guide to the choice of Selective or Blanket Dry Cow Treatment, page 106

14.5 Choose the Dry Cow Treatment product to be used – consult your veterinarian.

Your veterinarian will help you assess factors such as:

- Level of infection in your herd.
- Previous culture results and antibiotic responses on your property.
- Published cure rates of products for existing infections.
- Claimed period of protection of products for new infections.
- Minimum dry periods of products and anticipated dry period lengths of cows.
- Training needs of staff or organising help with the dry cow process.

Refer to Fact Sheet D – Guide to withholding periods after use of Dry Cow Treatment, page 107

14.6 Decide if a teat sealant product should be used,

consult your veterinarian.

Internal Teat Sealants (ITS) are used to:

1. Protect uninfected quarters during the dry period and at calving.
2. Extend protection provided by DCT.

- Internal Teat Sealants (ITS) contains an inert non-antibiotic product that stays inside the teat throughout the dry period. It provides a physical barrier inside the teat canal that stops bacteria moving up into the udder and causing an infection.
- ITS can extend protection by an antibiotic DCT, when administered immediately after the antibiotic tube, at drying-off. This may be appropriate for cows with extended dry periods (beyond 8–10 weeks), for higher ICCC cows, or for herds with a particularly high risk of mastitis around calving.
- As ITS contain no antibiotic, they will not kill bacteria already inside the gland. Therefore cows suspected to be infected (eg high ICCC) should not be treated with ITS only. Also, ITS cannot kill bacteria that may be pushed inside the teat canal if the administration is done poorly. These environmental bacteria can cause severe mastitis.

14.7 Purchase and store the Dry Cow Treatment you will need at drying-off.

Purchase the required number of tubes for all quarters of all cows to be treated.

Store in cool, clean environment.

Do not store Dry Cow Treatment near tubes of Lactating Cow antibiotic. This reduces the risk of accidental administration of DCT to milking cows.

Ensure you have methylated spirits and cotton balls, or disinfectant teat wipes to disinfect teat ends.

Use fresh supplies of teat wipes: once opened containers of teat wipes dry out quickly over a few days and are then ineffective.

✓ **Hygienic preparation of each teat before infusing intra-mammary treatments is critical, especially for teat sealant used alone. Discuss the training needs of the farm team with your veterinarian.**

GUIDELINE 15

Cull persistently infected cows

- **High cell count cows**
- **Problems in consecutive lactations**
- **Recurrent clinical cases**

Culling cows is the only way to eliminate some infections. It reduces bacterial challenge to clean cows, and may have a significant impact on **Bulk Milk Cell Counts**.

Despite long action and formulation to maximise penetration, **Dry Cow Treatment** does not cure all existing infections. Many studies worldwide have established that cure rates are lower for older cows with chronic infections. Some particular bacteria are also very difficult to treat successfully in all age groups.

Culling infected (particularly older) cows is a key strategy in mastitis control. Chronically infected cows are likely to be a source of bacteria for other cows. Culling cows with chronic infections helps protect the healthy, young cows which are the future of the herd.

A small number of high cell count cows can have a significant effect on Bulk Milk Cell Count level and milk quality payments. A decision to cull these cows should be based on economics – loss of net milk yield versus gain in milk quality payment (BMCC premium).

Although culling is important in mastitis control, it is an expensive option. Farm cell count problems are seldom solved by culling alone. Failure to prevent new infections will mean that other cows take their place at the top of the high cell count list.

Bulk Milk Cell Counts, refer page 7

Dry Cow Treatment, refer page 8

15.1 Consider culling any cow when you find her third clinical case for this lactation.

If only one quarter is involved, you may prefer to dry-off that quarter and milk the cow as a '3-teater', but these cows increase the risk of errors in cup application at milking. Use a simple and visual system that all milkers are familiar with to reduce the risk of accidental attachment of the teat cup to that quarter.

✓ **Cows with high cell counts pose a risk to other cows. Where possible try to separate them and milk last.**

Ensure that cows with three clinical cases (per cow) during the current lactation have been considered on the culling list.

Do not use Dry Cow Treatment on cows which you are going to cull.

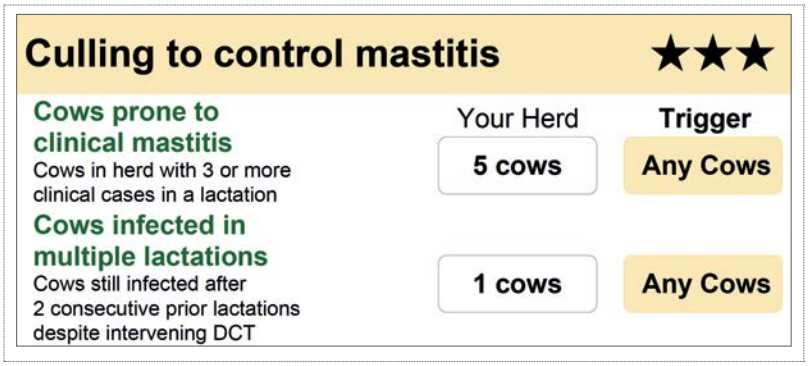
15.2 Consider culling cows with high cell counts in two consecutive lactations, despite treatment with Dry Cow Treatment in the dry period in between.

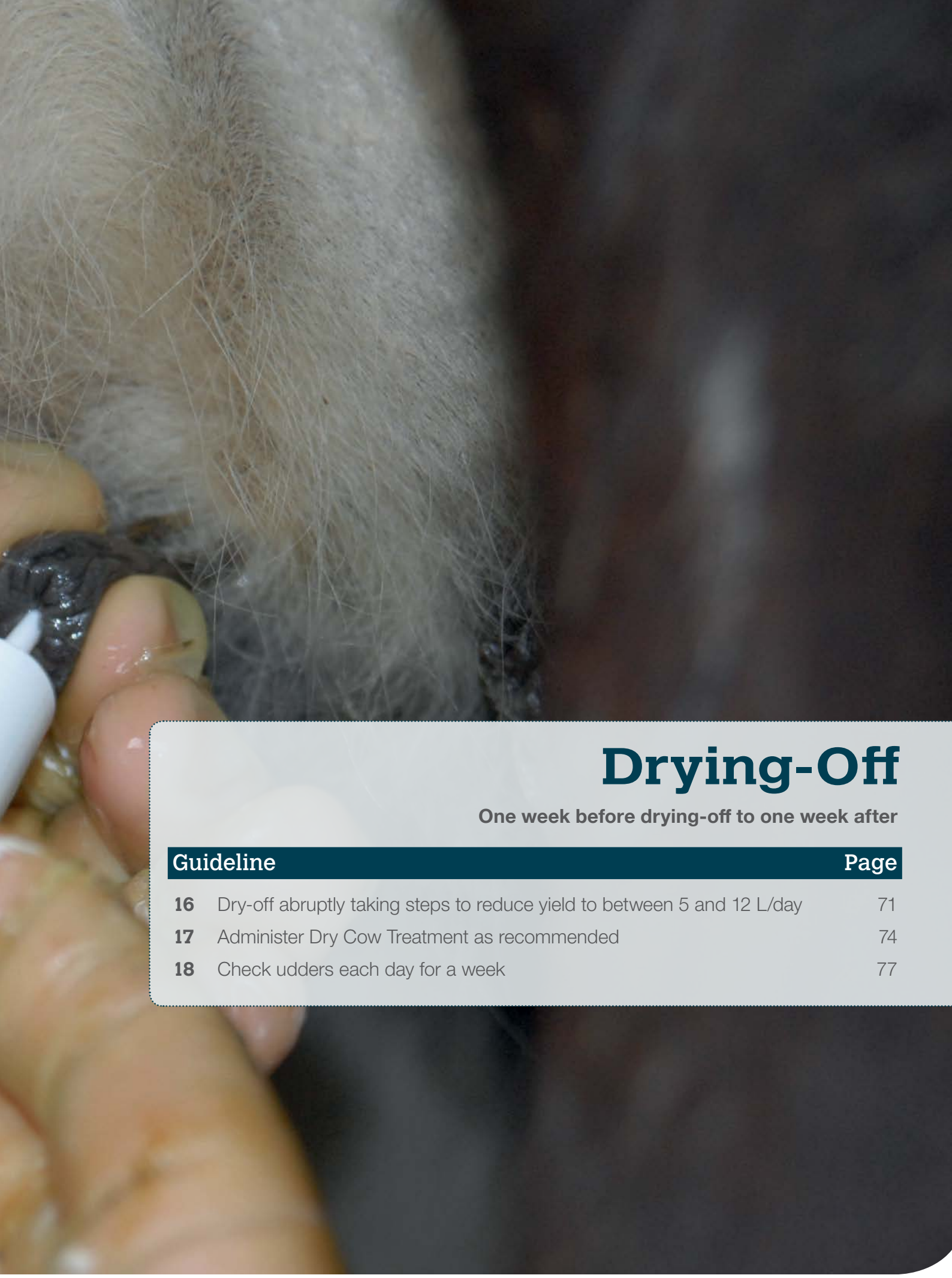
If strategic (voluntary) culling is possible in the herd, include cell counts as a factor to be assessed.

Cows to consider for culling are those which are unlikely to cure. For example, cows which have had high cell counts throughout two consecutive lactations (despite receiving Dry Cow Treatment in the dry period between). Other issues such as age, level of production and reproductive status must also be considered for each cow.

15.3 Assess culling to control mastitis using Mastitis Focus

Using an up to date Mastitis Focus report will alert you to the number of potential cows in these categories.





Drying-Off

One week before drying-off to one week after

GUIDELINE 16

Dry-off abruptly taking steps to reduce yield to between 5 and 12 L/day

- **Drying-off areas**
- **Last milking dates**
- **Maintaining water supply**
- **Manipulating diet**
- **Reducing yields**
- **Teat canal sealing**
- **Yields below 5L**

As cows near the end of lactation their milk quality changes. Milk from low-producing cows may cause processing problems for some dairy products. Cows producing less than five litres per day may have an elevated cell count even if uninfected. They may contribute to a higher **Bulk Milk Cell Count** (especially in seasonal herds), even though their milk volume is low.

Udder infections during the dry period can be minimised by events at drying-off. The aim is to shut down milk secretion and seal the teat canal as rapidly as possible – this sealing usually takes about two weeks. Studies in New Zealand have shown that virtually all new infections occur in quarters where the teat canal has not sealed.

Intermittent milking provides an on-going stimulus to produce milk and impedes teat sealing. If 'skip-a-day' milking is practised, mastitis risk is greatly increased.

During the first two weeks after drying-off, it is also important to minimise the number of bacteria that contaminate the teats.

Teat dipping after the last milking ensures complete coverage of the teat by disinfectant and reduces the number of **cow-associated mastitis** bacteria present on the skin.

To reduce the number of **environmental mastitis** bacteria, areas where cows lie should be as clean as possible, with no bare ground or heavy manure soiling. Outbreaks of Pseudomonas mastitis have been recorded in situations where cows lie in wet conditions in the first few days immediately after drying-off. These infections may be very severe (often fatal) and are virtually impossible to treat.

Bulk Milk Cell Count, refer page 7

Cow-associated mastitis, refer page 3

Environmental mastitis, refer page 4

16.1 Cows should be dried off when their production is between 5 and 12L/day.

16.2 If cows are producing less than 5L/day consult your vet before drying off to discuss the effectiveness of treatment and potential for residues after calving.

16.3 Take steps for cows producing more than 12 L/day, to reduce production to 12 L or less by the drying-off date. These steps involve reducing food intake and changing routine.

Decide the date of the final milking for target cows.

Start preparation for drying-off at least a week before date of final milking.

16.4 Dry off abruptly; do not skip days and preferably do not skip milkings.

Milk out as usual at each milking until drying-off.

Do not deliberately leave some milk in the udder (under milk). It is not necessary to leave milk in the udder at the last milking to improve the action of Dry Cow Treatment.

At the last milking:

- Milk out as usual.
- If Dry Cow Treatment is to be used, administer it as recommended by Countdown.
- If Internal Teat Sealant is to be used, administer it as recommended by Countdown.
- Cover whole surface of teat in freshly prepared teat disinfectant (dip is preferable to spray).

16.5 Don't leave cows in laneways or yards immediately after drying-off.

Avoid allowing them to lie down on bare ground or areas that are soiled with manure in the two hours immediately after you give Dry Cow Treatment.

Reducing yields

One week prior to the final milking date:

- Reduce concentrate feeding.

Three days prior to the final milking date:

- Move to a paddock with very little feed.
- Reduce feed intake to maintenance level eg approx 7–8 kg hay for a cow weighing 500 kg.
- Separate the cows from the main herd if practical.
- Change routine for milking if practical eg bring the cows to the milking area through a different entry.

Animal welfare codes require that water is available throughout.

Refer to Guideline 17 – Administer Dry Cow Treatments as recommended, page 74

16.6 Put the cows in a dry, clean paddock (not heavily soiled with manure, no bare ground, no exposure to dairy effluent) for 3–4 days after drying-off.

This paddock should be well away from the milking herd and the milking area, so cows don't have the stimulus to let down milk.

16.7 Continue the 'maintenance only' diet for another 3–4 days for cows that were producing 12 or more litres/day in the week before drying-off.

Refer to 'Reducing yields' on previous page

GUIDELINE 17

Administer Dry Cow Treatments as recommended

- **Avoiding injuries**
- **Disinfecting teat ends**
- **Drying-off environment**
- **Recording treatment**
- **Udder marking**
- **Withholding periods**

Administration of Dry Cow Treatment has some hazards, for cows and operators. It is critical that it is carried out properly.

It is easy to introduce bacteria into the teat if the teat end is not disinfected properly, or it is contaminated before it has sealed. Infection with environmental bacteria can cause severe mastitis.

Operators can be injured by cows during administration of Dry Cow Treatment; it is important to take time and have help.

Antibiotic residues in milk and meat (including calves) must be avoided by observing the minimum dry periods and withholding periods after calving which are specified for each product. This is particularly important where cows are culled during the dry period, or calve earlier than expected.

17.1 Plan for the time and effort that treating cows with Dry Cow Treatment takes. Administration of Dry Cow Treatment is a critical and difficult job. Ensure that responsible operators are trained adequately in the procedure and supervised well.

To do a good job with Dry Cow Treatment, one person can only handle about 20 cows per hour.

More than one person is often needed to do the job well and reduce the hazards associated with the procedure, especially if cows are not used to having their teats handled.

Select reasonable sized groups of cows to be treated after any one milking, especially in seasonal herds.

✓ **Good teat end preparation and intra-mammary infusion technique is essential. Consider a refresher demonstration for the farm team, delivered by your veterinarian.**

If practicable, at the previous milking, draft out the next batch of cows to be treated. Milk and treat these cows before bringing the remainder of the herd through the dairy. This ensures maximum cleanliness of the plant at the time of treatment.

Wash out the dairy between batches of cows if several batches are to be treated after one milking.

17.2 Treat all cows if using Blanket Dry Cow Treatment. If using Selective Dry Cow Treatment, treat all cows with any ICCC above 250 000 cells/mL during the lactation, and any cow which has had a clinical case during the lactation.

17.3 Do not use Dry Cow Treatment on cows that are to be culled.

17.4 Use Dry Cow Treatment only at the cow's last milking for the current lactation.

Dry Cow Treatment is registered only for use immediately after a cow's last milking for a lactation. Off-label use is strongly discouraged because drug residue risks increase and cure rates are likely to be reduced.

17.5 Administer the treatments as recommended ensuring the teat ends are sanitised properly.

17.6 Treat all quarters of cows to receive Dry Cow Treatment (except quarters that have been dried off for some time in cows milked as '3-teaters').

If a quarter is dry, absorption of the Dry Cow Treatment in the quarter will be changed. Off-label use is strongly discouraged because drug residue risks increase and cure rates are likely to be reduced. Injectable antibiotics may be used in these cases – consult with your veterinarian.

17.7 Dip or spray teats with freshly made up teat disinfectant after treatment.

Even if you usually spray, dipping is preferable after Dry Cow Treatment to ensure complete coverage of the teat. If not dipping, thoroughly spray teats with freshly made teat disinfectant after treating. Manually apply the teat spray after treating with antibiotic DCT and/or Internal Teat Sealant (ITS), if you usually use an automatic teat spraying system. Make sure that all surfaces of the teats are covered with teat spray.

Refer to Guideline 14 – Decide dry cow mastitis strategy, page 63

Refer to Fact Sheet C – Guide to the choice of Selective or Blanket Dry Cow Treatment, page 106

Refer to Fact Sheet B – The correct way to give intra-mammary treatments, page 104

✕ Under no circumstances should intra-mammary tubes become wet or dirty before use. This greatly increases the risk of environmental bacteria being introduced into the udder. If you drop it, bin it!

✕ Internal Teat Sealants require a different method of administration compared to Dry Cow Treatment. Do not massage ITS into the udder.

17.8 Mark the udder (eg with a spray paint) so that cows that have received Dry Cow Treatment can be easily recognised.

This allows easy recognition if cows rejoin the herd in error. A fail safe practice is marking the udder just prior to administering the Dry Cow Treatment so that no treated cows are inadvertently missed

17.9 Record cow ID, date and product details of all Dry Cow Treatments.

If cows calve early, or a decision to cull them during the dry period is made, the date of treatment and the withholding period of the particular product must be known.

For each batch of cows treated, mark the earliest calving date allowable for the meat withholding period and minimum dry period to pass. Calves born before this date may contain antibiotics, whether they have sucked or not. They should not be sold for slaughter until the meat withholding period for that product has elapsed. Check the label.

17.10 Don't leave cows in laneways or yards immediately after Dry Cow Treatment.

Avoid allowing them to lie down on bare ground or areas that are soiled with manure in the two hours immediately after you give Dry Cow Treatment.

17.11 Put the cows in a dry, clean paddock (not heavily soiled with manure, no bare ground, no exposure to dairy effluent) for 3–4 days after Dry Cow Treatment.

This paddock should be well away from the milking herd. It is essential that cows treated with Dry Cow Treatment are not able to rejoin the herd in error. If they enter the dairy they will probably let-down milk (reducing teat plug formation) and may have the cups put on, leading to antibiotic contamination of the vat milk.

17.12 To minimise milk and antibiotic leakage, do not walk cows long distances for 3–4 days after Dry Cow Treatment is administered.

Refer to Fact Sheet D – Guide to withholding periods after use of Dry Cow Treatment, page 107

Countdown Mastitis Toolkit app – Antibiotics Reference Guide

Countdown Mastitis Toolkit app – Antibiotics Withhold calculator

GUIDELINE 18

Observe cows daily in the paddock and look for swollen quarters

- **Clinical quarters**
- **Manual check**
- **Swollen quarters**
- **Veterinary advice**

Cows are susceptible to new infections particularly in the first week of the dry period before their teats have sealed.

These infections must be identified and treated so that they do not persist and create problems after calving. Remember, however, the objective is to achieve teat plug formation quickly.

18.1 Look at udders of all cows for swollen quarters (larger than other quarters on the same cow), while cows are in the paddock.

Avoid bringing cows near the dairy area (or they may start running milk).

Observe every day for a week. Look for swollen udders and signs of sickness ie cows that are visibly slow in their movement or off their feed.

Do not handle – just look.

If a quarter is swollen, bring the suspect cow into the dairy area and check the udder manually.

18.2 Check swollen quarters manually.

Check for heat and pain – compare between all quarters.

Strip secretion from suspect quarter and check. It may be different from milk prior to drying-off (eg thicker and more 'stringy') and therefore difficult to assess.

If suspicious, treat as a clinical case.

Do not remove milk or secretion from adjacent normal quarters.

18.3 Treat clinical quarters by stripping out completely and using a full course of lactation antibiotic.

- Veterinary advice is recommended.
- Use Lactating Cow intra-mammary antibiotic (even if Dry Cow Treatment was previously used in the quarter).
- Use the full course of the antibiotic (as recommended on the label).
- Strip out completely and continue to strip out at least twice every day during the course of the treatment.
- Avoid using high doses (greater than 3 mL) of Oxytocin in late pregnant cows.
- Injectable antibiotic may be appropriate.
- Record clinical details.

Oxytocin, refer page 11

18.4 Treat again with Dry Cow Treatment and amend record of date for Minimum Dry Period when the case is resolved.

Dry Cow Treatment, refer page 8

For clinical cases that occur in the first week after drying-off, re-treatment with Dry Cow Treatment is advised. Consult with your veterinarian.

Any cows receiving re-treatment must have their details adjusted and new withholding periods recorded.

Dry Period

GUIDELINE 19

Observe cows weekly

- **Antibiotic treatment**
- **Manually check swollen quarters**
- **Watch for swollen quarters**

Dry cows should be checked regularly for changes in the udder because clinical cases can occur during the dry period and quarters that are not treated may have lower production in the next season. Visual observation of udder size and symmetry is all that is required, and often all that is possible where dry cows are kept. Some facilities for handling suspect cows are essential.

19.1 Observe cows regularly (each week) during the dry period.

Observe udders for signs of swollen quarters when carrying out normal observation of dry cows.

If quarters look swollen, bring in and check udders manually.

19.2 Check swollen quarters manually.

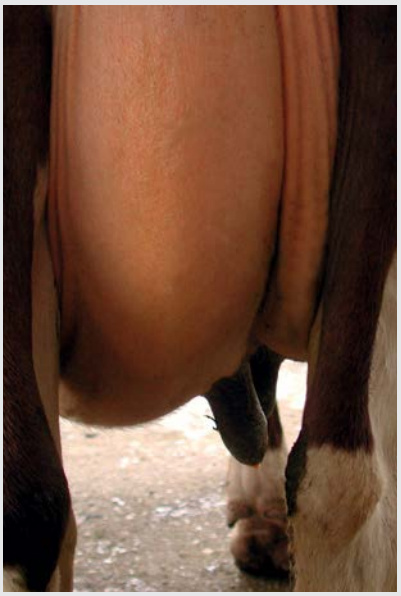
Check for heat and pain – compare between all quarters.

Strip secretion from suspect quarter and check. It may be different from milk prior to drying–off, and therefore difficult to assess.

If suspicious, treat as a clinical case. Do not remove milk or secretion from adjacent normal quarters.

Do not repeat the use of Dry Cow Treatment in these quarters – withholding periods may exceed the remainder of the dry period time.

Remember to record the full details of the clinical case and treatment.



Swollen quarter in a dry cow.

Refer to Guideline 4 – Rapidly find, treat and record clinical cases in freshly calved cows, page 23

GUIDELINE

20

Selling cows – check withholding periods

- **Selling for meat**

Local and overseas consumers demand 'clean beef', free from unacceptable chemical residues. Cows culled from our dairy herds must be free from all unacceptable residues when they are sold for slaughter. Errors have the potential to jeopardise Australia's beef export trade.

All cows must be identified if treated with any antibiotic. Dairy farmers tend to maintain markings which can be easily seen on cows during the milk withholding period, but not for the full length of the meat withholding period. They generally rely on permanent identification and written records to check when meat withholding periods have expired.

It is essential to keep records of all treatments and check these for every cow that is to be sold.

20.1 Check withholding periods.

Do not sell for meat unless the antibiotic withholding period for meat has passed.

20.2 Check Export Slaughter Interval

Ensure that where there is Export Slaughter Interval (ESI) information available for products used that these are also considered before sale.

Withholding period, refer page 12

GUIDELINE 21

Buying cows – check cell count and treatment histories, examine udders

- **BMCC history**
- **Buying heifers**
- **Checking cows**
- **DCT history**
- **ICCC history**
- **Introduced cows**
- **Milk sample culture**
- **PCR**

One of the most common ways of introducing the cow-associated mastitis bacteria into a herd is in the udders of cows that are bought in. Bacteria such as Strep agalactiae can spread rapidly through a herd – it is better not to introduce the bacteria in the first place.

21.1 Buy heifers before first calving (rather than cows), where possible.

It is likely (although not certain) that a heifer that has never been in another dairy area will be free of the major bacterial causes of mastitis.

21.2 Don't buy cows unless the Bulk Milk Cell Counts from the herd of origin are available.

If the average BMCC for the past six months is less than 200,000 cells/mL, it is unlikely to be a **Strep agalactiae** herd.

21.3 Don't buy cows unless they have Individual Cow Cell Counts.

Don't buy cows with any cell counts above 250,000 cells/mL. Be especially wary of older cows.

21.4 Ask about Dry Cow Treatment history.

If cows have received Dry Cow Treatment, you should know the product used and the date of treatment.

21.5 Check cows before buying them.

Feel udders for uneven consistency or lumps.

Look at teats for teat sores or damage.

If lactating, check foremilk by stripping milk, preferably onto a black surface, and definitely not onto your hand.

Bulk Milk Cell Counts, refer page 7

Strep agalactiae, refer page 3

Individual Cow Cell Counts, refer page 6

Dry Cow Treatment, refer page 8

Refer to Guideline 5.2 – Foremilk stripping, page 32

21.6 Check new cows again before milking them with the herd.

Feel udders for uneven consistency or lumps.

Look at teats for teat sores or damage.

Check foremilk by stripping milk, preferably onto a black surface, and definitely not onto your hand.

Milk containing infection may be spread during this procedure, so gloves should always be used, and hands washed in running water between cows.

If abnormalities are detected, have a milk sample cultured.

✓ **If cow parking is required both the host farm and the farm sending cows should seek veterinarian advice to reduce mastitis risk.**

Refer to Fact Sheet A – Milk cultures, page 99

21.7 Consider having a milk sample cultured even if no abnormalities are found when you check the udder.

A milk sample (containing an equal portion of milk from each quarter) is very likely to show Strep agalactiae if it is present. The cost of the culture is likely to be a good investment.

If Strep agalactiae is found, segregation and treatment is advised.

Consult your veterinarian for more advice.

21.8 Request a bulk milk PCR (molecular test) from the herd of origin

A milk PCR test can be easily requested from the herd of origin and arranged through the milk processor they supply.

This test is useful for screening herds for the presence of Strep agalactiae or Mycoplasma (as long as all lactating cows, including cows out of the vat, have contributed to the sample). A negative result will lower the risk of importing these bacteria.

Consult your veterinarian where a positive result is seen for either of these two bacteria.

✓ **Ask for a PCR test to rule out the presence of Strep agalactiae or Mycoplasma in the herd of origin, if purchasing cows or cow parking.**

Refer to Fact Sheet N – Using milk PCR (Molecular tests), page 32

21.9 Milk introduced cows last until you are confident that they are free of mastitis.

21.10 Don't milk other people's cows with your herd.

Review and Planning

GUIDELINE 22

Conduct annual mastitis control activities and review achievements

- **Involve everyone**
- **Set time aside**

Each year, time must be set aside to:

- Review achievements for the past 12 months.
- Undertake annual maintenance tasks.
- Set your goals for the next 12 months.
- Develop a plan to achieve these goals.

22.1 Mark 'a day in the office' on your calendar or diary.

Mark 'a day in the office' on your calendar or diary. Set time aside well in advance. This set time may be in the dry period for seasonal herds, or a convenient period in split-calving herds.

Recognise that it may require involvement of a number of people on the farm as well as your qualified advisors, and may involve a number of conversations and discussions over a period of time.

22.2 Involve all members of staff and family working on the farm in developing and reviewing mastitis control activities and achievements.

Consider also involving your factory field officer and veterinarian.

Make a list of tasks to be completed. Make sure that these tasks are allocated to someone and they set a regular time to do them.

- Review staff training requirements or refresher course. Consider enrolling in National Centre for Dairy Education Australia (NCDEA) Cups on cups off course.
- Review induction and initial training of new milk harvesters. Consider using the Countdown 2020 App as a guide.

✓ **Regardless of dairy business size, you will benefit directly from improving teamwork on your farm. To learn more visit the People in Dairy website: See Working Together module.**

✓ **Organise 'to do' lists. Make sure that these tasks are allocated to someone and then set a regular time to do them.**

Countdown Mastitis Toolkit app – Topics, new staff

- Review communication of milk quality results with staff. It is important to share both the farm's goals but also the results of the collective energy of milk harvesters in the form of up to date BMCC results or numbers of clinical cases at calving, or per month.

22.3 Make an appointment with your milking machine technician for testing, servicing and (where necessary) upgrading your milking system.

Make the appointment well in advance. The technician should be qualified.

Your milking machine should be fully tested and serviced at least once a year, and you should receive a written report.

In addition, it should be monitored, tested and adjusted as often as necessary during lactation.

Refer to Guideline 25.2 – Use a milking machine technician who tests to industry standards, page 92

Refer to Guideline 25 – Test, service and upgrade milking machines, page 92

Refer to Guideline 6 – Monitor and maintain milking machine function, page 36

GUIDELINE 23

Sign on for milk recording (herd testing)

- **Milk recording**

23.1 Utilise ICCCs as a key management tool

Good management requires information. Without records of clinicals and subclinicals revealed by cell count data, mastitis is an invisible disease.

Regular herd testing provides you with valuable information about:

- Milk yields – to aid drying-off decisions in late lactation.

Individual cow cell counts – to help:

- Identify individual cows that may be causing your bulk milk cell count to rise.
- Track new infection rate during key times of the year.
- Make decisions about drying-off treatment strategy.
- Make decisions about culling.

Refer to Fact Sheet K, Mastitis Focus, page 125

Refer to Guideline 12 – Use ICCCs for management decisions, page 57

GUIDELINE 24

Review Countdown Records

- **Review records**

24.1 Calculate the figures for your farm in the past 12 months, and set targets for the next 12 months.

A review of the past 12 months will help set targets for the next 12 months. This review should summarise:

- The herd structure and production eg numbers of lactating cows, replacements and culls, age structure, production.
- Major elements of the mastitis control programme.
- Results of any special investigations eg bacterial cultures or machine upgrades.
- Any major events that affected the mastitis program or the team.
- Brief description of the farm team members, including training that occurred.
- A review of the mastitis indicators eg reviewing bulk milk cell count trends through the year and clinical case rates.
- A Countdown Mastitis Focus report (if available) and the Countdown Mastitis Toolkit App will help make this task much easier.

Targets for the next 12 months should be:

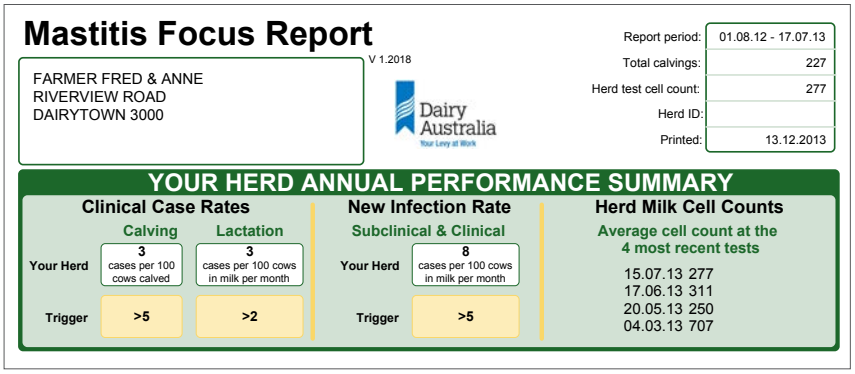
- Realistic and achievable.
- More ambitious than the minimum requirements for the dairy company.
- More stringent than the Countdown warning levels or 'triggers for action'.

✓ **A Mastitis Focus report will provide an overview of udder health in your herd. It helps identify problem areas and potential risks as well as tracking progress after making management changes.**

24.2 Seek advice if farm indexes are above the warning levels.

Use **www.mastitisfocus.com.au** to generate Mastitis Focus Reports or ask your herd recording organisation to generate one. The Mastitis Focus report uses your herd testing records and clinical case records to give an accurate overview of udder health in your herd. They help identify problem areas and track progress after any management changes are made.

24.3 Consider setting time to review milk quality with your Countdown Adviser



Mastitis Focus Report

V 1.2018

FARMER FRED & ANNE
RIVERVIEW ROAD
DAIRYTOWN 3000

Dairy Australia
Your Levy at Work

Report period:	01.08.12 - 17.07.13
Total calvings:	227
Herd test cell count:	277
Herd ID:	
Printed:	13.12.2013

YOUR HERD ANNUAL PERFORMANCE SUMMARY

Clinical Case Rates

	Calving	Lactation
Your Herd	3 cases per 100 cows calved	3 cases per 100 cows in milk per month
Trigger	>5	>2

New Infection Rate

Subclinical & Clinical

Your Herd	8 cases per 100 cows in milk per month
Trigger	>5

Herd Milk Cell Counts

Average cell count at the 4 most recent tests

15.07.13 277
17.06.13 311
20.05.13 250
04.03.13 707

Refer to Guideline 13.1 – Seek professional advice from your veterinarian, factory field officer or a milking machine technician if mastitis indexes are above warning levels, page 59

GUIDELINE 25

Test, service and upgrade milking machines

- **Milking machines**

Testing, servicing and upgrading milking machines is absolutely essential.

Virtually all infections enter the udder through the teat openings.

Your milking machine spends a total of 50–100 hours attached to each teat in a lactation. Machine malfunctions cause teat damage and increase the risk of infection.

Regular service and maintenance of your milking machine will help ensure that:

- Speed and completeness of milking is maintained
- Risk of mastitis due to milking machine faults is minimised

25.1 Fully test and service your milking machine at least once per year.

In addition, it should be monitored, tested and adjusted as often as necessary during lactation.

A complete milking machine test should be conducted:

- As an acceptance test for a new milking system (before making the final payment!).
- After any major service work or upgrade on an existing installation.
- At least once per year for all systems – or, preferably, after each 1500 – 2000 hours of operation.

25.2 Use a milking machine technician who tests to industry standards.

Make sure the technician performs the tests according to industry standards.

Refer to Guideline 6 – Monitor and maintain milking machine function, page 36

✓ **Don't rely only on an annual service. Immediate testing and service is recommended when: cows appear to milk slowly or incompletely, teatcups slip frequently, teat condition is poor or cows appear uncomfortable**

25.3 Insist that the technician provides and explains a full written report.

An industry standard test report form provides a summary on the first page, and full details of milking machine performance before and after adjustment. The report should compare your machine performance against the current industry recommendations.

The technician should explain the details of the report to you.

Each pulsator should be checked and a printout attached to the industry standard report.

25.4 Carry out all recommendations.

Make a plan with a schedule which will fit in with work commitments and cash flow. Don't put off making your plan for some other time.

You may also find it useful to discuss the plan with your other milk quality advisers (your factory field officer, veterinarian or other milk harvesting specialist).

Make sure that the report describes which recommendations are:

- Urgent and require immediate action.
- Important but not urgent.
- Ideal or cosmetic changes.

Refer to Fact Sheet F – milking machine test report form example, page 112

GUIDELINE

26

Service teat spray units and review teat disinfectant which is to be used

- **Teat spray units**
- **Teat disinfectant**

26.1 Clean and check teat spraying equipment.

Check for sediment in the bottom of the stock container of teat disinfectant, or the spray mix being used on cows' teats. Clean the container if required.

26.2 Review teat disinfectant and method of application to be used.

Factors to consider include:

- previous experience on the property (including hand skin reactions, teat skin condition).
- published effectiveness of products.
- how much you want to be able to see the teat disinfectant on the teats after application – some products are coloured and easier to see.
- price (taking account of dilution – larger volume products may not be as cost-effective as smaller volumes of stock solution when diluted to the recommended concentrations).
- how the teat disinfectant is to be applied to teats – it is easier to do a better job of covering teats by dipping than spraying. Spraying typically uses twice as much disinfectant to get the same teat coverage.

Refer to Fact Sheet G – The correct way to mix teat disinfectant, page 116

GUIDELINE 27

Fix areas that make udders muddy

- **Muddy areas**

Keeping udders and teats clean helps reduce the risk of mastitis due to environmental bacteria. Areas where cows stand and lie down should be kept clear of manure and dirt to help keep udders and teats as clean as possible.

Regular cleaning and maintenance of high use areas will help make the task less difficult.

27.1 Clean and renovate areas around troughs, gates, laneways and the entrance to the dairy area.

Adequate drainage and proper formation of lanes will decrease problems with dirty teats and udders.

Don't allow cows to enter dams, channels or other waterways to drink. If it is impossible to replace these water sources, limit access to the edge of a small pond area by fencing, and reinforce the bank with sleepers or wire grating.

- Consider fencing off highly contaminated areas; under or near trees.
- Consider concreting high traffic areas which regularly become muddy.
- Ensure drains and culverts are sprayed and cleaned out.

27.2 Regularly clean and maintain areas where cows are stood off-pasture.

All areas where cows are held for any period of time should have good drainage, and be regularly cleaned and maintained to help keep teats and udders clean.

Depending on the surface materials used, this may mean:

- Washing holding yards after every use.
- Scraping laneways and areas where cows feed or stand daily.
- Cleaning up loafing areas daily or weekly.

If free-stalls or cubicles are being used for lactating cows, these should be:

- Cleaned or scraped off daily.
- Fresh bedding and/or lime applied after cleaning.
- Loafing areas maintained so that water does not pool.

✓ **If muddy areas are unavoidable, ensure that dirty teats are washed and dried before cup attachment. See Fact Sheet P, page 138, for more on washing and drying teats. Thoroughly spray with teat disinfectant after milking.**

Fact Sheets

Fact Sheet

A

Milk Cultures

What is milk culturing?

It isn't possible to tell which bacteria are responsible for infections by looking at milk, udders or cell counts – you have to actually grow the bugs to know for sure.

A milk sample can be processed in microbiology labs so that the bacteria that are present can be identified. This involves the lab spreading some of the milk on sterile plates covered with particular growth factors, incubating the plates for defined periods and assessing the bacterial colonies that grow. This is called milk culturing.

The lab can also check which antibiotics are likely to be effective against each bacteria (called 'sensitivity testing'), but these tests only provide a guide because conditions in the lab are never exactly the same as in the cow.

When is it worthwhile culturing milk samples from cows?

Milk cultures are recommended whenever a herd problem emerges – either more clinical cases than acceptable, or rising cell counts. They are used to indicate which bacteria are present within the herd, so samples from a number of cows (a minimum of 10) are required to give a representative picture.

Virtually all mastitis is caused by bacterial infection. It is essential to know which bacteria (eg Staph aureus, Strep agalactiae, Strep uberis) are present to choose where to look for problems and select appropriate management strategies.

Cost is important but if a herd mastitis problem is emerging, the cost of the cultures is likely to only be a small issue. Cultures vary from about $6 to $20 per sample depending on factors such as the number submitted at the same time and transport costs, etc.

Would you sample quarters with clinical mastitis?

Yes, in most cases it is a good insurance policy to take samples – but you won't necessarily choose to have them all cultured. You can collect them from all clinical cases before treatment (any antibiotic in the sample will make it very difficult to culture), store them frozen and only submit them if a cow fails to respond to treatment, or there are a higher number of cases than you expected (eg more than five clinical cases per 100 cows in the first month of lactation).

If you only end up having a couple of cases and they respond to treatment, you don't need to send the samples for culture, but if you do wish to investigate further, you've got some to start with.

What about cows with high cell counts?

To investigate a herd cell count problem, it is sensible to sample some of the individual cows with high cell counts. Here the sample is often a composite one (some milk from all four quarters) and some infections will be missed because the bacteria from an infected quarter are diluted by milk from the others. To ensure you get results from at least 10 cows, it is worth taking samples from a few extras.

Current research shows that it is not economic to treat lactating cows with high cell counts caused by Staph aureus infections, but infections with Strep bacteria are more responsive to antibiotic treatment and may be worth treating. Cultures are essential if you are contemplating treatments, and discussion with your veterinarian is recommended.

Are there any traps in milk culturing?

The main problems are associated with collection and transport of samples. Milk is a good place for contaminants to survive, and most of these bacteria can also cause mastitis, so very confusing results can occur if any contamination occurs. Spread of bacteria between cows can also occur, so it is important to use gloves and disinfectant.

There is a specific procedure to follow to collect good quality samples. Bottles must be sterile (not just clean) and teat ends must be scrubbed with 70% alcohol to disinfect them adequately. You can get sterile containers from your vet or lab. The step-by-step guide below tells you how to collect the milk.

Ideally samples should be kept cool and arrive at the lab within 24 hours. If this isn't possible, most mastitis bacteria survive freezing, so you can store them in the freezer until delivery.

Collecting milk samples

Sterile collection is the most important step for successful culturing of milk samples. Poor technique will give misleading results and resampling will be required. A good technique involves planning and some patience.

■ Have the following ready in the dairy:

☐ Sterile sample bottles. You can obtain these from your vet or lab. Sterile collection requires using only sterile bottles. It doesn't matter how well washed a Vegemite jar is – it won't do.

☐ A marker to label the bottle.

☐ Disposable gloves.

☐ Paper towels.

☐ Cotton balls.

☐ A mixture of 70% alcohol (seven parts methylated spirits and three parts water) or teat wipes.

☐ A cooled esky or similar portable and temporary cooling system.

■ Label the bottle.

☐ Unlabelled samples are useless, so make sure you identify the sample.

☐ Do this before collection as it can be difficult to write on a label with milk sprayed on it.

☐ Use the marker pen to clearly label details of the sample – the date, your name, the cow's ID, the quarter samples, and why the sample was collected.

Label the bottle

■ **Restrain the cow so she can't move around too much.**

☐ Sometimes this is difficult on a platform, but do what is possible.

☐ Another person holding the cow's tail as a 'tail jack' can be helpful.

■ **Put on disposable gloves.**

■ **Wash and dry the teats.**

☐ You might skip this step if the teats look clean.

☐ Wash the teats with running water. Avoid getting too much water on the udder – the udder is hard to dry, and drops of contaminated water can easily fall in the sample.

☐ Dry with a paper towel.

■ **Completely disinfect the end of the teats to be sampled. This step is critical.**

☐ If you are sampling more than one teat, disinfect the ones furthest away first. This reduces the risk of unintentionally contaminating an already disinfected teat.

☐ Disinfect by vigorously scrubbing the teat opening with a cotton ball and alcohol (or teat wipes) for a minimum of 10 seconds.

☐ Check the cotton ball. If there is any dirty colour, repeat the scrub using a clean cotton ball until there is no more dirt seen.

Disinfect teat end

■ **Get the sterile bottle ready.**

☐ Remove the cap and place upside down in a position not likely to be contaminated.

☐ Do not touch the inside surface of the cap or bottle.

■ **Establish the direction of flow from the teat.**

☐ Squeeze the first couple of squirts of milk onto the ground.

☐ This also helps to remove any contaminants that might be just inside the opening of the teat.

■ **Collect the sample in the bottle.**

☐ Hold the bottle at an angle (to avoid anything falling into it) at least 3–4 cm from the end of the teat.

☐ Squirt 2–4 mL of milk into the bottle. Only a small amount of milk is required for culture – trying to get a large sample increases the chance of contamination.

☐ If you are collecting a combined sample from all quarters, move the bottle away from the first teat and repeat the initial squirts of the next teat before moving the bottle back. Take the first samples from the teats closest to you. Try to get the same amount from each teat. (Note: a combined sample from all quarters may be less likely to grow bacteria because milk from one infected quarter is diluted by milk from the clean quarters.)

☐ Replace the cap and secure it tightly.

☐ Place the sample in the cooled esky.

☐ Wash your hands.

☐ Use running water and dry on paper towel.

☐ Wash your hands after each cow, including the last cow.

■ **Deliver the sample to the vet or lab that day, or freeze until delivery is arranged.**

☐ Samples for mastitis culture can be frozen and stored before being sent to the laboratory.

☐ Frozen storage of more than four weeks reduces the chance of obtaining a positive culture result.

Collect the sample

Fact Sheet B

The correct way to give intra-mammary treatments

It is easy to introduce bacteria into the teat with a treatment nozzle if the teat end is not disinfected properly. Before any material is infused into a quarter, the teat end must be disinfected very carefully. Infection with environmental bacteria can cause severe mastitis.

Operators can be injured by cows during administration of intra-mammary treatments. It is important to take time and have help. More than one person is often needed to do the job well, especially if cows are not used to having their teats handled.

■ **Have the following ready in the dairy:**

☐ Disposable gloves.

☐ Cotton balls.

☐ A mixture of 70% alcohol (seven parts methylated spirits and three parts water) or teat wipes.

☐ Intra-mammary antibiotic tube(s). Keep the tube sterile; do not warm tubes by putting them in a bucket of warm water (this increases the chance of contamination); do not remove the tube cap until ready for use.

■ **Restrain the cow so she can't move around too much.**

☐ Sometimes this is difficult on a platform, but do what is possible.

☐ Another person holding the cow's tail as a 'tail jack' can be helpful.

■ **Before infusing any antibiotic into a quarter, ensure the quarter is completely milked out.**

■ **Ensure that your hands and the teats are clean and dry.**

■ **Put on disposable gloves.**

■ **Completely disinfect the end of the teats to be treated. This step is critical.**

☐ If you are treating more than one teat, scrub the ones furthest away first. This reduces the risk of unintentionally contaminating an already disinfected teat.

☐ Disinfect by vigorously scrubbing the teat opening with a cotton ball and alcohol (or teat wipes) for a minimum of 10 seconds.

☐ Check the cotton ball. If there is any dirty colour, repeat the scrub using a clean cotton ball until there is no more dirt seen.

■ **If you are treating more than one teat, treat the one nearest you first, followed by treatment of the more distant teats.**

■ **Insert the antibiotic tube into the teat canal.**

☐ Remove the cap of the tube and, without touching its tip with your hand, gently insert the nozzle into the teat canal.

☐ It is not necessary to insert the nozzle to its full depth – this can dilate the teat canal excessively and predispose the cow to mastitis.

☐ The technique of only partially inserting the nozzle into the teat canal reduces teat end damage and has been shown in some trials to reduce the incidence of new infections at calving.

■ **Infuse the contents of the syringe into the teat. Massage it up the teat into the udder.**

■ **Teat dip treated quarters with freshly made up teat dip immediately after treatment. Refer to Fact Sheet G on page 115.**

■ **Clearly mark the treated cow and treated quarter.**

■ **Record all treatments on mastitis record sheet.**

For more information about using Dry Cow Treatment, refer to Guideline 17 – Administer Dry Cow Treatment as recommended, on page 74.

Fact Sheet C

Guide to the choice of Selective or Blanket Dry Cow Treatment

Use the information here and consult your veterinarian for advice. If you have less than three Individual Cow Cell Counts (ICCCs) for each cow, use Blanket DCT. If you have three or more ICCCs for each cow, and wish to consider selective treatment, proceed down this chart.

If using Blanket Dry Cow Treatment, treat all quarters of all cows. If using Selective Dry Cow Treatment, treat all quarters of cows with any ICCC above 250,000 cells/mL during the lactation, and cows which have had a clinical case during the lactation.

Consult your veterinarian about the potential use of combination treatment with DCT and Internal Teat Sealants (ITS) or ITS as a standalone treatment in cows with ICCC's below 250,000 cells/ml. Refer to Fact Sheet M.

If answers to all questions are 'No', then use Selective DCT.

If the answer to any question is 'Yes', then use Blanket DCT.

1. **Is your herd average BMCC for the last 6 months above 250,000 cells/mL?**
   - Yes → **Use Blanket Dry Cow Treatment**
   - No ↓
2. **Do more than 30% of your cows have peak ICCCs above 250,000?**
   - Yes → **Use Blanket Dry Cow Treatment**
   - No ↓
3. **Did you have more than five clinical cases per 100 cows in the first month of lactation?**
   - Yes → **Use Blanket Dry Cow Treatment**
   - No ↓
4. **Did you have more than an average of two clinical cases per 100 cows per month after the first month of lactation?**
   - Yes → **Use Blanket Dry Cow Treatment**
   - No ↓
5. **Did you have more than two clinical cases per 100 cows per month in either of the last two months of lactation?**
   - Yes → **Use Blanket Dry Cow Treatment**
   - No ↓
6. **Do your milk cultures indicate the presence of Strep agalactiae or significant numbers of Strep uberis?**
   - Yes → **Use Blanket Dry Cow Treatment**
   - No ↓

Select cows for Dry Cow Treatment

Fact Sheet D

Guide to withholding periods after use of Dry Cow Treatment

Dry Cow Treatment (DCT) is an antibiotic preparation infused into each quarter immediately after the last milking of a cow's lactation. It is an important management procedure for removing existing udder infections and preventing new infections during the dry period.

All DCT products are registered with a specified Minimum Dry Period (MDP) after treatment. If a cow calves before this time has expired, withholding periods for milk and bobby calves are longer than usual. These withholding periods (WHP) are shown on the product labels and in the table in this Fact Sheet.

Follow these guides to minimise risk of antibiotic residues in meat or milk after use of DCT:

■ **Ensure all cows to be culled have passed their recommended withholding period for meat.**

☐ Withholding periods for cull cow meat are counted from the date the DCT is administered.

■ **Check each cow that received DCT has passed her Minimum Dry Period when she calves.**

☐ If not, withhold milk from the vat and withhold the calf from sale for meat for the period shown on the product label, and in the following table.

■ **Keep colostrum milk from all freshly calved cows out of the vat.**

■ For milk quality reasons, all cows should have their colostrum milk withheld from the vat for at least the first eight milkings after calving (10 milkings for induced cows). This applies to all cows whether they received DCT or not.

☐ For cows that did receive DCT (and their Minimum Dry Period has elapsed), a withholding period for milk after calving is specified for each product (see labels and the following table). This withholding period for all current products is equivalent to or less than the eight milkings of the colostrum mob. Colostrum milk from these cows should be fed to replacement calves only.

■ **Follow these guides for calves:**

☐ Keep all calves for a minimum of four days (navels must be dry). Calves from induced cows may need to be kept for much longer before being sold.

☐ Animal welfare codes require that all calves must be at least four days of age before being sold. This applies to all calves, whether their dams received DCT or not.

☐ All calves should receive at least 2 L of colostrum in the first 12 hours of life.

☐ Bobby calves whose dams had received DCT (and their Minimum Dry Period has elapsed) should be removed from their mothers after 12 hours and then fed milk. The milk should preferably be from cows in the colostrum mob that did not receive DCT. Residues in bobby calves are unlikely to occur as a result of intake of DCT in first sucked colostrum because absorption from the gut is relatively poor for most DCT antibiotics, and the calves will be at least four days old when sold.

☐ After their calves are removed, cows that had received DCT should be milked out completely, and this milk discarded or fed to replacement calves only.

■ **Have a milk sample tested by your factory before putting milk in the vat from a particular cow you are concerned about.**

☐ If you suspect an error in cow identity, or treatment or calving date records, don't put the milk in the vat until the issue is resolved.

☐ Although milk antibiotic tests are not designed for use on milk from individual cows, a check test will avoid the possibility of an inadvertent inclusion of positive milk. Request your factory to perform their regular test procedure for antibiotics in milk.

Dry Cow Treatment withholding periods

Antibiotic product	Company	Active ingredients per tube	Minimum Dry Period (MDP)	Milk WHP (calved after MDP)	Cow meat WHP	Calf meat WHP (calved before MDP)	Calf meat WHP (calved after MDP)
Ampiclox Dry Cow	Jurox Pty Ltd	Ampicillin 250mg, Cloxacillin 500mg	30 days	96 hours (8 milkings)	30 days	30 days	4 days
Bovaclox DC LA	Norbrook Laboratories Aust P/L	Ampicillin 300mg, Cloxacillin 600mg	49 days	96 hours (8 milkings)	30 days	30 days	4 days
Cepravin Dry Cow	Intervet Australia P/L	Cephalonium 250mg	49 days	96 hours (8 milkings)	21 days	21 days	4 days
Elaclox DCX	Norbrook Laboratories Aust P/L	Cloxacillin 600mg	35 days	96 hours (8 milkings)	30 days	30 days	4 days
Juraclox LA 600 Dry Cow	Jurox Pty Ltd	Cloxacillin 600mg	35 days	96 hours (8 milkings)	30 days	30 days	4 days
Maxalac DC	Jurox Pty Ltd	Cephalonium 250mg	49 days	96 hours (8 milkings)	21 days	21 days	4 days
Noroclox 500	Norbrook Laboratories Aust P/L	Cloxacillin 500mg	30 days	96 hours (8 milkings)	30 days	30 days	4 days
Noroclox 600	Norbrook Laboratories Aust P/L	Cloxacillin 600mg	35 days	96 hours (8 milkings)	30 days	30 days	4 days
Orbenin Enduro	Zoetis Aust P/L	Cloxacillin 600mg	35 days	96 hours (8 milkings)	30 days	30 days	4 days
Non-antibiotic product							
Teatseal	Zoetis Aust P/L	Bismuth subnitrate 650mg	4 days	96 hours 8 milkings)	Nil	Nil	Nil

Fact Sheet E

Records to keep on clinical cases of mastitis

Mark cows with clinical cases of mastitis with a highly visible band, tape or paint.

Keep a temporary record of all current clinical cases of mastitis. The record should be clear and easy-to-see and located in the dairy for quick reference during milking. A whiteboard, for example, displays information about cows for special handling (such as withholding milk).

It is also essential to keep permanent records of clinical mastitis cases. This record should include information about the cow and the drug used.

This record allows you to:

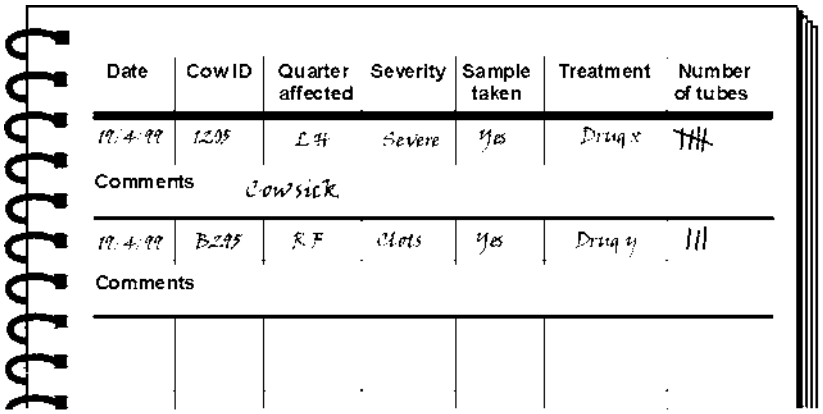
Make better decisions for individual cows at drying off and culling times.

Assess numbers of cases and responses to treatment for the whole herd. This is an important part of monitoring udder health and mastitis control.

The Australian Dairy Herd Improvement Scheme (ADHIS) has established cow record details for mastitis cases and treatments in its database. This means it is now possible to permanently record details of clinical cases through most of the Milk Recording services, and it is possible to easily combine ICCC data and information about clinical cases for each cow. For more information see your Herd Improvement service.

■ **Set up a record sheet in the milking shed, or a pocket book page to record the following for each case:**

- Date
- Cow identity
- Quarter affected
- Severity
- Sample taken (Yes or No)
- Treatment (Drug)
- Number of tubes (mark a stroke for each as given eg I I I I)
- Comment



■ **Record these details when you first detect a case of clinical mastitis.**

■ **If you are Milk Recording, use a system which allows you to have the data included on your cows' records.**

☐ You may be entering your own records on a computer, or you may be able to send the records to your data processing centre for them to enter.

Udder Health Summary for the year to 2204.98

Cow	Calve date	Age	Peak CC Prev Lac	DCT Prev DO	Cell Counts for each test ('000s)									Peak CC Cur Lac	Clinical	Inf	Action
					25.04	14.06	29.08	16.10	01.12	23.01	02.03	25.03	22.04				
2409	23.08.97	61	201	None	175	78	C34	18	35	112	106	64	192	192	0		
2417	21.09.97	62	457	DCT	136	301		C27	58	34	111	123	164	164	0		
2439	14.09.97	62	159	None	149	159		C145	209	530	845	611	612	612	1	#	To DCT

Fact Sheet

F

AMMTA milking machine test report form example

(Reproduced with permission from AMMTA)

AUSTRALIAN MILKING MACHINE TRADE ASSOCIATION
ABN 58 957 370 822
(Incorporated in Victoria)
Phone: 03 54 395 094

MILKING MACHINE TEST REPORT FORM

Name: Mr V. Pump
Address: Pulsation Lane
Date: 8-1-14

MACHINE: Tested by G. Mein — AMMTA Mem. No. Life Member — Qualification
Reason for Test Routine — Milkline Size & Configuration 100 double (mm) ~~Dead end~~/loop
No of Units 50 — Minimum Line Fall 0% variable % see comments mm per metre
Dairy Type Rotary — Pulsator Airline Size & Configuration 75 (mm) ~~Dead end~~/loop
No of Cows 830 — Regulator Type & Capacity VRM 4000 L/min
Last Herd B.M.C.C. 380,000 — Electric Motor (HP)/Kw 7.5 x 2 — Speed (1445 (F)) (1430 (C)) r.p.m.
Claw Type HC 150 — Motor Pulleys 140 mm Section 2 Shaft diam. 1½" mm
Liner type AL 960000-06 — Vac. Pump Pulleys 230 mm Section 2 Shaft diam. 28 mm
Cup Dimensions 155 x 44 x 17 (Length x O.D. x Hole) (960550-82) — Vac. Pump Belts 1520 mm Section SPZ

NOVEMBER 2009

MILKING MACHINE TEST SUMMARY & RECOMMENDATIONS

Mark box as ✓ = Satisfactory ✗ = Unsatisfactory (✗) = Most urgent service requirement

Milking machine performance test measurements		Recommendations
Pulsation system	(✗)	7 pulsators need attention - These are likely to cause slower, more uneven milkings
Vacuum levels	(✗)	Re-set system vacuum to 46 kPa See comments on regulator
Effective reserve	✗	Slightly low, mainly because of high air leakage in the airline system
Cluster	✗	Replace short milk tubes
Vac. Difference (WV/PIV1)	☐	

Condition and/or suitability of main components		
Vacuum pump(s)	☑	
Pulleys & belts	☑	
Regulator	(✗)	Vacuum drifting down ~~from~~ 3 kPa during milking Service Regulator
Vacuum Gauge	✗	within specification but note progressively lower reading as vacuum increased ☐ High Vacuum Limiter
Pipelines	✗	Main milk lines require more fall towards the receiver
Liners	☑	
Rubberware	(✗)	Claw tubes & long pulse tubes need replacement
Claw Tubes	✗	see above
Milk pump/Releaser	✗	second pump may need replacement
Air filters	(✗)	(Condition and cleaning frequency)
A.C.R.'s	☐	
Other Components	✗	

Safety

Noise	☐	(8 hour decibel level measured in the working area. If excessive noise is suspected professional evaluation is recommended)
Moving parts	✗	Both vac. pumps require larger belt guards to enclose belts at both ends of pulleys
Stationary parts	☑	
Electrical	☑	

I acknowledge that I have read and understood the report and recommendations stated therein.

Signed: Victor Pump. Date: 8 / 1 / 20 14

PULSATION CHAMBER VACUUM RECORDINGS

1. **Pulsation System:**
   Make: EP 2000 — Intended pulse rate: 60 ± 3cpm
   Operation: Alternating (2x2) — Intended pulse ratio: 60: 40 (60%) ± 5%
   (4x1 or 2x2) — Limping: ... max 3%

	Bail No.	Rate (CPM)	Ratio (A+B%)	B% (min30%)	C%	D% (min15%)	D(sec) min150ms	% of Limp
	1a	60.2	59	39	15	26	261	1
	1b		58	43	14	28	278	
	2a	60.2	59	44	14	27	268	1
	2b		58	39	15	27	272	
*	3a	60.2	(51)	31	19	30	303	0
	3b		(51)	28	20	28	278	
	4a	60.2	59	41	11	30	302	1
	4b		60	39	13	28	278	
	5a	60.1	59	39	13	28	279	0
	5b		59	41	13	28	275	
	6a	60.1	59	39	13	28	280	1
	6b		60	39	14	27	265	
	7a	60.2	59	37	13	28	277	0
	7b		59	38	14	27	269	
	8a	60.2	59	37	14	27	267	0
	8b		59	38	14	27	265	
	9a	60.2	58	37	14	28	280	1
	9b		59	38	13	28	277	
	10a	60.2	59	38	13	28	279	1
	10b		58	37	14	28	280	
	11a	60.2	60	39	15	25	250	1
	11b		59	38	14	27	270	
	12a	60.2	59	38	14	27	271	0
	12b		59	39	14	27	268	
	13a	60.1	59	39	13	28	278	0
	13b		57	39	14	27	270	
*	14a	60.1	(55)	32	19	29	269	2
	14b		(53)	32	18	29	285	
	15a	60.1	59	37	13	28	284	(8)
	15b		(51)	30	20	29	284	
	16a	60.2	59	38	14	27	273	0
	16b		59	38	14	27	271	
	17a	60.1	59	38	14	27	269	0
	17b		59	38	12	29	268	
	18a	60.2	60	39	14	27	267	1
	18b		59	38	13	27	275	
*	19a	60.2	(54)	35	17	29	284	2
	19b		56	36	15	29	289	
	20a	60.2	59	39	13	28	280	1
	20b		60	40	14	26	263	
	21a	60.2	59	39	13	28	278	-
	21b		57	39	13	28	277	
	22a	60.2	59	38	13	28	276	-
	22b		59	37	13	28	277	
	23a	60.2	59	37	13	28	283	-
	23b		59	37	12	29	289	
	24a	60.1	59	39	12	29	283	-
	24b		59	38	12	29	288	
	25a	60.2	59	38	13	28	281	-
	25b		59	37	13	28	274	
	26a	60.2	59	38	13	28	275	-
	26b		59	38	13	28	275	
	27a	(65)	56	32	21	32	291	(14) *
	27b		42	32	28	30	274	
	28a	60.2	59	38	15	26	261	-
	28b		59	41	13	28	274	
	29a	60.2	59	38	14	27	271	-
	29b		59	37	14	27	268	
	30a	60.2	59	38	14	27	270	-
	30b		59	38	12	29	290	
	31a	60.2	59	39	14	26	263	
	31b		59	39	(9)	32	321	
	32a	60.1	62	41	11	28	270	3
	32b		59	38	14	27	268	
	33a	60.2	59	38	14	27	275	-
	33b		59	38	13	28	280	
	34a	60.2	60	41	13	28	280	1
	34b		59	41	13	28	281	
	35a	60.2	59	40	13	28	275	(7) *
	35b		(52)	39	13	28	278	
	36a	60.1	57	36	12	31	310	(6) *
	36b		(51)	30	20	29	285	
	37a	60.1	59	39	13	28	278	-
	37b		59	39	14	27	263	
	38a	60.2	59	39	14	27	270	-
	38b		59	39	13	28	274	
	39a	60.2	59	39	13	28	280	-
	39b		59	38	15	26	265	
	40a	60.1	60	41	13	27	275	1
	40b		59	41	13	28	277	

NOVEMBER 2009?

Pulsator readings in excess of 40 units may be recorded on a separate addtional pulsation sheet or on the comment sheet.
If pulsation graphs only are attached those that do not meet specifications should be identified and their characteristics recorded above.

	✓	✗	Guidelines or specifications
1. PULSATION CHARACTERISTICS - see over			
2. RELEASER/MILK PUMP: Spit Chamber ☐ Diaphragm ☐ Centrifugal ☑			Max 25% dead time for S.C.R.
Inner flap open B % Vac. (kPa)			Min. Vacuum = 80 kPa/head — Diaphragm pump
Outer flap open D %			Between 30-50 str. min
Rate (c/min) Str./min			
3. VACUUM LEVELS AND DIFFERENCES (kPa) As found			
(a) Working Vacuum (WV) 48 - at central test point		X	High line 50 kPa max. — Difference between PIV1 and WV - prefer <2kPa
(b) Regulator Vacuum level - at regulator sensor point			Mid line 48 kPa max
(c) Pump inlet vacuum (PIV1) 49 - at the pump inlet	✓		Low line 44 kPa max - max 3.0 kPa
4. REGULATOR OVERSHOOT/UNDERSHOOT over under kPa			An overshoot or undershoot of less than 2 kPa is recommended
5, 6, 7 EFFECTIVE RESERVE, MANUAL RESERVE, AIR FLOW MEASUREMENTS			Min. Requirements 1700 L/min F
5. WV-2 Effective Reserve (ER) 1650 L/min		X	**ER = 800 + 20n up to 40 units**
6. WV-2 Manual Reserve (MR) 1680 L/min			**+ 10n for each unit over 40**
7. (a) Regulation efficiency % (ER÷MRx100) 30 %	✓		Regulation efficiency must be 90% or greater
(b) Vacuum change at regulator or sensor (only measured if efficiency less than 90%) 98 kPa	✓		Regulator should sense a minimum of 1.3 kPa drop when a vacuum drop of 2 kPa is applied at the CTP.
8a. HIGH VACUUM LIMITER Fitted Y/N			High vacuum limiter should be fitted between the vacuum pumps and the first high liquid level vacuum shut off point. Not recomended to be set above 55kPa
Operating Y/N			
Activation Level kPa			
8b. VACUUM GAUGE ACCURACY @ 40kPa 42			
@ 45kPa 47			
@ 50 kPa 52			Accurate within 2 kPa over range 40-50 kPa

9. AIR CONSUMPTION OF COMPONENTS

	AFM Reading	Actual Value	Per Unit	✓	✗	
(a) WV Air consumption of components	1300					
(b) WV Spit chamber releaser	N/A	-				Approx 20-40 L/min per end
(c) WV Pulsation	2850	1550	31	✓		Approx 20-35 L/min/cluster
(d) WV Claw Air Admission	3200	350	7	✓		Spec: 4-12 L/min/cluster
(e) WV Ancilliary	3220	20	-	✓		Teat spray unit

10. AIR LEAKAGE

(a) WV Milkline No. 1 / WV Milkline No. 2	3320	100		Not more than 10 L/min + 2 L/min/unit leakage into the milk system (milklines and receiver) and milk pump = Calculated ____ Actual ____
(b) WV Receiver				Total system leakage shall not exceed 5% of Pump Capacity at PIV2 = ____ L/min
(c) WV Pulsator Airline	3830	510		
(d) PIV2 Main/Rec. Airline	4170	340	X	Actual system leakage Total leakage measured in section 10 ____ L/min

11. VACUUM PUMP Make/Model VP78 x2 (Pump 1) (Pump 2)

	Pump 1	Pump 2		✓	✗	
(a) Pump inlet vac. (PIV2)	49	49				P1 P2
(b) Speed	920	950	rpm			Rated 1900
(c) Capacity @ 50kPa	2180	1900	L/min/capacity		X	L/min - see manufacturer's specs.
(d) Capacity @ PIV2	2220	1950	L/min		X	**As a guide:**
* Total Capacity @ PIV2 * (Same value into 10 (d)	4170				X	**Pump capacity = Required ER + 50 L/min/unit** 4200

12. RECHECK WORKING VACUUM AND ER	kPa	L/minF		
13. VACUUM LEVEL MEASURED AT END OF				
(a) Pulsator airline (not in rotary or looped line)	\ kPa			Within 2.0 kPa of WV
(b) Milkline or last cluster	45 kPa		X	During milking
14. REGULATOR SENSITIVITY (vacuum at max. airflow through regulator) measured at the end of milkline or last cluster	48 kPa			Within 1.0 kPa of WW Refer to test procedures in front of test book
15. MILK SYSTEM LEAKAGE TEST COMPLETED	✓			Ensure no leaks into centrifugal milk pump
16. DISINFECT TEAT PLUGS				

NOVEMBER 2009

Fact Sheet

G

The correct way to mix teat disinfectant

Teat disinfection after milking is one of the most effective cell count and mastitis control measures available. However, it only works if it is done correctly.

Teat disinfectants must be diluted to the correct concentration for use. After mixing, the active ingredients often lose their disinfectant ability with time, and if you include additives to improve skin condition (emollients) these may reduce disinfectant activity. Any contamination with milk and other organic material also reduces activity. Correct mixing each day is best to get maximum performance.

Each time you buy a new stock of teat disinfectant:

■ **Read the label on the teat disinfectant container.**

☐ Familiarise yourself with the mixing instructions and any necessary safety precautions.

■ **Calculate the approximate amount of diluted teat disinfectant needed for one day or, for large herds, one milking.**

☐ If applying the disinfectant in a dip cup, you will need approximately 10 mL of solution for each cow in the milking (1 L per 100 cows). For example, you will need 1.2 L of disinfectant solution each milking if you are milking 120 cows.

☐ If applying the disinfectant by spray, you will need approximately 20 mL of solution for each cow in the milking (2 L per 100 cows) to achieve complete coverage of the teat. For example, you will need 2.4 L of disinfectant solution each milking if you are milking 120 cows.

■ **Select a clean container which is large enough to hold the volume of disinfectant solution you will need for one day or, for large herds, one milking.**

☐ A clear plastic container (such as a large fruit juice container) is ideal so you can see how much of each ingredient you are adding to the mix.

■ **Calculate how much stock disinfectant solution,**

clean water and emollient (if required) you will need to make up a day's volume of disinfectant solution.

☐ 10 mL of solution for each cow in the milking.

☐ One part iodine disinfectant to three parts water.

■ **Permanently mark the mixing container for all future mixing. Accurately measure each of the quantities for your solution (use water instead of iodine and glycerine). Mark the container with a permanent marking pen.**

For example, if you are spraying a 120 cow herd:

Solution:

20 x 120 x 2 milkings = 2400 mL x 2 4800 mL
(4800 mL = 4.8 L)

You will need 4.8 litres of solution each day.

Disinfectant and clean water:

1 part iodine to 3 parts water (1 + 3 = 4)

4.8 divided by 4 = 1.2 litres; 1.2 x 3 = 3.6

You will need 1.2 L iodine and 3.6 L water.

If you want the solution to contain 10% glycerine:

10% of 4.8 L = 480 mL

Glycerine is taken from the water volume.

3.6 L minus 480 mL is 3.12 L

You will need 1.2 L iodine, 3.12 L water, and 480 mL of glycerine.

■ **Measure and mix the solution.**

☐ Accurately measure the volume for each ingredient and add consecutively to the plastic container.

☐ Clearly mark on the container (with a permanent marker pen) the fluid level and the name of each ingredient.

Each day as you make up the teat

disinfectant required:

■ **Use water of very high quality.**

☐ Water from the dairy hot water service is recommended over other water sources including town water and rainwater.

☐ Cool and store the water in a clean container ready for use.

■ **Make up the disinfectant solution by adding the disinfectant base, water and emollient according to the levels marked on the plastic container.**

☐ Ensure that the correct dilution is made each time.

■ **Wash out the plastic mixing container after each use.**

■ **Wash and clean all teat dip cups before each milking. All teat spray containers should be washed and cleaned each day.**

■ **Tip out all teat disinfectant solution not used at the end of the day.**

Fact Sheet H

Cell Count ABVs

HIGHLIGHTS

- While most variation in mastitis incidence is due to the management environment, long term gains are achievable by selecting bulls using Australian indices.
- A Cell Count ABV more than 100 means improved resistance to mastitis (reduced cell count) compared to the average.

Cell Count ABV

Mastitis lowers farm profitability, reducing both product quality and quantity. Dairyfarmers can select bulls that produce daughters that are less susceptible to mastitis using the Cell Count ABV. This leads to the selection of more profitable dairy cows.

While most reduction in mastitis comes from improved management, breeding for low susceptibility to mastitis can have considerable long-term benefits. Genetic variation for Cell Count does exist and some bulls have been found to produce daughters that are less susceptible to mastitis than others.

Mastitis has an impact on farm profit. Therefore Cell Count ABVs are included in the Balanced Performance Index (BPI), Health Weighted Index (HWI) and Type Weighted Index (TWI). Farmers will improve mastitis resistance by selecting bulls using any of the three indices.

Cell Count ABV Expression

Cell Count is expressed as a percentage more or less than the average of 100. To improve mastitis resistance, select bulls with a Cell Count ABV more than 100.

ADHIS analysed the national milking population to determine the group of cows which represents the average of the current milking population. The average was determined as cows of the same breed that are 6 years +/- 2 years of age.

The average of this group is set at 0 for production traits and 100 for management traits, such as Cell Count and provides a reference point for comparisons between ABVs for both cows and bulls, as illustrated in Figure 1.

The average is updated each year so that it stays current and is a reflection of the cows that are milking around Australia, today.

Higher Cell Count ABVs are an indicator of greater mastitis resistance. While lower Cell Count ABVs are an indicator of less mastitis resistance. Therefore:

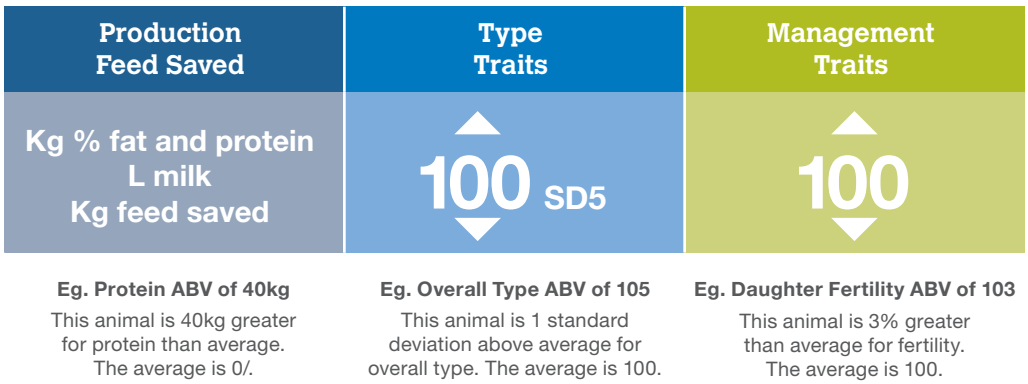
- A bull with a higher Cell Count ABV will increase mastitis resistance (reduce cell count) compared to average
- A bull with a lower Cell Count ABV will reduce mastitis resistance (increase cell count) compared to average

Benefit of breeding for Cell Count

Mastitis has an impact on the farm profit. Therefore Cell Count ABVs are included in the Balanced Performance Index (BPI), Health Weighted Index (HWI) and Type Weighted Index (TWI). Every 1% change in Cell Count is estimated to be worth $1.07 net profit per cow per year. The difference between the best bull (CC ABV of 170) and worst bull (CC ABV of 20) is estimated to be $160 net profit per cow per year. For most bulls (66%) Cell Count ABVs range between 78 and 122.

The benefit each dairyfarmer gets from selecting for lower cell count relates to their herd's cell count average. The higher the herd's bulk milk cell count the higher the potential benefit. Herds with a very low bulk milk cell count will see less benefit. Given that most of the variation in herd mastitis levels is explained by non-genetic factors it is critical that dairy farmers continue to manage mastitis.

Figure 1 A summary of the expression of ABV traits



Heritability

An estimated 8% of the variation in cell count in the Australian dairy cow population is explained by genetics. The other 92% of variation is explained by the management environment of the cow.

The heritability of Cell Count is lower when compared to other traits such as protein kg (0.27) and milking speed (.15). However, at 0.08, there is still enough genetic variation to warrant genetic selection.

How is Cell Count ABV calculated?

From about the middle 1990's all test-day records were accompanied by a Cell Count therefore ADHIS has a large data source for Cell Count analysis. ADHIS will officially publish Cell Count ABVs for individual bulls when their reliability reaches 50% with daughters in at least 15 Australian herds (Holstein and Jersey) or 30% with daughters in 5 herds (other breeds). If the bull has very few or no daughters in Australia, a Cell Count ABV(i) is published using Interbull data.

In 2008, scientists refined the techniques used to calculate Cell Count ABVs from herd recording data.

A somatic cell score is produced for each bull using test-day information from daughters. Each test day is treated as a separate measurement which is a better reflection of what really happens than a whole lactation average. The new technique allows scientists to model the trends in cell count through the lactation as well as the variations from the 'norm' which occur. The result is an improvement in the reliability of Cell Count ABV's and a greater number of bulls with publishable Cell Count ABV's.

Conclusion

The management environment is the predominant influencer of mastitis in a herd so genetics isn't a 'silver bullet' to solving a mastitis problem. However, for little or no cost, a dairyfarmer can make a long-term difference to the mastitis resistance of the herd by selecting high BPI, HWI or TWI bulls with Cell Count ABV more than 100 from the Good Bulls Guide.

More information

Go to www.adhis.com.au

For more information,

contact ADHIS by phone 03 8621 4240 or e-mail abv@adhis.com.au

Acknowledgement: this Fact Sheet has been prepared using material from the ADHIS Cell Count ABV fact sheet

Fact Sheet

I

The impact of nutrition on mastitis and cell counts

The incidence and severity of mastitis can be affected by a cow's nutrition. Malnutrition and imbalance of the major dietary nutrients can increase susceptibility to all infections, including mastitis.

Cows at risk of milk fever (hypocalcaemia), both clinical and subclinical, may have a higher incidence of mastitis cases at calving.

Mammary white blood cell (leucocyte) function, the important defence mechanism against bacterial infection of the udder, is modulated by antioxidants and other nutrients in the diet. Antioxidants believed to have an effect on the intra-mammary infection rate include vitamin E (alphatocopherol), vitamin A (beta-carotene), caeruloplasmin (a copper plasma protein) and vitamin C. Copper, zinc and selenium are three micronutrients that are also required for leucocyte antioxidant activity.

Deficiency of these trace elements and vitamins in the diet of dairy cows may predispose these animals to increased occurrence and/or severity of mastitis. Supplementation can reduce both occurrence and severity of mastitis cases.

There is no evidence that supplementation of dairy cows receiving adequate trace elements and vitamins has any beneficial effects.

Under normal conditions in Australia, vitamin A and E supplements are not required for pastured cattle. During drought both vitamin A and E supplements are needed if the ration consists essentially of grain and conserved fodder.

If bloat treatments such as 'teric' or oil-based liquids are given to grazing cows, vitamin E supplementation may be needed.

Suggested nutritional management for mastitis control is:

- **Ensure that dairy cow rations are adequate and balanced in major nutrients of water, energy, protein and fibre.**
- **Use dry cow rations and 'springer' or 'close up' rations that do not predispose to milk fever.**
- **If dry cow and heifer rations are deficient in trace elements and antioxidant vitamins, supplement the rations or administer supplements to the cow.**
  - ☐ Ideally supplements should be given by injection at least three weeks before calving, or one month before drying off if given by intraruminal bolus.
- **During drought, supplement with both vitamin A and E if the ration consists mostly of grain and conserved fodder.**

Fact Sheet

J

The role of vaccination in mastitis control

Many attempts have been made to develop vaccines to increase a cow's immunity to bacteria within the udder. This is not an easy task because the action of antibodies and white blood cells in milk is hard to stimulate by usual vaccination routes – an increase in antibodies in the bloodstream does not necessarily indicate an enhanced action in the udder.

No vaccination routines for mastitis bacteria are currently recommended in Australia. Despite this, it is interesting to look at some of the experimental work which has been done over the past 20 years, and the vaccine against coliforms which is used overseas. It is highly unlikely, given current technology, that a vaccine could be prepared which would protect against all of the wide range of bacteria that cause mastitis. Rather, vaccines must be targeted against particular bacteria species. It is also important to emphasise that no vaccination procedures, however successful, are likely to eliminate the need for good hygiene and milking management on dairy farms.

Staph aureus is very hard to treat with antibiotics and E. coli causes severe clinical cases that rapidly progress. As a consequence, they have both been studied extensively. Recently a novel approach to development of a vaccine against Strep uberis has also been explored.

Vaccine research using Staph aureus has found that new infections are not prevented, but severity of clinical cases can be reduced, and the likelihood that a cow will eliminate the infection (self-cure) can be increased in vaccinated animals. Australian work in the 1980s led to an experimental vaccine that helped somatic cells to engulf bacteria that entered the udder. This vaccine was trialled in an extensive field experiment in Australia, but the results were not significantly encouraging to proceed with commercial production of the vaccine.

Commercial progress has been made in the United States with a vaccine against coliform mastitis (using a mutant E. coli called J-5). It is not available in Australia. J-5 is injected subcutaneously at drying–off, 30 days later and again within 14 days of calving. It stimulates antibodies against a number of related coliform bacteria. The J-5 vaccine does not eliminate coliform infections in herds, but combined with good management practices, especially at high risk times in the calving period, it decreases the number of new infections. One field study with the vaccine showed a decrease of coliform mastitis from 13% in unvaccinated animals, to 3% in cows that had been vaccinated.

Recent studies in the UK on the growth and invasion characteristics of Strep uberis have shown that these bacteria gain some essential nutrients in the udder by activating an enzyme (plasminogen) in milk. Experimental vaccination has been used to immobilise the activating molecule and protect the quarters (which were subsequently challenged with Strep uberis infused into the quarters) from infection by the bacteria. This research is continuing, with hopes that a commercial vaccine may be available in the future.

Fact Sheet

K

Mastitis Focus

Mastitis Focus Report

V 1.2018

FARMER FRED & ANNE
RIVERVIEW ROAD
DAIRYTOWN 3000

Dairy Australia
Your Levy at Work

Report period:	01.08.12 - 17.07.13
Total calvings:	227
Herd test cell count:	277
Herd ID:	
Printed:	13.12.2013

YOUR HERD ANNUAL PERFORMANCE SUMMARY

Clinical Case Rates

	Calving	Lactation
Your Herd	3 cases per 100 cows calved	3 cases per 100 cows in milk per month
Trigger	>5	>2

New Infection Rate

	Subclinical & Clinical
Your Herd	8 cases per 100 cows in milk per month
Trigger	>5

Herd Milk Cell Counts

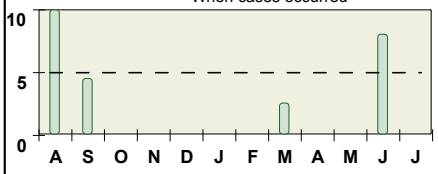
Average cell count at the 4 most recent tests

15.07.13 277
17.06.13 311
20.05.13 250
04.03.13 707

KEY MANAGEMENT AREAS IN FOCUS

Your calving system ★

Monthly clinical case rate at calving (all cows)
When cases occurred

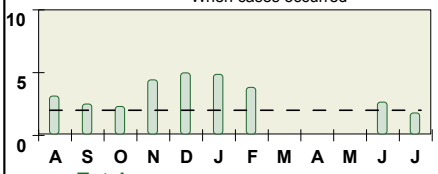


Trigger: 5 cases per 100 cows calved

	Your Herd	Trigger
First calver clinical case rate	0 cases per 100 first calvers	>5

Clinical mastitis ★

Monthly clinical case rate in lactation (all cows)
When cases occurred



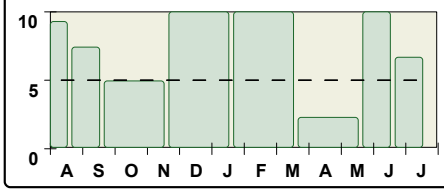
Trigger: 2 cases per 100 cows in milk

	Your Herd	Trigger
Total clinical cases	70 cases	
Treatment failure (Cases with an extended treatment)	24%	>20%

Spread of infection ★

	Your Herd	Trigger
First calver new infection (Indicates the extent of spread)	11%	>15%

Average new infection rate (all cows)
When clean cows became infected



Trigger: 5 cases per 100 cows in milk

Previous dry-off strategies ★

	Your Herd	Trigger
Failure to cure over the dry (Existing infections not cured by antibiotic Dry Cow Treatment)	26%	>20%
Missed treatments (Infected cows that didn't receive antibiotic Dry Cow Treatment)	8%	>5%
Infections over the dry (Cows that became infected in the dry-off or at calving)	10%	>10%
Dry period clinical case rate (Indicates the success of the dry-off procedure)	?	>1 case per 100 cows

Culling to control mastitis ★★★

	Your Herd	Trigger
Cows prone to clinical mastitis (Cows in herd with 3 or more clinical cases in a lactation)	5 cows	Any Cows
Cows infected in multiple lactations (Cows still infected after 2 consecutive prior lactations despite intervening DCT)	1 cows	Any Cows

Plan your next drying-off

Only consider a selective DCT strategy when:	Your Herd
You have 4 or more cell counts for each cow	Yes
Strep ag is not present in your herd (based on milk culture results)	See your vet
Less than 30% of cows had high cell counts	No
Your clinical case rate at calving was less than 5	Yes

Star rating

★★★★★	★★★	★	?
Consistently below trigger points	Opportunity to reduce risk	Seek professional advice	Insufficient records

Udder health is described by 3 basic measures in the herd performance summary: the clinical case rates, new infection rate and Bulk Milk Cell Counts over the twelve month report period.

Explore your herd performance in terms of key management areas.

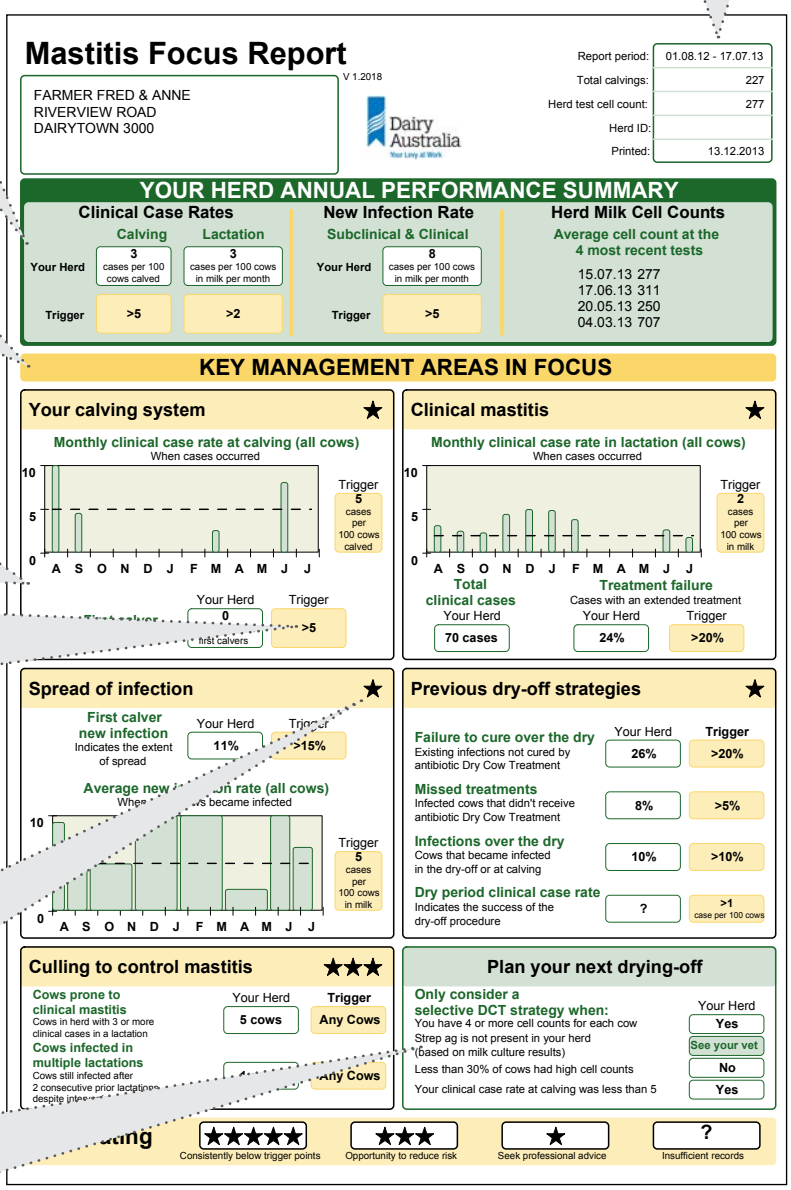
Check how your herd is travelling for each measure (a question mark shows when they cannot be calculated).

The Countdown 2020 Farm Guidelines for Mastitis Control recommends you seek professional advice for measures above the 'trigger'.

Use the star rating to decide which areas to follow up or plan to improve.

Use experiences from the last twelve month to decide your next drying-off strategy.

The report covers the twelve months preceding the end date you nominate.



Visit mastitisfocus.com.au
Refer to Guideline 24.2on page 91 for information about generating a Mastitis Focus Report

Behind your Mastitis Focus Report

Herd ID: ####
Report period 01.08.12 to 17.07.13

FARM DATA BOX -- Check that these records represent your herd

Number of	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	TOTAL
Cows milking	245	260	259	258	245	210	155	181	195	230	225	207	
Cows herd tested	220	247		246		203		132		193	191	198	
Calvings	26	16	1					46	68	47	22	1	227
Heifer calvings		1						10	3				14
Cows culled or died	1	2	9	18		7	1	3	5	1	2	1	50
Clinical cases	10	7	6	11	11	10	5	1			7	2	70
Cows dried-off					35	51	20	54	10	27	18		215
Antibiotic DCT					22	51	20	52	7	27	18		197
Cows given Teat Sealant						52	19	51	4	28	18		172

NUTS AND BOLTS -- Helps cross-check the details behind the key management areas

Your calving system

Calving dates: ☑
Clinical case records: ☑
Termination dates: ☑
Birth dates: ☑

Monthy clinical case rate at calving

Number of clinical cases within 14 days of calving: **7**

When they occured:

Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
3	1						1			2	

First calver clinical case rate

First calvers that calved during the report period: **14**
Clinical cases in first calvers within 14 days of calving: **0**

Clinical mastitis management

Calving dates: ☑
Clinical case records: ☑
Termination dates: ☑
LCT records: ☑

Monthy clinical case rate in lactation

Number of clinical cases in lactation (from 14 days after calving): **63**

When they occured:

Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
7	6	6	11	11	10	5				5	2

Total clinical cases: 70

Treatment failure

Number of cases given an extended treatment course (4 or more doses of antibiotic in 10 days): **17**

Spread of infection

Calving dates: ☑
Clinical case records: ☑
Herd test records: ☑
Termination dates: ☑
Birth dates: ☑

First calver new infection

The number of first calvers that developed a high cell count or clinical case during the report period: **4**

Average new infection rate

Average infection rate between herd tests:

20.08.2012 - 9.3	20.05.2013 - 2.3
17.09.2012 - 7.4	17.06.2013 - 11.7
12.11.2012 - 4.9	15.07.2013 - 6.7
21.01.2013 - 10.3	
04.03.2013 - 13.7	

Previous dry-off strategies

Calving dates: ☑
Clinical case records: ☑
Herd test records: ☑
DCT records: ☑
Termination dates: ☑

Eligible cows (dried-off and re-calved during the report period): **152**

Failure to cure over the dry

Eligible cows that were infected and treated with antibiotic dry cow: **137**
Of these, the number herd tested after calving (10-30 days): **42**
And still had a high cell count or clinical case after calving: **11**

Missed treatments

Eligible cows infected and not given antibiotic DCT: **9**

Infections over the dry

Eligible cows uninfected in previous lactation: **42**
Of those, the number herd tested after calving (10-30 days): **21**
And developed a high CC or clinical case after calving: **2**

Dry period clinical case rate

Number of cows that had a clinical case over the dry period: **0**

Culling to control mastitis

Clinical case records: ☑
Herd test records: ☑
DCT records: ☑
Termination dates: ☑

Cows prone to clinical mastitis

Number of cows in herd with 3 or more clinical cases in a lactation: **5**

Cows infected in multiple lactations

Number of cows still infected after 2 consecutive prior lactations despite intervening DCT: **1**

Plan your next drying-off

Number of cows milking at report end date: **204**
Number of cows more than 240 days into lactation: **24**
Of these, the number with 4 or more cell counts (YES reported when more than 80%) **22**
And number with a peak cell count above 250,000: **18**

For more information visit: **www.dairyaustralia.com.au/mastitis**

This report is a guide only and professional advice should be sought about your specific circumstances.

The ‘Farm Data Box’ shows the data behind the calculations. Always check that this data accurately represents the herd before referring to the measures on page 1.

The ‘Farm Data Box’ also gives an overview of the herd and its management – its size, calving pattern extent of herd testing, type of dry cow strategy, level of culling, etc.

The ‘Nuts and Bolts’ section shows the counts used to calculate the performance measures. These may help readers to recognise events as observed on the farm.

The ‘tick boxes’ show which records are needed to calculate the measures in each key management area. A ticked box indicates which records were available for analysis. The lack of a tick will mean not all measures can be calculated.

Behind your Mastitis Focus Report

Herd ID: ##
Report period 01.08.12 to 17/ /.13

FARM DATA BOX -- Check that these records represent your herd

Number of	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	TOTAL
Cows milking	245	260	259	258	245	210	155	181	195	230	225	207	
Cows herd tested	220	247		246		203		132		193	191	198	
Calvings	26	16	1					46	68	47	22	1	227
Heifer calvings		1						10	3				14
Cows culled or died	1	2	9	18		7	1	3	5	1	2	1	50
Clinical cases	10	7	6	11	11	10	5	1			7	2	70
Cows dried-off					35	51	20	54	10	27	18		215
Antibiotic DCT					22	51	20	52	7	27	18		197
Cows given Teat Sealant						52	19	51	4	28	18		172

NUTS AND BOLTS -- Helps cross-check the details behind the key management areas

Your calving system

Calving dates: ☑
Clinical case records: ☑
Termination dates: ☑
Birth dates: ☑

Monthy clinical case rate at calving
Number of clinical cases within 14 days of calving: 7

When they occured:

Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
3	1						1			2	

First calver clinical case rate
First calvers that calved during the report period: 14
Clinical cases in first calvers within 14 days of calving: 0

Clinical mastitis management

Calving dates: ☑
Clinical case records: ☑
Termination dates: ☑
LCT records: ☑

Monthy clinical case rate in lactation
Number of clinical cases in lactation
(from 14 days after calving): 63
When they occured:

Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
7	6	6	11	11	10	5				5	2

Total clinical cases 70

Treatment failure
Number of cases given an extended treatment course
(4 or more doses of antibiotic in 10 days): 17

Spread of infection

Calving dates: ☑
Clinical case records: ☑
Herd test records: ☑
Termination dates: ☑
Birth dates: ☑

First calver new infection
The number of first calvers that developed a high cell count or clinical case during the report period: 4

Average new infection rate
Average infection rate between herd tests:

20.08.2012 - 9.3
17.09.2012 - 7.4
12.11.2012 - 4.9
[illegible].01.2013 - 10.3
[illegible] - 13.7
20.05.2013 - 2.3
17.06.2013 - 11.7
15.07.2013 - 6.7

Previous dry-off strategies

Calving dates: ☑
Clinical case records: ☑
Herd test records: ☑
DCT records: ☑
Termination dates: ☑

Eligible cows (dried-off and re-calved during the report period) 152

Failure to cure over the dry
Eligible cows that were infected and treated with antibiotic dry cow: 137
Of these, the number herd tested after calving (10-30 days): 42
And still had a high cell count or clinical case after calving: 11

Missed treatments
Eligible cows infected and not given antibiotic DCT: 9

Infections over the dry
Eligible cows uninfected in previous lactation: 42
Of those, the number herd tested after calving (10-30 days): 21
And developed a high CC or clinical case after calving: 2

Dry period clinical case rate
Number of cows that had a clinical case over the dry period: 0

Culling to control mastitis

Clinical case records: ☑
Herd test records: ☑
DCT records: ☑
Termination dates: ☑

Cows prone to clinical mastitis
Number of cows in herd with 3 or more clinical cases in a lactation: 5

Cows infected in multiple lactations
Number of cows still infected after 2 consecutive prior lactations despite intervening DCT 1

Plan your next drying-off

Number of cows milking at report end date: 204
Number of cows more than 240 days into lactation: 24
Of these, the number with 4 or more cell counts (YES reported when more than 80%) 22
And number with a peak cell count above 250,000: 18

For more information visit: **www.dairyaustralia.com.au/mastitis**
This report is a guide only and professional advice should be sought about your specific circumstances.

Fact Sheet

L

Countdown Mastitis Toolkit App for smart phones

With the uptake of new technology in recent years, Countdown wanted to take the existing resources for mastitis control and make them more readily available to farmers, advisers and vets.

The Countdown mastitis toolkit app was developed in consultation with dairy farmers, advisers and vets to bring paper based resources to your back pocket. It has been designed to be intuitive to use and easy to read indoors, in the dairy shed and out in the paddock.

The app has been divided into four main sections:

1. **Guidelines**
2. **Topics**
3. **Tools**
4. **Library**

In the Guidelines section you will find a condensed version of the 'Countdown Farm Guidelines for Mastitis Control.' You have the ability to save a particular guideline as a favourite or email yourself a pdf copy of the whole guideline.

The Topics section of the app contains useful information for different mastitis control scenarios such as high BMCC, new staff training, and drying-off to name a few.

The Tools section of the app is based on a number of already existing activities you would normally do, made into an easy to use smart phone tool. You can calculate when your liners need to be changed next and set a reminder alarm, calculate withholding periods for mastitis antibiotics, check teat condition, and calculate potential benefit of lowering BMCC and much more.

The Library section has all the fact sheets from the 'Countdown Farm Guidelines for Mastitis Control'. This section also has some useful tips and traps as well as the most up-to-date news and research on mastitis.

By downloading this app you will have an easily accessible suite of resources in your back pocket.

Key features:

- Countdown Farm Guidelines for mastitis control.
- Topics include: new staff, mastitis at calving, drying-off cows etc.
- Library: mastitis control articles, tips & traps.
- Clinical cost calculator.
- Lower BMCC benefits calculator.
- Liner life calculator.
- Antibiotics withhold calculator.
- Antibiotics reference guide.
- Teat gallery.
- Teat condition calculator.
- Save favourites and email selected guidelines, topics and library resources.

Find the Countdown Mastitis Toolkit app on iTunes or Google Play or download it directly to your smart phone with the relevant QR code:

iPhone / iPad

Android

Scan the code
to download the app for iPhone / iPad

Scan the code
to download the app for Android

Fact Sheet

M

Using Internal Teat Sealants

Internal Teat Sealants (ITS) are used in cows at the time of drying-off to help protect them from environmental mastitis infections during the dry period and prior to calving. They are infused into the teats after the last milking and stay in the lower part of the teats throughout the dry period, physically preventing bacteria from entering the teat canal.

Under the direction of a veterinarian, Internal Teat Sealants are now often used as a combination treatment with Dry Cow Treatment (DCT).

Internal Teat Sealants are not antibiotics but they can cause black spot blemishes in maturing cheese. This is not a human health problem but can result in export customers rejecting or downgrading product.

To maintain Australia's reputation for high quality dairy products it is essential that milk leaving the farm does not contain teat sealant.

The 3 key steps for the proper use of Internal Teat Sealants:

1. Administer Internal Teat Sealants correctly

The techniques required are very different to those used with antibiotic Dry Cow Treatment. It's important that you and your staff know how to administer the product correctly.

- **Administer Internal Teat Sealants last.**

If a cow is to receive antibiotic Dry Cow Treatment in conjunction with internal teat sealant, make sure that the internal teat sealant is the final product administered.

- **Keep the tubes sterile.**

Cold temperatures can make the product hard to instil into the teat. Do not warm tubes by putting them directly into warm water. Instead, place the tubes in a warm room prior to use or put the product container into a larger bucket containing hot water (ie a bucket in a bucket).

- **Completely disinfect the teat ends.**

Wearing gloves, disinfect by rubbing the teat opening with a teat wipe or cotton ball and alcohol (70% methylated spirits & 30% water). Repeat until no dirty colour is evident on the wipe.

- **Gently close off the top of the teat and insert the tube nozzle.**

To encourage the product to remain within the teat cistern and canal (rather than in the udder) gently squeeze close the top of the teat (closest to the udder). Remove the tube cap (without touching the tip), gently insert the nozzle into the teat canal and infuse the product. Do not insert the nozzle to its full depth – this can damage the teat end.

- **Do not massage the udder after infusing internal teat sealant.**

Unlike antibiotic treatments, the infused product must sit in the lower part of the teat.

X-ray of a teat showing the position of correctly administered teat sealant in the teat cistern and canal.

2. Remove Internal Teat Sealants from fresh cows

It is very important to stop internal teat sealant entering the vat from fresh cows. This can be time consuming especially if you have large batches of cows calving, so make sure you have enough staff available.

- **At the first milking strip each treated quarter at least 10-12 times.**

This removes the bulk of the internal teat sealant so that it does not come in contact with the milk lines or rubberware – remember to wear gloves! This step is necessary even if calves have sucked prior to the first milking.

Strip each teat 10-12 times at the first milking.

- **Keep milk from fresh cows out of the vat for at least 8-10 milkings after calving.**

Small amounts of residual internal teat sealant will still be present in the milk for the first few days after calving, so it is important that all cows have a minimum period of 8 milkings (10 milkings for induced cows) before milk is included for pickup. This is also the standard Countdown recommendation to minimise colostrum in the milk for sale.

- **Preferably use designated clusters and test buckets.**

Internal teat sealants adhere to milk lines and rubberware. Where possible avoid running milk from treated animals through normal milk lines during the first eight milkings.

3. Clean milking equipment carefully

Residual internal teat sealant can stick to and form clumps (seen as a greasy white substance) in areas of reduced milk flow, such as milk claws and plate coolers.

Carefully clean milking plant to ensure that every effort has been made to prevent residual product from entering the bulk vat.

- **Review the cleaning routine in your shed and update milking staff.**

Take extra care to follow label directions on the cleaning products used. Ensure that the water temperate, chemical concentration, and volume used is according to label directions.

- **Change filter socks regularly.**

Effective filters are crucial to limiting the amount of residual internal teat sealant entering the bulk vat. Change filter socks regularly, especially if there is visible teat sealant present and leave filters in place during the cleaning phase to stop any product coming in contact with the plate cooler.

For more information or to discuss which animals to treat, contact your veterinarian.

Fact Sheet N

Using Milk PCR (Molecular tests)

Since 2010 Australian dairy farmers have had access to a milk PCR (molecular) test. PCR stands for polymerase chain reaction and it is an example of a test used in agriculture, science and medicine to assess a biological sample for the presence of specific types of DNA. DNA are the building blocks of genes in all living organisms such as bacteria. Other milk molecular tests, other than PCR, have been used in Australia but only within research projects.

The milk PCR test, offered by a commercial Australian laboratory, underwent extensive field assessment in 2011 through a research project funded primarily by the Geoffrey Gardiner Dairy Foundation. This research assessed the application and interpretation of test results for the milk PCR under a variety of scenarios and it the results of this work that form the basis for this Fact Sheet.

The milk PCR test can be applied to every type of milk sample: whole herd samples taken directly from the vat; composite samples of multiple cows taken via herd test flasks or direct sampling; composite quarter samples with all quarters contributing to a single cow sample and quarter level samples where one sample represents one quarter. Regardless of the milk sample type, interpreting the test result correctly remains the aim.

The PCR test has been designed to assess a sample for the presence of common mastitis bacteria DNA – if one of the target bacteria's DNA is present in the sample the test will indicate a positive result (down to a certain, very low level of bacteria). Test validation studies have indicated that the PCR will very accurately identify target mastitis bacteria DNA if it is present in the sample. One challenge is predicting if the DNA detected originates from mastitis causing bacteria from within an infected udder or from contaminant bacteria present on teat or udder skin or the sampling equipment.

Under Australian conditions, the PCR test appears to have the most benefit for assessing the presence of two mastitis bacteria: Strep agalactiae and Mycoplasma bovis. Both bacteria can only originate from within an infected udder so if the DNA is detected it generally means that infection in the sampled cow (or cows) is present. Both bacteria can cause significant mastitis problems at the individual cow and herd level and should be prevented from entering a herd through effective biosecurity procedures.

If cows are being purchased, or are entering a herd from another farm through other circumstances (eg: cow parking), the vat milk from the herd of origin should be assessed using the milk PCR test to help prevent the entry of these two mastitis bacteria. The test result should be reviewed with your veterinarian.

Whilst the milk PCR test returns a result quicker than a standard milk culture, it should not be viewed necessarily as a replacement for standard bacterial culture. This is primarily because of the increased relative cost of the PCR and the reality that identifying contaminant bacteria DNA for mastitis bacteria targets other than Strep agalactiae and Mycoplasma can be challenging, especially where the sample has not been taken aseptically. Milk PCR test results from composite multiple cows or single cow samples taken via herd testing flasks should be treated with caution because of this milk will not have been sourced aseptically (see Fact Sheet A).

A milk PCR test can generally be organised via your veterinarian or processor field officer. In all cases it is wise to assess test results in consultation with your veterinarian.

Fact Sheet O

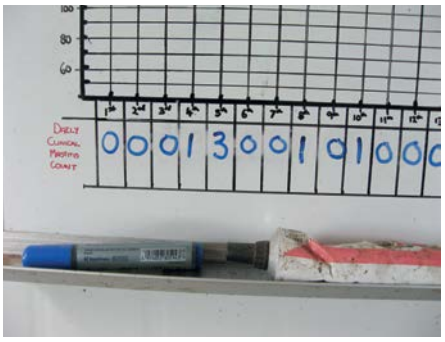
Surveillance systems for clinical mastitis

There are a number of methods that milkers can use to detect cows with changes in the milk that require treatment as a clinical mastitis case or re-checking at the next milking. Surveillance for a missed cow with clinical mastitis in the herd can be performed by checking the filter sock at the end of milking (see Guideline 10.3). Detecting cows with clinical mastitis during milking can be through visual assessment of the udder or quarter, clots within an in-line filter (long milk tube), or handstripping an individual quarter or quarters.

Stripping technique

An effective technique is to squeeze the base of each teat between the thumb and the first two fingers, then pull gently downwards. If no clots, flecks or other abnormalities appear in the first two squirts, move to the next teat. Foremilk should be stripped onto a black surface eg dark RMT paddle, piece of black plastic, or a strip cup to aid detection of discoloured milk.

Some milkers reduce the time (and the risk of injury) by fore-stripping only one or two teats per cow per milking eg the left quarters at morning milkings and the right quarters at evening milkings. Alternative ways for regular fore-stripping the whole herd are described in the table below.



Quality milk is essential for each farm and our industry – it is not an optional extra. Clinical mastitis cases are time-consuming and costly (an estimated $270 per case).

Ways to regularly fore-strip the whole herd

System	Description	Comment
Strip all 4 quarters before every milking	Fore-strip all 4 quarters before every milking.	Very effective when level of mastitis is high. Time consuming and labour intensive when clinical rate is low.
Strip all 4 quarters once per week	Fore-strip all 4 quarters before one milking eg Monday morning.	Requires extra labour unit or prolonged milking time. Can be unsettling as cows don't become accustomed to having teats touched.
Strip 2 quarters at 2 milkings each week	Fore-strip 2 quarters at one milking, other 2 at the next milking, once a week eg one side in morning, other side in afternoon or both fronts in morning, both backs in afternoon.	Milking routine will be slower but this method can be handled by the normal milker, without extra labour.
Strip 1 quarter at 4 milkings each week	Fore-strip 1 quarter at a milking. All quarters stripped over 4 milkings. Use 2 morning and 2 afternoon milkings, or 4 morning milkings.	Requires no extra labour and has least impact on milking routine. Less unsettling for cows as teats being touched more regularly. Method is practical when clinical rate is low to moderate.

Fact Sheet P

Controlling mastitis in wet conditions

High cell counts and clinical mastitis won't fix themselves!

Mastitis risk has changed significantly in the past five years, for example, the use of feed pads, stand-off areas and bare paddocks have all increased the exposure of teats to bacteria. When conditions get wet, the risk of mastitis skyrockets. Many old routines don't work.

Don't assume you're already 'doing all the right things'

In wet or muddy periods there are 4 key steps:

1 Wash and dry all teats before cups go on. On wet or muddy days, every teat must be washed and dried with one paper towel per cow.

2 Strip cows every day to detect, treat and isolate clinical cases.

3 Cover 100% of teat skin on every teat with teat disinfectant.

4 Keep teats clean for an hour after the cows leave the shed. Set up feeding and other routines so cows don't lie down soon after milking.

If elevated BMCCs or clinical cases persist:

Assess whether you have an underlying problem with teat condition, machine function, or other opportunities for bacteria to spread. Seek professional advice.

Cultures are needed to determine the bacteria involved.

At the end of lactation

Dry Cow Treatment is your best chance to remove infections and reduce mastitis risk at calving. Talk to your vet about using blanket antibiotic Dry Cow Treatment and internal teat sealant.

On days that are wet or muddy you must change your milking routine. You may need an extra person in the shed.

1. Wash and dry teats before cups go on

Wash – If there is mud/manure on the teat surfaces, mastitis-causing bacteria are more likely to enter the teat during milking.

Dry – If teats are wet, cups crawl up, cut off milk drainage and damage the teat ends.

- Wash with a low pressure water hose and dry with one paper towel per cow.
- In rotaries, you may need to change your cups on position.

2. Strip cows every day to detect, treat and isolate clinical cases

The earlier that clinical cases are treated and isolated, the higher the chance of cure, and the lower the chance of mastitis spreading.

- Make daily quarter stripping a routine at times of high risk. You can reduce the time taken by stripping only two teats per cow per milking, eg all front teats at the morning milking and all back teats at the evening milking. Always wear gloves.
- A quarter has clinical mastitis if it has abnormal milk (wateriness or clots) for 3 or more squirts of milk.
- Recheck suspect cows at the next milking. Have a system in place that lets other staff know about suspect cows.

3. Cover 100% of every teat with teat disinfectant

100% coverage with the correct concentration of disinfectant and emollient helps remove bacteria and heal teat damage. This is critical to mastitis control. Supple teat skin is also easier to keep clean.

- Using a Ready-To-Use product if water quality is uncertain.
- If you do mix teat disinfectant from concentrate, re-check the mixing rate and consider adding extra emollient during the wet period.
- Spray the whole surface of every teat. Check with a paper towel on some teats to make sure the fronts of the teats haven't been missed.
- If you usually use an automatic teat spray at the dairy exit, switch to hand spraying for this period to ensure complete coverage.

4. Keep teats clean for an hour after cows leave the shed

Teat ends remain open for up to an hour after milking. If teats become dirty during this time, there is a high risk of bacteria entering the udder.

- Reduce muddy areas at the exit of the shed, lanes, holding and feeding areas. Look for badly pot-holed areas and repair or use a temporary fence to prevent cows entering. Scrape clean feed pads regularly to minimise splashing of mud and manure onto udders.
- Set up a routine so cows don't lie down soon after milking. Have feed available when cows leave the shed, especially on feed pads, so cows stand and feed for the first hour.

Look at the relevant Countdown Farm Guidelines and Resource Sheets on the Dairy Australia website. Talk to your milk quality adviser, veterinarian or field officer to adapt these steps to your farm situation.

Fact Sheet

Q

Teat changes that increase mastitis risk

Maintaining healthy teat skin is vital for successful prevention of mastitis.

Factors or organisms that affect the teats of dairy cows fall into one of three broad categories:

- Milking induced (ie, faulty machines or milking management).
- Environmental (eg, water, mud, windy cold conditions, sunburn).
- Infectious (ie, viral or bacterial infections).

These changes can produce short, medium or longer term changes in teat condition.

Regular checks of teat condition are recommended in all herds to pick up and identify emerging issues and take action.

Short term changes

Short term changes in teat condition are seen immediately after a single milking and can include:

- Skin colour.
- Firmness or swelling.
- Open teat orifice.

Red teat

The teat colour appears red. This change may be caused by machine factors or milking management practices.

Blue teat

The teat colour appears blue or cyanotic. This will be caused by machine factors.

Rings at the base of teat

Teat have marked rings or swelling at the teat base. This change may be caused by machine factors or milking management practices.

Open teat orifice

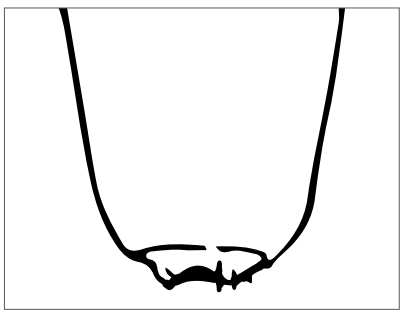
The teat orifice, or teat canal opening, appears open after the cups have been removed. Generally, the teat orifice looks as if a match head would fit into the opening. This change may be caused by machine factors or milking management practices.

Red teat

Blue teat

Rings at the base of teat

Open teat orifice



Rough teat end

Medium to long term changes

These usually take a few days or weeks to become obvious. These include:

- Photosensitisation.
- Haemorrhages (petechiations).
- Chaps and cracks.
- Hyperkeratosis (rough or very rough teat ends).

Rough teat end

This is a rough surface at the teat end due to increased production of keratin or hyperkeratosis. Fronds of keratin extend 1-3mm from the surface. This may be caused by machine factors, milking management practices or environmental changes.

Very rough teat end

This is a rough surface at the teat end due to increased production of keratin or hyperkeratosis. Fronds of keratin extend >4 mm from the surface. This may be caused by machine factors, milking management practices or environmental changes.

Haemorrhages (petechiations) on teat skin

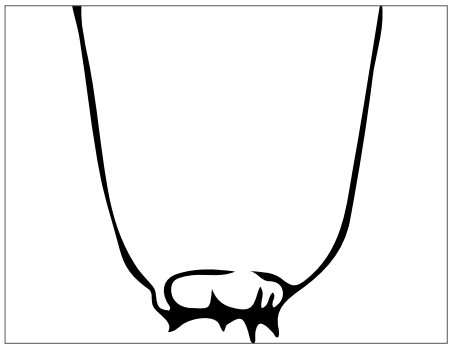
Small haemorrhages, or petechial haemorrhages, can be seen with the naked eye on the teat skin. These may be caused by machine factors or milking management practices.

Photosensitisation

Observed as lesions on the skin, generally in un-pigmented skin, due to exposure to sunlight. This change occurs as a result of photodynamic agents being retained in the bloodstream.

Chaps and cracks

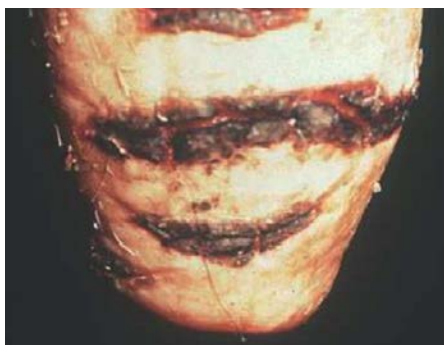
Chaps and cracks, observed particularly around the upper parts of the teat barrel. This is often associated with adverse environmental conditions.



Very rough teat end

Haemorrhages

Photosensitisation



Chaps and cracks

Fact Sheet

R

Benefits of lowering Bulk Milk Cell Count

What are the benefits of lower cell counts?

Countdown 2020 has developed an economic model of Australian farms, showing increased income from lowering the annual average Bulk Milk Cell Count (BMCC). The model shows there are gains to be made right down to very low Bulk Milk Cell Counts.

The Step Diagram below shows the increased income per cow per year for reductions in the herd's annual average BMCC, in steps of 50,000 cells per mL.

The increased income per cow is calculated after taking into account benefits such as improved milk production (from the fact that more milk is produced from healthy udders) and additional quality premiums, minus the increased feed costs associated with the increase in milk production.

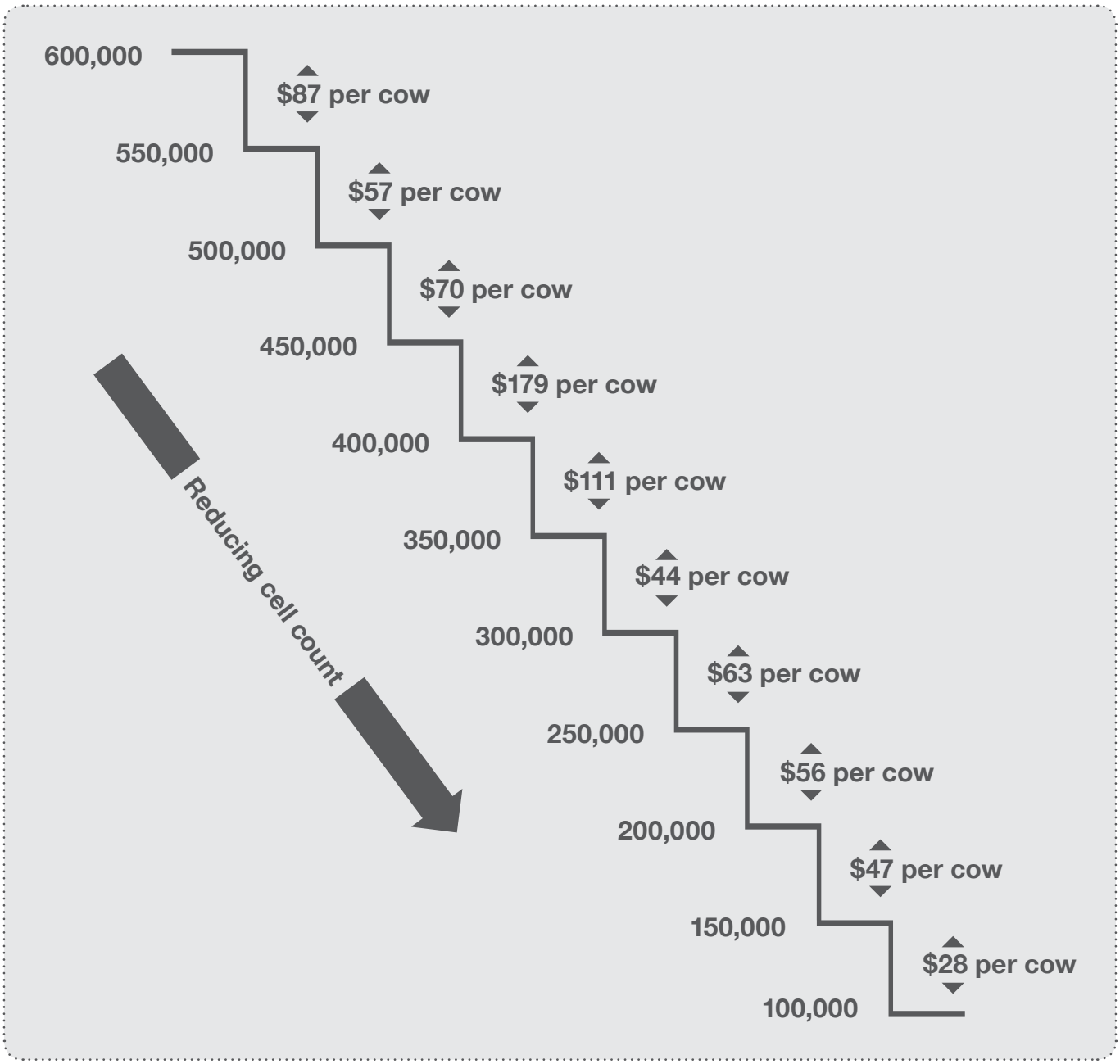
As BMCC goes down there is decreased infection pressure, decreased new infection rate and BMCC becomes easier to manage.

In this example the model has been set for typical split-calving herds using a typical dairy processor's payment system for the season 2013/2014 with a grain price of $400/tonne.

The increase in income which results in moving to a lower BMCC level can then be used to compare with the possible costs associated with moving to the lower BMCC level.

* Joe works hard to reduce his average BMCC from 250,000 to 150,000. Following the steps on this graph, he gains $56 per cow when his herd drops from 250,000 to 200,000 BMCC and another $47 per cow when the herd drops to 150,000 BMCC. This is a total of $103 per cow per year for his effort.

* Lowering BMCC Step Diagram



Index

N

O

P

Q

R

S

T

U

V

W

Y

Acknowledgements

Members of the Australian Mastitis Advisory Council (1996 – 2002) which supported the publication of Edition 1. The asterisks denote people who participated in developing these guidelines:

Jeff Andrews
Pauline Brightling
John Bone
John Bywater*
Harry Collins*
John Craven
Bill Darmody*
Tom Davison
Lee Fitzgerald*
John Furphy*
Richard Habgood
Terry Hehir (Chair)*
Ian Hubble*
Angus Hume*
Peter Maguire
Jakob Malmo
Jill McKenzie
Graeme Mein
John Oldaker
Kem Perkins*
Robert Poole
Sally Reid
Graeme Rogers*
Diane Ryan

Invaluable help was also offered by many farmers and professional service providers with an interest in milk quality throughout Australia. Written contributions for Edition 1 were received from:

Pierre Baychelier
Glen Beath
Greg Cavanagh
David Chaffey
Russell Coote
Gabriel Hakim
Stuart Halliday
Graham Hancock
Sue Hides
Ian Holmes
Meaghan Johnston
Sandy McClintock
Mal Maroske
George Miller
Bill Morgan
John Ryan
Richard Shephard
Greg Stevens
Jos Vermunt
Peter Wendell-Smith
Jack Winterbottom
Peter Younis

Members of the Australian Milk Quality Steering Group (in 2013/2014) which supported the publication of Edition 2.

Lisa Dwyer (Chair 2013)
Stuart Griffin (Chair 2014)
Graeme Mein
Jakob Malmo
John Penry
Carol Millar
Kathryn Davis
Rod Dyson
Ruth Kydd
Sylvia Vagg
Meaghan Johnson
Durham Prewett
John Craven
Geoff Matthews
Karensa Delany
Sarah Chaplin
David Beggs
John House
Pauline Brightling
Daniel Dickeson
Sarah Carter





Dairy Australia
Your Levy at Work

Dairy Australia Limited ABN 60 105 227 987
Level 3, HWT Tower
40 City Road, Southbank VIC 3006 Australia
T + 61 3 9694 3777 F + 61 3 9694 3701
E enquiries@dairyaustralia.com.au
dairyaustralia.com.au

0741 | Mar 2018