14 Decide dry cow mastitis strategy – drying off dates and Dry Cow Treatment

At the end of lactation, dairy cows require a dry period that is sufficiently long to allow the udder tissue to repair and rejuvenate.

Alveolar cells, the cells that synthesise milk, collapse and the number of active alveolar cells declines to a minimum during the early dry period (Blowey and Edmondson 1995). New secretory tissue is laid down when cows start to 'freshen' ready for calving, so that the total amount of secretory tissue increases from one lactation to the next.

A minimum of six weeks (and preferably eight weeks) is recommended between drying-off and calving for regeneration of udder tissue. If cows are not dried-off at all, the next lactation yield may be as much as 25-30% lower (Blowey and Edmondson 1995).

Another physiological change, that occurs at the start of the drying-off period and is critical for preventing new infections over the remainder of the dry period, is the closure of the teat canal with a keratin plug made from the cells lining the teat canal (Woolford *et al* 1998).

In a field trial in New Zealand, observers found quarters receiving Dry Cow Treatment at drying-off had a significantly higher rate of closure of the teat canals in the first four weeks of the dry period than untreated quarters (Williamson *et al* 1995). This implies that Dry Cow Treatment facilitates physical sealing of the canal. Although there is no obvious mechanism, the authors suggest the lining of the teat canal may be cleaner as (1) the dry-cow antibiotic kills resident bacteria that colonise the teat canal and (2) there is minimal build-up of debris associated with the action of bacterial enzymes.

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

Confidence – High

World-wide experience supports this recommendation.

Research priority – Low

The length of the dry period impacts on the daily milk yield achieved the following lactation. Dias and Allaire (1982) found that age, intercalving interval, and milk yield prior to drying-off influenced the dry period required to maximise yields in the subsequent lacation. They believe that to achieve optimal yields, younger cows need longer dry periods than older cows, and cows producing more milk require longer dry periods than their herd mates.

In a study of non-seasonally calving herds in New South Wales, cows with longer intercalving intervals were less likely to be culled from the herd for udder disorders, including clinical and subclinical mastitis (Stevenson and Lean 1998).

Confidence – High

In seasonal herds, cows with high cell counts in late lactation can contribute significantly to increased bulk milk cell counts.

Research priority – Low

Conventional wisdom is that longer dry periods may benefit cows with high cell counts by allowing additional time for resolution of infections via Dry Cow Treatment or self-cure.

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

Technote 12 describes how to use ICCC for management decisions.

14.3 Collect data to assess herd mastitis level.
&
14.4 Plan to use Dry Cow Treatment in all appropriate cows in the herd.

Confidence – Moderate

The flow chart on Fact Sheet C of the Countdown Farm Guidelines provides a logical planning sequence based on both field experience and experimental observations of Dry Cow Treatment in Australia (in the 1980s) and New Zealand (in the 1990s).

Research priority – Moderate

This approach should be reassessed after 1-2 years of use especially in *Strep uberis* herds.

The Australian dairy industry is recognised for its responsible use of antibiotic treatments (JETACAR 1999). Dry Cow Treatment is used to:

- Treat existing infections that have not been cured during lactation. Sustained antibiotic activity, high doses of active ingredient and penetrating formulations increase the chance of curing infections embedded deep in the udder tissue.
- Reduce the number of new infections that may occur during the dry period. Dry Cow Treatment protects udders from new infections in the dry period, directly through the effect of the antibiotic and indirectly by promoting the formation of a natural keratin plug that seals the teat canal (Williamson *et al* 1995).

Although relatively high new infection rates have been observed in dairying systems during the dry period in North America and Europe, they have not been a feature of pasture-based dairying in Australia. In Victoria in the 1980s, new quarter infections during the dry period were 2% for cows given blanket Dry Cow Treatment and 4% for uninfected untreated cows (Browning *et al* 1990). More recent reports from New Zealand (Woolford *et al* 1998) found about 13% of untreated cows were infected at calving. This higher rate is more consistent with infection rates currently observed on farms in Australia (see the discussion in *Strep uberis* below).

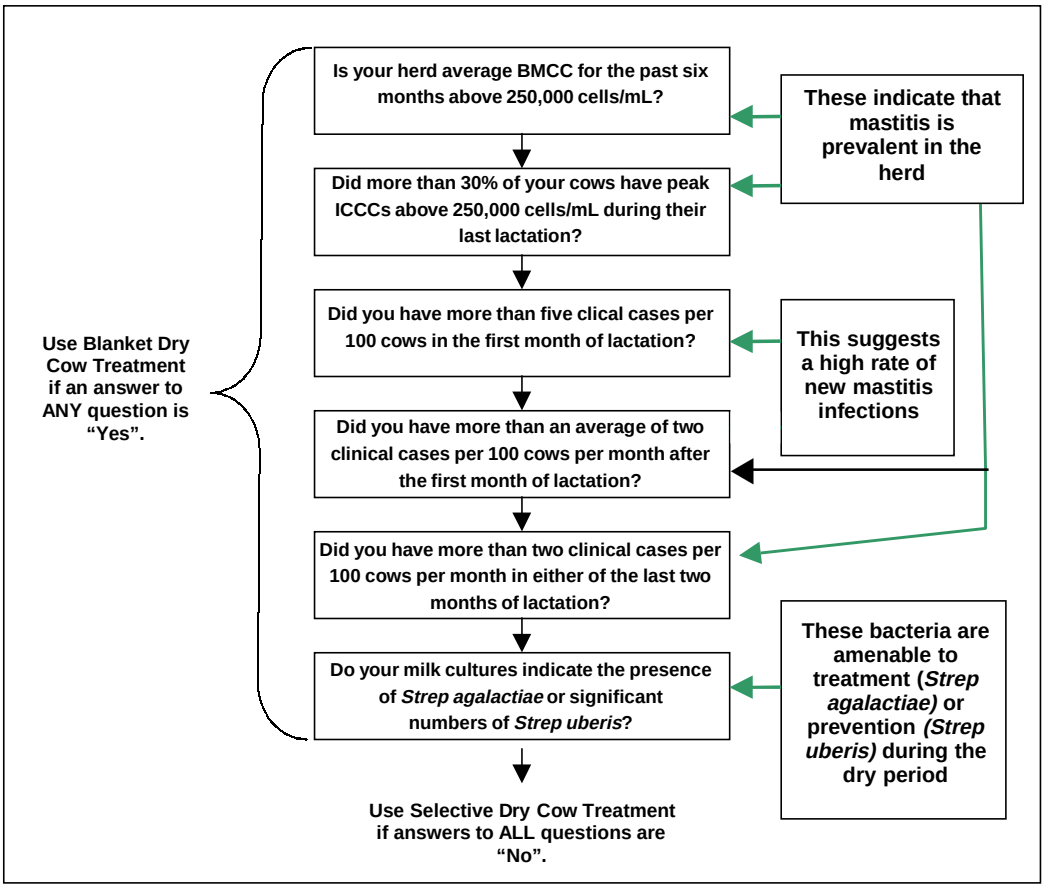
For an individual farm, the economic impact of different Dry Cow Treatment strategies can be investigated using spreadsheets – such as the model developed by Beggs (1999).

Issues to consider when choosing between a blanket or selective dry cow strategy are the:

- estimated mastitis prevalence in the herd;
- likely pathogens causing the mastitis in the herd;
- the economics of missing infected cows or treating uninfected cows;
- risk of new infections in the dry period; and
- management of antibiotic use to avoid residue violations in meat and milk.

The most appropriate strategy should be planned with a veterinarian. Selective treatment can only be considered when each cow in the herd has at least three individual cow cell counts (ICCCs) for the current lactation. Fact Sheet C of the *Countdown Downunder Farm Guidelines for Mastitis Control* gives a basic flow chart that helps with this decision process. The reasons behind each decision node when choosing a dry cow strategy are shown below.

Reasons behind the questions concerning dry cow strategy in Fact Sheet C of the Countdown Downunder Farm Guidelines for Mastitis Guidelines



Important points to emphasise to farmers

When planning for Dry Cow Treatment farmers are advised to:

- Treat all quarters of all cows if using Blanket Dry Cow Treatment. In infected cows, restricting treatment to infected quarter results in a higher new quarter infection rate than if dry cow antibiotic is given to all quarters (6.4% compared to 3.9%) (Browning *et al* 1994).
- If using Selective Dry Cow Treatment, treat all quarters of all cows with a peak ICCC above 250,000 cells/mL during the current lactation, and all cows that had clinical mastitis at any time during the current lactation (Victorian Mastitis Research Group 1982).
- Dry Cow Treatment products do not protect against some environmental bacteria (such as *Pseudomonas*) that may be introduced into the udder if the intramammary infusions are not given correctly (Radostits *et al* 1994).

These thresholds are harder to assess in year-round calving herds.

Analysis of ICCC and clinical records through milk recording may make calculating these indices easier.

Technote 1 summarises characteristics of *Strep uberis*.

Blanket Dry Cow Treatment and Strep uberis

Strep uberis is ubiquitous in the environment. Infection most frequently occurs in the first two weeks of the dry period (secretions in the mammary glands of cows that have been dry for 7-28 days support the growth of *Strep uberis*) and during the calving period and early lactation.

In the 1980s, studies of Victorian herds with predominately *Staph aureus* infections showed that Dry Cow Treatment of uninfected cows was not warranted (Browning *et al* 1990). Consequently the prime focus of Dry Cow Treatment strategies at this time was selective treatment of cows suspected to have mastitis with the aim of *curing existing infections*. In the 1990s, Williamson *et al* (1995) demonstrated that use of dry-cow antibiotic protected treated cows against new infections with *Strep uberis* during the dry period, significantly reducing the incidence of mastitis both in the dry period and post-calving.

As *Strep uberis* infection is of increasing importance in Australia (Wraight 1998), more farmers are reverting to blanket Dry Cow Treatment. Although the *Countdown Downunder Farm Guidelines for Mastitis Control* encourage farmers to use selective Dry Cow Treatment where possible, the appropriate use of antibiotics to protect udders in high-risk circumstances is also supported.

There is no objective information on what constitutes "significant numbers" of *Strep uberis*, however, field experience suggests that isolation of this bacteria from more than 30% of milk cultures indicates a significant problem with *Strep uberis* infection in the herd. The decision that the herd has a problem with *Strep uberis* during the dry period is supported by:

- assessing the management of fresh cows (e.g. how wet and muddy the calving paddocks are, the interval between calving and entering the shed, etc); and
- demonstrating *Strep uberis* infection in a number of cases of clinical mastitis that occurred immediately prior to, or within the first two weeks following, calving.

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

Confidence – Moderate

Because no antibiotic product is 100% effective, choices for a specific farm must be made on pathogens known to be present and on the herd's previous response to antibiotic therapy.

Two types of products used at treat and/or prevent mastitis during the dry period are Dry Cow Treatments and products that physically seal the teat-end (currently only registered for use overseas).

The 'Teat sealants' FAQ sheet describes physical methods of sealing the teat canal during the dry period.

The choice of Dry Cow Treatment depends on a number of factors, including the spectrum of activity, cure rates and periods of protection of the different products.

Cure rates following Dry Cow Treatment are greatly influenced by the bacteria causing the mastitis and how long the cow has been infected, and they vary a lot between herds.

Generally, cure rates will be high for *Strep agalactiae* and lower and more variable for *Staph aureus*. For example, cure rates of 92% to 100% were reported following treatment of *Strep agalactiae* infections with cloxacillin or cephalonium (Sol and Sampimon 1995) while cure rates for *Staph aureus* ranged from 41% to 84% and tended to be lower in older cows (Ziv *et al* 1981).

A field trial reported significantly higher cure rates for *Staph aureus* (a 73% clearance of infection) when cows were treated with one of the new formulations of cloxacillin during the dry period compared with 55-58% clearance by two other products (Marco *et al* 1995). The newer formulations contain an increased dose of active ingredient and finer particle sizes to increase drug solubility and extend the duration of action.

Chronically infected cows are less likely to respond to Dry Cow Treatment than more recently infected cows.

Where individual cow cell counts (ICCC) are available, cows that a) had high ICCCs in the previous lactation, b) were treated with an appropriate Dry Cow Treatment at drying-off and c) continue to have a high ICCC the following lactation, could be considered as chronically infected.

Active ingredients and spectrum of activity for Dry Cow Treatments available in Australia (October 1999)

Product name	Company	Active ingredients*	Spectrum of activity
Ampiclox Dry Cow	Jurox	Ampicillin 250 mg, Cloxacillin 500 mg	Gram +, Gram -
Cepravin Dry Cow	Schering-Plough	Cephalonium dihydrate 250 mg	Broad spectrum
Elaclox DC	Elanco	Cloxacillin 500 mg	Gram +
Elaclox DC Xtra	Elanco	Cloxacillin 600 mg	Gram +
Noroclox Dry Cow	Novartis	Cloxacillin 500 mg	Gram +
Orbenin Dry Cow	Pfizer	Cloxacillin 500 mg	Gram +
Orbenin Enduro	Pfizer	Cloxacillin 600 mg	Gram +

*All cloxacillin preparations as a benzathine salt.

Technote 3.1 lists Minimum Dry Periods and recommended withholding periods for various Dry Cow Treatments.

Technote 4.10 describes antibiotic residue violations associated with Dry Cow Treatments.

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

Farmers planning to administer Dry Cow Treatments are advised to obtain their supplies (antibiotics, materials for teat sanitising, etc) well ahead of the drying-off date. Advisers should emphasise the importance of correctly storing antibiotics, as specified on the label, for efficacy and safety reasons (Food Quality Program 1999). For example, many veterinary antibiotics should be stored at refrigeration temperatures to retain their effectiveness.

From a practical point of view, it is important to discourage storage of Dry Cow Treatment near Lactating Cow tubes. This reduces the risk of accidentally administering Dry Cow Treatments to lactating cows – which can be a very expensive mistake in terms of antibiotic violations and costs associated with withholding milk from the vat.

Key papers

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