15 Cull persistently infected cows

Culling infected cows is a key strategy in mastitis control as it is the only way to eliminate some infections. When making culling decisions, farmers should consider a variety of factors such as milk production, reproductive performance and lameness. From an udder health perspective, a cow should be considered for culling if she has clinical or subclinical mastitis that is unlikely to cure, or if she is highly likely to develop further cases of mastitis in the future. The time of culling is not related to dry off: culling decisions need to be made throughout the production cycle.

It is well accepted that cure rates vary depending on the causative pathogen. It is therefore important that herds routinely conduct milk cultures to identify their unique pathogen profile to help shape the overall culling policy on the farm.

For herds with a high prevalence of intra-mammary infection caused by pathogens that are both persistent and contagious (i.e. Staph. aureus and Mycoplasma bovis), culling is an important control strategy. In such herds, it is important to detect infected cows or quarters using milk culture (routine and/or specialised culture to detect Mycoplasma species), individual cow cell count (ICCC) data and clinical case records so that the reservoir can be managed through strategic culling, early dry off or treatment.

In contrast, herds experiencing cases caused by environmental pathogens such as Strep. uberis and coliforms may be able to operate at a lower culling rate, as such pathogens usually have higher cure rates.

Antibiotic Dry Cow Treatment is less likely to eliminate bacterial infections with increases in the chronicity of infection, the age of cows, and the presence of Staph aureus (Buddle *et al* 1987, Sol *et al* 1994). For example, cure rates to cloxacillin in 12 Victorian herds was over 80% for cows less than five years of age and less than 60% for cows over five years of age (Browning *et al* 1994).

In a study of eight dairy herds in New South Wales, Stevenson and Lean (1998) observed the likelihood that cows would be culled for acute or chronic mastitis increased each lactation and suggested this may be due to cumulative damage in the udder over their productive life.

Although culling is an important mastitis control tool, it is an expensive option and bulk milk cell count problems will only be solved if concurrent measures are taken to prevent the spread of new infections. Very little research has been conducted to determine the costs and benefits of different culling strategies on udder health status.

Confidence – High

Treatment is less likely to be successful in cows that have multiple mastitis episodes.

Research priority – Low

Technote 12.1 shows how to calculate the impact of high cell count cows on milk payments.

Technote 8.3 discusses segregation of infected cows.

Technote 4.13 discusses the options for drying-off clinical quarters.

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

There is general industry agreement that it is uneconomic to keep cows with recurrent cases of mastitis in the herd. Pinzon and Ruegg (2011) found that cows without bacteriological cure had 8 times the odds of recurrence of clinical mastitis during a lactation. The study also found that cows experiencing their first clinical case had 7 times the odds of curing compared with those experiencing recurrent clinical mastitis. In an older large New Zealand study, cure rates of 75% for first cases, 45% for second cases and 12% for cows being treated for the third time were reported (Livestock Improvement 1992).

New Zealand studies have found that the bacteriological cure of quarters with clinical mastitis varies depending on the:

- Causative pathogen (approximately 70 to 90% for Strep. uberis, and 30% to 40% for Staph. aureus)
- Age of cow (88% for 2 year olds compared to 71% for cows ≥7 years)
- Number of days from calving at diagnosis (84% for cases on the day of calving versus 68% for >7 days since calving) (McDougall *et al* 2007a; McDougall *et al* 2007b).

Other overseas findings are similar, with cure rates for Staph. aureus mastitis decreasing with increasing cow age, increasing individual cell count, increasing duration of infection, increasing colony counts of bacteria in the milk, increasing numbers of quarters affected and for rear compared to fore quarters and presence of beta-lactamase producing genes in the bacterial isolate (Barkema *et al* 2006; Sol *et al* 1994).

If three clinical episodes occur in a single quarter, a practical solution may be to cease milking just the affected quarter for the rest of the lactation, until she is culled.

Confidence – Moderate

High cell counts in two consecutive lactations, with intervening Dry Cow Treatment, indicate chronic infections or cows that are highly susceptible to re-infection.

Research priority – Low

If cows with high cell counts are retained in the herd they should be segregated and milked last as infected cows.

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.

High cell counts in two consecutive lactations, despite antibiotic Dry Cow Treatment, indicate extensive or refractory infections. These cows are unlikely to cure and should be considered for culling if this action is economically justifiable.

Whether or not it is economic to cull high cell count cows depends on:

- Their impact on the BMCC and consequently on the milk payment
- The risk of mastitis spreading to other cows in the herd; and
- Meat value and the cost of replacement cows.

Increasing age and parity have been shown to be associated with decreasing odds of cure over the dry period (Barkema *et al*, 2006; Browning *et al*, 1994; Henderson *et al*, 2016; Østerås *et al*, 1999). Henderson *et al* (2016) found that cows of parities 3 or greater had lower odds of cure when compared to cows of parity 2 (OR = 0.39 – 0.5). Østerås *et al* (1999) found that cows of lactations ≥2 were 1.9 times less likely to cure over the dry period when compared with primiparous cows. Browning *et al* (1994) showed that cows less than 5 years of age had significantly higher cure rates over the dry period (80% vs <60%). In contrast to these findings, small datasets from trials in New Zealand have shown much more modest effects of age and parity (Bryan *et al*, 2011; McDougall, 2010).

A recent, large observational study of 45,627 lactations in the UK by Henderson *et al* (2016) found that increasing length of intra-mammary infection (determined using ICCC data) was associated with lower cure rates over the dry period. In that study, cows with ICCC ≥ 200,000 cells/ml across greater than 50% of herd tests in the current lactation had considerably lower odds of cure over the dry period when compared to cows with less than 50% of herd tests ≥ 200,000 cells/ml.

15.3 Assess farm's use of culling to control mastitis using a Mastitis Focus Report.

The Mastitis Focus Report identifies the number of cows in the herd with 3 or more clinical cases during a lactation. It also assesses the number of cows that have had high cell counts for three consecutive lactations, despite intervening antibiotic dry cow therapy i.e. cows that have had multiple opportunities to cure and are therefore high priority culls that are still in the herd. Currently, the Mastitis Focus Report does not individually identify these cows. However. if these indices are high, then a farm's culling protocols could be improved.

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**

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