

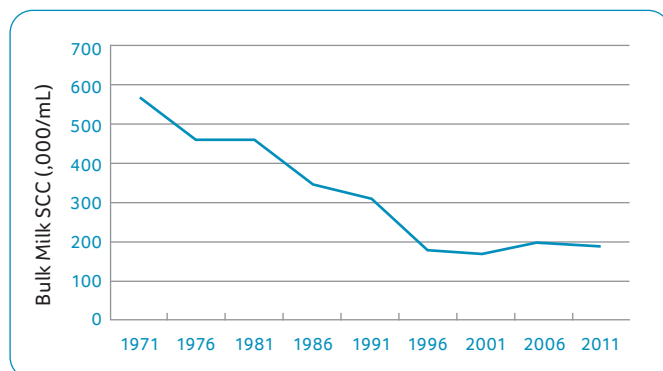
Mastitis, the inflammatory condition of the mammary gland, remains one of the most significant and costly diseases in the dairy industry with a cost of \$250 – \$450 per clinical case. It impacts animal welfare, milk quality and farm profitability. For decades, structured control plans have been the cornerstone of effective mastitis management.

The first coordinated approach to controlling bovine mastitis began in the 1960s with the development of a 5-point plan for mastitis control:

1. **Teat dipping:** Disinfect all teats after every milking.
2. **Dry cow therapy:** Administer antibiotic therapy to all quarters at the end of lactation.
3. **Prompt treatment of clinical cases:** Identify and treat clinical mastitis cases promptly and appropriately.
4. **Culling chronic cows:** Identify and permanently remove cows with chronic, recurrent infections from the herd.
5. **Regular milking machine maintenance:** Ensure machines are functioning correctly to avoid teat-end damage

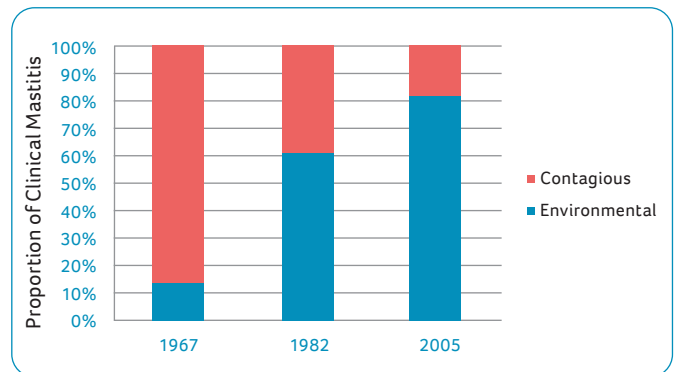
Uptake of the plan resulted in rapid progress in the control of clinical and sub-clinical mastitis. This came about primarily through better control of contagious mastitis pathogens (i.e. those adapted for survival within the host mammary gland). For example, in the UK the incidence rate of clinical mastitis fell from more than 150 cases per 100 cows per year to just 40 cases per 100 cows per year between 1967 and 1982. At the same time, the national bulk milk somatic cell count reduced from over 600,000 cells/ml to 400,000 cells/ml (Figure 1).

Figure 1



In recent decades, there has been a shift from contagious mastitis to mastitis from environmental bacteria (Figure 2).

Figure 2



This shift towards environmental mastitis, combined with heightened concerns regarding antimicrobial resistance and antibiotic residues from both lactation therapy and dry-cow treatment, has led experts to expand the traditional 5-point plan into a 7-point plan for mastitis control.

**This updated 7-point plan for mastitis contains the following guidelines:**

## 1 Disinfect all teats after every milking

Application of an effective teat disinfectant after each milking significantly reduces the risk of new intramammary infections, particularly those caused by contagious pathogens such as *Staphylococcus aureus*. Dips or sprays should completely cover the teat end and remain on long enough to destroy pathogens. Teat disinfectants that possess barrier properties can help reduce environmental as well as contagious mastitis. The effectiveness of the various products offered is well documented in the scientific literature. There is a wide range of choices in germicides with proven efficacy like iodine, chlorine dioxide, hydrogen peroxide, lactic acid and chlorhexidine.

## 2 Treat all cases of mastitis promptly and record data

Early detection through visual inspection, California Mastitis Test (CMT), somatic cell counts (SCC), and milk culture enables timely intervention. Intervention with antibiotics remains important and should be based upon bacteria identification by culturing on plates or by rapid on-farm tests that can identify bacteria within 12 hours. Early detection and targeted treatment will improve cure rates by returning the cow to full production. It will also limit the pathogen spread within the herd and lead to a reduction in antimicrobial use and antimicrobial resistance.

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### ③ Use dry cow teat sealant on all cows and selectively use dry cow therapy

The dry period represents both risk and opportunity in mastitis control. Key practices include:

- Implementing selective dry cow therapy
- Maintaining excellent hygiene during drying off
- Use a dry cow teat sealant on all dry cows
- Monitoring dry cows for early signs of infection
- Providing appropriate nutrition and environment

Blanket dry cow therapy, where all cows systematically are dried off with intramammary antibiotics was a common and effective practice on farms for curing existing clinical and sub-clinical infections and in reducing infections during the dry period. With concerns of antibiotic overuse, prophylactic use is no longer allowed in some countries and is not advisable anywhere. By testing and monitoring the udder infection status, it is possible to implement selective dry cow therapy. Healthy udders with no history of clinical or subclinical infection should not receive antibiotics. Teat sealants are sterile, inert, non-antibiotic products typically composed of bismuth subnitrate in a paraffin-based carrier. When infused into the teat canal at drying off, they form a physical seal that mimics the natural keratin plug, preventing environmental pathogens from entering the teat canal throughout the dry period. Teat sealants have been shown to provide good protection against new dry period infections and should be given to all cows. For high-risk quarters, teat sealants can be combined with dry-off antibiotic injectors.

### ④ Cull all cows with three or more cases

Strategic culling decisions help eliminate persistent infection sources:

- Identifying cows with recurrent mastitis
- Removing cows with severe udder damage
- Considering somatic cell count (SCC) history in culling decisions
- Balancing animal welfare with economic considerations

Animals with repeated clinical episodes, consistently high somatic cell counts, and poor response to treatment should be identified and evaluated for culling. These animals often harbor deep-seated infections that are difficult to eliminate with antibiotics and remain reservoirs for infection of contagious bacteria.

### ⑤ Maintain the milking machine properly

Faulty milking machines can injure teat tissue and facilitate bacterial penetration. Vacuum levels, pulsation rates, and rubber liners must be tested and maintained regularly. Equipment should be disinfected thoroughly after the milking of infected animals and cleaned and disinfected at the end of each milking session. If not done properly, the machine remains a point of transfer of contagious bacteria from infected to non-infected cows. With the increase in herd size, 24-hour milking and robotic milking, we often have a substantial increase in the number of cows milked per day in the same milking point. Therefore, herds with higher milking frequency will need more frequent liner replacement to maintain optimal udder health and milking efficiency.



## ⑥ Milk a clean, dry, and disinfected teat

Milking should only be performed on teats that are clean, dry, and properly disinfected to minimize bacterial contamination and reduce the risk of mastitis. Dirt, manure, and moisture on teats serve as major sources of environmental pathogens that can easily enter the teat canal during milking. Effective pre-milking hygiene also helps to reduce bacterial contamination of the milking system and the bulk tank.

A pre-milking routine should include:

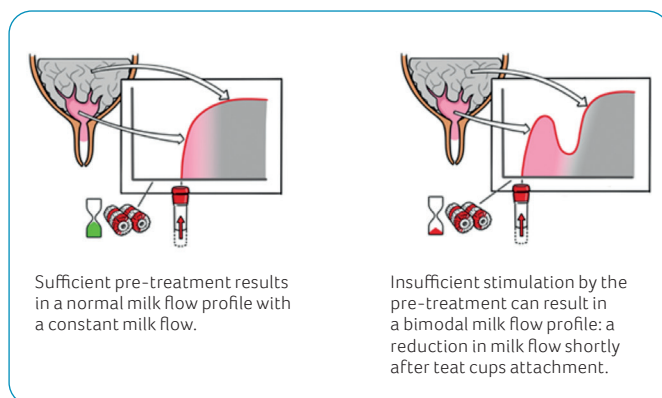
- fore-stripping
- cleaning
- disinfecting
- wiping the teat prior to attachment of the cluster.

Fore-stripping should be routinely practiced before cluster attachment. This involves expressing a few streams of milk from each teat to stimulate milk let-down and allow early detection of abnormal milk such as clots, flakes, or discoloration, which are indicators of clinical mastitis. Fore-stripping also helps flush bacteria from the teat canal and reduces the number of microorganisms entering the milking unit.

A good pre-milking procedure results in a clean, dry, disinfected teat and allows for good milk let-down and rapid milk flow. Cleaning or disinfecting agents should be registered for use in this application, and materials used should be approved for food contact. Disinfectants should be selected from those naturally present in milk (iodine, hydrogen peroxide, lactic acid, glycolic acid).

It is important that the milking units are only attached when the cow lets down the milk from the milk alveoli. This occurs 60 to 90 seconds after the first touch of the teat. A waiting period of approximately 60 to 90 seconds between pre-treatment and attachment therefore has a positive effect on smooth and complete milking (figure 3).

Figure 3



## ⑦ Improve cow health by stimulating immunity and proper nutrition

Balanced nutrition strengthens immune function. Adequate intake of energy, protein, vitamin E, selenium, zinc, and copper enhances resistance to mastitis. Stress reduction, comfortable clean housing and disease control programs contribute to overall udder health. Vaccines for coliform and *S. aureus* mastitis show good results in reducing the symptoms. Immune stimulation with phytonutrients can offer additional protective benefits.

### Conclusion

A successful mastitis control program is based on prevention, not treatment alone. The seven-point plan emphasizes hygiene, monitoring, equipment maintenance, and cow management. When applied consistently, it significantly reduces mastitis prevalence and improves dairy herd profitability.

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