Teat disinfection systems

1. Introduction

The delivery of teat disinfectant to cover the entire barrel of the teat after each milking is a key task at milking. This Quick Note contains information on the different methods of application to make milking easier and is designed to compliment information on teat disinfection for mastitis control in the Countdown Downunder program.

2. Interpretation and relevance to Australian Conditions

Teat disinfection is a key strategy to control mastitis and maintain teat skin health during lactation. The application of teat disinfectant to cover the entire teat surface is difficult to achieve quickly and is poorly done on many Australian farms. A technique is described in the Countdown Downunder guidelines to assess the effectiveness of teat coverage. This technique is useful when comparing spray equipment and application methods used by different operators. Mastitis is a major cost to the industry and the correct application of teat disinfectant requires time, attention to detail and a methodical routine. This is more difficult to achieve with manual systems when labour in the dairy is in short supply.

3. Relationship to CowTime goals

Effective teat disinfection can prevent mastitis and so increase milking productivity, both in terms of saleable milk and less interruption to the milking routine. The ease with which good teat coverage can be achieved is a key consideration to the productivity and routine in the dairy.

4. Features of teat disinfection systems

Expected Benefits of implementing teat disinfection

Teat disinfection can reduce mastitis in the herd by up to 50%. This results in a significant reduction in workload and time in the operator's work routine due to less time spent separating milk, flushing clusters and treating cows. For example, if an operator doing 100 cows per operator per hour devotes 5 minutes overall to each clinical case per milking then this reduces his productivity by 8% for every 1% of cows being treated! In addition, it is commonly accepted that higher clinical mastitis levels create greater stress on the farm workforce.
Clinical mastitis poses a significant cost to the farm with estimates approaching $146 per case from direct cost in drugs, discarded milk, cow losses etc. Subclinical mastitis reduces the quality of milk and farm gate milk prices.

Manual systems

Manual spraying and dipping systems are available. They generally fall into one of four categories:

- Teat spraying from a hand pump container;
- Teat spraying with a 'wand' from a larger, pressurised fixed container of spray solution;
- Teat dipping using a hand held cup to immerse the teat in the disinfection solution;
- Teat dipping from a rechargeable cup on a wand ('power dipper').

The advantages and disadvantages of these systems are summarised in the following table. Individual choice is a compromise between cost, time and effectiveness of the technique.

System	Advantages	Disadvantages
Hand Pump	Low cost Portable	Refilling Prone to under-spray* Breakages
Pressure Sprayer	Quick Light to use Little refilling	More expensive Prone to under-spray* Potential for solution to go stale
Teat Dip	Full teat coverage Low solution usage	Slow application Risk of contaminated solution
Teat Dipping Wand	Full teat coverage Quick to recharge Low solution usage No spillage	Slower than spray units Risk of contaminated solution More expensive than dip cup

*The effectiveness of a spray applicator is greatly enhanced by ensuring the spray nozzle emits a solid cone spray pattern, not a hollow cone spray pattern.

Automated systems

While all of the above systems have served Australian farmers well in the past, there is increased interest in automated disinfection systems to either remove operator error or to enhance low labour input systems. Some systems are available commercially while others are 'home built'. The systems can be broadly categorised into three types:

- Spraying teats on the milking platform;
- Spraying teats in an exit race; and
- Spraying teats within the teat cup.

This is a difficult subject to review because of commercial considerations. However, the following comments are offered to farmers exploring the opportunities that these systems may have to their milking system. Bear in mind that these systems are typically designed to operate with no human supervision other than to refill the disinfection solution.

On-platform spraying

This is typically only used on rotary platforms or by 'robots'. An automated spray system on a herringbone or parallel platform is not really practical.

The rotary platform sprayers typically have one spray head that uses electronic eye beams to detect the stall position, to check if the stall contains a cow and to determine if the cluster is removed. The better designs move via an arm to a position under the udder when spraying. Having the cow stationary in a stall is a great advantage but the true benefit of these systems can only be achieved if 'leg-spreaders' are installed to keep the cows legs apart while spraying. Several robotic systems also use this method to spray teats prior to releasing them from the milking stall.

Spray units installed close to the 'cups-off' operator position may be a health risk.

Exit race spraying

These units are all based around cows moving over one or more nozzles fixed in a narrow section of the exit race with the spray activated by an eye beam. These units require steady, even cow flow to achieve effective teat spray coverage and so will often incorporate some sort of 'obstacle' to ensure this. This can be achieved by making cows step over pipes on the ground or waddle over some sort of leg spreader.

There is debate about the height of the spray nozzle(s). One argument is that the closer the nozzle is to the teat the more likely to achieve good spray coverage. The other argument is that the lower the nozzle the greater the 'fan' effect and the broader the coverage on the base of the udder. The author is not aware of any data to support either view. One issue is probably clear, the more spray heads and the better that they are arranged to cover all teat surfaces the more successful the spraying will be. Although perfect coverage is still some way off most farmers consider these units to do a better job than a bad manual operator. The units usually use around 20ml per cow per milking, which is in line with Countdown Downunder recommendations but more than manual systems commonly use.

One issue on which there is consensus is that the eye beam should be triggered from the rear of the cow, rather than from the head of the cow, to improve the timing and reliability of spray application to the teats.
Another factor to consider is wind drift - the unit must be shielded from the wind. As well, components must be protected from the weather and from effluent.

Spraying within the teatcup

This new technique was developed in the Netherlands. The concept is that teat disinfection solution is injected (with compressed air) into the teatcup just after vacuum shut off to spray directly onto the teat. Every teatcup must have a small tube connected to it and a nipple into the liner. The teatcup is then automatically flushed with clean water after they detach. These systems only work in conjunction with an automatic cluster removal system.
These systems were developed in European milking sheds where potable water is used and the teats are carefully washed and disinfected before the cups are attached. An insufficient number of these systems have been trialed in Australia to pass comment on their appropriateness for Australian milking conditions.

5. Potential challenges with implementation

Historically, teat disinfection was viewed as an optional process on Australian dairy farms. Times have changed and it is now standard industry practice. Problems usually stem from failing to adequately disinfect each teat at every milking. Common reasons are that too little solution is applied (less than 20ml), teat disinfectant solution is ineffective or that teats are missed.

While automated spraying may only do 70% of the job that good hand spraying does, it may be 50% better than poor hand spraying!

6. Robustness of this information

The bulk of the content in this Quick Note is widely accepted in the industry with specific mastitis control measures available in Countdown Downunder materials.

7. References and further reading

Brightling P. et al (2000) Countdown Downunder : Technotes for mastitis control; Technote 7. Dairy Research and Development Corporation. 3/84 William St. Melbourne 3000.

CowTime Guidelines for milk harvesting - Chapter 5, edited by Klindworth, D. et al (2003). Available on the CowTime website www.cowtime.com.au

Quick Note 3.2: Checklist for making changes to milk harvesting infrastructure

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