National Mastitis Council

Dry Cow Therapy

Dry cow therapy has traditionally been the use of intramammary antibiotic therapy immediately after the last milking of lactation. If products have a medicinal purpose or claim, they require approval by the appropriate regulatory authority [Food and Drug Administration (FDA) in the US and European Medicines Evaluation Agency (EMEA) in Europe]. Approved products applied by intramammary infusion at drying off can decrease the number of existing intramammary infections and/or prevent new infections during the early weeks of the dry period.

Use of dry cow treatment is one component of an effective mastitis control program that should also include: proper milking procedures using properly functioning milking equipment, dipping teats immediately after milking with a product known to be safe and effective, good udder hygiene between milkings, keeping accurate records of clinical mastitis and somatic cell counts on individual cows to assist in making management decisions, treating all clinical cases of mastitis promptly and appropriately, and culling cows with chronic mastitis.

Curing Existing Infections
The most effective time to treat subclinical udder infections is at drying off. Dry cow therapy has the following advantages over lactation therapy:

- The cure rate is higher than that achieved by treatment during lactation, particularly for Staphylococcus aureus.
- A much higher dose of antibiotic can be used safely.
- Retention time of the antibiotic in the udder is longer.
- Tissue damaged by mastitis may be regenerated before freshening.
- The risk of contaminating milk with drug residues is reduced when the milk withholding time after calving is properly observed.

Preventing New Infections
The risk of new intramammary infection is greatest during the early and latter portions of the dry period. Most dry cow treatments provide sufficient protection after drying off so that:
a) The frequency of new infections during the dry period is reduced
b) The incidence of clinical mastitis at freshening may be reduced
Few products have extended activity for the entire dry period. Most have maximum activity in the first few weeks of the dry period and activity declines as the dry period length increases. If they have extended activity then particular care is needed to prevent drug residues in milk when calving occurs earlier than expected.

Dry Cow Products - Antimicrobial Infusions
Only approved commercial antibiotic products formulated specifically for dry cow therapy in single dose containers for intramammary infusion should be used. These products contain high levels of one or more antibiotics in a slow release base which will maintain therapeutic levels in the dry udder for a significant length of time. Further, they have been tested in field studies, meet the guidelines of the regulators, and are guaranteed to be prepared aseptically. Home remedies should not be used. All syringes used must be for single infusion only. Unapproved products and non-standard methods may lead to the infusion product becoming contaminated during mixing and through multiple use, and may spread resistant organisms. Products used for dry cow therapy should be stored in accordance with Good Dairy Farming Practice and discarded when the expiration date is reached. Outdated intramammary antibiotics may have little antibacterial activity.

Most dry cow therapy products are designed to eliminate existing infections by Gram-positive bacteria, particularly Staphylococcus aureus and streptococcal infections at drying off and to prevent new S.

aureus and streptococcal infections in the early dry period. Many producers have already eliminated Streptococcus agalactiae and dramatically reduced the level of S. aureus infection in their herds. Continued use of dry cow treatment will help to maintain a good herd udder health status. In many herds and especially where dairy cattle confinement has become more intense, a higher percentage of new infections during the dry period are caused by environmental bacteria. Most dry cow therapy products are reasonably effective against environmental streptococci, especially Streptococcus uberis, but lack activity against Gram-negative environmental bacteria, especially the coliforms. The length of effective protection varies between products, often according to the type of antibiotic or the dose. In Europe and Australia, dry cow products providing protection up to 54 days are available. The herd veterinarian should be consulted to determine which dry cow product should be used.

Dry Cow Products - Internal Sealant Infusions
Sealing of the teat canal by the natural keratin plug that forms during the dry period is the primary natural component protecting against new intramammary infection in the late dry period. Potential damage to that protection is one reason why repeated infusions are not recommended. It has been documented that a significant proportion of quarters experience long delays or outright failure to form a complete keratin plug during the dry period, putting these quarters at increased risk for experiencing new mastitis infections. One study has reported that this risk is increased in cows producing high levels of milk at dry off.

One method of supplementing the teat's defenses throughout the entire dry period is by use of an internal teat sealant. An artificial internal sealant is available for use alone or in combination with an antibiotic infusion. This product has no antimicrobial activity and therefore is recommended for use alone only in the uninfected udder. Otherwise, internal teat sealants should be used in conjunction with dry cow antibiotic therapy. When used alone in uninfected quarters, this product has been shown to prevent significantly more new infections than using no treatment at all, and has been shown to have equal, if not better, efficacy in preventing new infections, as compared to using antibiotic alone. In the infected udder, or when the infection status is unknown, an antibiotic infusion is recommended. This may be accompanied by teat sealant and may be especially valuable for the longer dry period. Using the internal sealant in combination with an antibiotic prevents significantly more new dry period infections than using antibiotic alone. While internal teat sealants are most commonly used in combination with intramammary antibiotics in North America, they are also approved for combination use in most European countries. The teat sealant meets all requirements for protection of the non-lactating gland for organic herds, but this is also dependent on individual countries' requirements. It is paramount that the very best hygienic practices are adopted when infusing the teat sealant to prevent contamination of the mammary gland.

Dry Cow Products - External Sealants
Another method to supplement the cow's defenses is to apply an external sealant to teats by dipping. These products are adjuncts to antimicrobial infusion. External teat sealants presently do not have a long duration of persistency on teat ends. As long as the teat end remains covered, protection from bacteria entering the gland is provided. Thus, for continuous protection, they require visual inspection and reapplication (if required) every 5 to 7 days throughout the dry period. Alternatively, routine use and reapplication can be targeted at times of increased susceptibility, namely the late (transition) dry period.

Total vs. Selective Dry Cow Therapy
Most herds have been shown to benefit by treating every quarter of every cow at drying off with an antimicrobial infusion. This blanket approach will reach all infected quarters, is more effective than selective treatment in preventing new infections early in the dry period, and does not require laboratory screening procedures to decide which cows and quarters to treat.

When subclinical mastitis in a herd has been reduced to a very low level (e.g. every cow in the herd less than 100,000 cells/ml), using dry cow treatment only on selected higher risk cows has been considered appropriate by some dairy producers and veterinarians. However, selective treatment may fail to reach 20 to 40 percent of infected quarters in a herd. Also, uninfected quarters not treated at drying off are more likely than treated quarters to become infected during the dry period. It has been shown when the cow is the unit of risk, a cow with one infected quarter is more likely to suffer another infected quarter than any quarter in an uninfected cow.

Most studies indicate that if the decision is based on economics (i.e. the cost of dry cow therapy compared to the return to the producer), treating every quarter of every cow at drying off is preferable.

Infusion Procedures
The teats must be cleaned and sanitized carefully before any infusion. Without proper preparation, organisms present on the teat end may be forced into the udder and result in a severe infection especially if Gram-negative bacteria are introduced.

The best procedure is to follow these easy steps:

- Clean and dry teats.
- Dip teats in an effective germicidal product. Allow 30 seconds contact time before wiping teats with an individual disposable towel.
- Thoroughly clean and disinfect each teat end, paying particular care to the teat orifice, by scrubbing with a cotton swab soaked in 70% alcohol. Use a separate piece of cotton for each teat.
- Prepare teats on the far side of the udder first, followed by teats on the near side. (Teats may be cleaned and infused individually, if necessary.)
- Treat quarters in reverse order; near side first, far side last.
- Insert only the tip of the cannula into the teat end and express all of the contents. Do not allow the sterile cannula to touch anything prior to infusion.
- Do not massage the teats to disperse the product.
- Dip teats in an effective germicidal product after treatment.
- Identify treated cows and remove them from the milking herd to prevent antibiotics from entering the milk supply.

Drying Off Methods
Concentrate feeding of high producing cows should be stopped two weeks before the anticipated drying off to reduce daily yield (target less than 35 lbs or 15 kg per day). A change in environment can also help reduce production. Abrupt cessation of milking is recommended when the target daily yield has been achieved. Intermittent milking along with a decrease in the energy concentration of the ration can be used as a method to achieve the target yield. Cows should be observed closely for the first two weeks after drying off to ensure that udders are involuting properly. Udders with swollen quarters should be examined for mastitis.

Number of Infusions
Research to date indicates there is little, if any, value in treating cows at drying off with multiple infusions, where multiple infusions refers to treating twice at drying off, or at dry off and at some later time. Subsequent treatments may pose the additional risk of forcing bacteria into the gland as well as increase the risk of antibiotics in milk after freshening. However, in some countries, in some seasons and in some high risk environments, particular problems (e.g. summer mastitis) may warrant additional treatment three weeks prior to calving, subject to veterinary advice. An alternate strategy to provide continuous protection throughout the dry period may be to infuse an internal teat sealant in combination with an antibiotic at time of dry off.

Preventing Drug Residues
Attention must be given to preventing drug residues in milk and meat. Label directions must be followed exactly to avoid drug residues after freshening, especially when cows have shorter than normal dry periods. Tests are available to determine antibiotic residues in milk. Most dairy cooperatives, direct milk purchasers, and many veterinary clinics will run these tests. Kits are available for use on-farm. If the dry period is unexpectedly short or additional treatment has been used, or when any other doubt exists, then each cow should be tested before consigning milk.

Sanitation / Dry Cow Management

Because udders are not milked during the dry period, pathogens are not flushed out of the lower portion of the teat canal. This may lead to new intramammary infections especially by skin colonizing staphylococci. The number of new infections is related to the bacterial population on teat ends. Therefore, exercise lots, loafing areas, stalls and maternity pens should be clean and dry. Animals on pasture should not be allowed in ponds and muddy areas.

Dry cow treatment may be helpful in preventing new infections during the early dry period. However, the udder is vulnerable to new infections during the last two or three weeks of the dry period when dry cow therapy is no longer effective. Special attention must be given to springing cows and heifers. These animals must be kept clean and dry if mastitis is to be avoided during early lactation. Weather permitting, a clean grassy lot of paddock is an ideal calving area. A clean box stall with clean bedding, preferably straw or inorganic bedding, is recommended during inclement weather. In the week immediately prior to calving, it is valuable to examine the udder daily and to use an effective teat dip on all teats.

Nutritional management of the dry (transition) cow should also be considered in the mastitis prevention program. For example, a negative energy balance or deficiencies in vitamin (e.g. vitamins A, D, E) or trace mineral (e.g. selenium, copper or zinc) status during the transition period can result in impaired immune function. Producers should work with a qualified nutritionist to provide a dry (transition) cow diet balanced to meet current recommended nutrient intake guidelines.

Summary

- Research indicates that most herds will benefit from properly treating all quarters of all cows at drying off with an antimicrobial infusion.
- Take special care in cleaning and sanitizing teats prior to infusing antibiotics into a quarter.
- Use only approved commercial antibiotic products which have been formulated specifically for dry cow therapy and which are available in single dose containers for intramammary infusion.
- A teat sealant may be appropriate for some cows and some herds.
- Reduce nutrient intake of cows one to two weeks prior to drying off.
- Place dry cows in a clean and dry environment.
- Observe dry cows periodically for swollen quarters which may indicate intramammary infection.
