

# Dairy Update

## PREVENTING DRY PERIOD MASTITIS

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Many dairymen treat the dry period as the end of the lactation. The dry period was once considered a time for cows to rest, gain weight and "stand still" while turned out with the heifers and fed whatever was available. In reality, the dry period is the beginning of the next lactation. Proper management of the dry cow is critical to effective mastitis control. There is a several-fold increase in new infections during the period immediately following dryoff and immediately preceding freshening. This relationship is seen in Figure 1. Dry cow treatment, sanitation, and dryoff strategy are all important management factors that influence the number of new mammary infections that occur in the dry period.

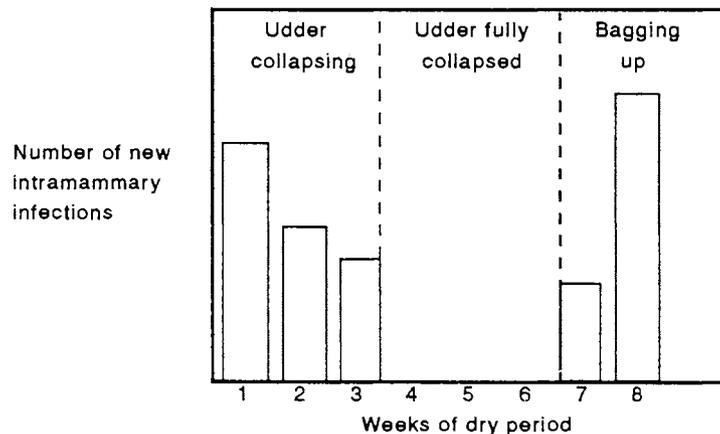


Figure 1. Incidence of new infections during the dry period.

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## CHANGES OCCURRING IN THE UDDER DURING THE DRY PERIOD

An understanding of the changes that occur in the mammary gland during the dry period may be helpful in better understanding how mastitis can be prevented. At dryoff, there is an increase in intramammary pressure. The increased pressure stops milk secretion. This process results in disintegration of the mammary cells, eventually leading to udder collapse.

Increased intramammary pressure also causes a shortening of the teat, resulting in a more opened teat canal. This allows easier entry of bacteria through the teat canal. In addition, the cow's natural immune system is impaired because of the presence of milk fats, proteins, and the byproducts of the degenerating mammary tissue. White blood cells (somatic cells) are unable to efficiently destroy and remove bacteria from the mammary gland under these conditions.

During the middle of the dry period, when the udder is fully collapsed and the teat canal has been sealed with a keratin plug, the udder is relatively resistant to new infections. The sooner the mammary gets to this fully collapsed state the less likely new infections will occur. Occurrence of new infections during this period is rare.

Another critical time for new infections is during the two to three weeks prior to freshening. This is the period during which new mammary secreting tissue is being formed. Udder edema and increasing intramammary pressure may make it easier for bacteria to penetrate the teat canal. Ohio studies have indicated that the intramammary environment is more conducive to bacterial growth when the cow is bagging up, making the udder vulnerable to new infections.

## CAUSES OF MASTITIS DURING THE DRY PERIOD

*Staphylococcus aureus* and *Streptococcus agalactiae* infections are contagious; they usually are spread between cows during milking. Research conducted during the 1950's indicated that most new infections during the dry period also were caused by *S. aureus* and *S. agalactiae*. In Australia and New Zealand, where pasture systems of management prevail the year around, this is still the observed pattern. Recent research indicates that in the U.S., where dairy cattle confinement has become more intense, new infections during the dry period usually are due to environmental pathogens. This does not mean that we should relax our vigil against *S. aureus* or *S. agalactiae*, but that we should consider the problem of environmental mastitis when establishing dry cow management practices.

The shift to a predominance of environmental mastitis during the dry period in this country is easier to understand when we realize that the new infection rate clearly is affected by the number of bacteria on teat surfaces. *S. aureus* frequently can be found on the teats after the last milking of the lactation, but rarely can it be found a month after dryoff. Coliforms, environmental Streps and Staph species, on the other hand, can be found in large numbers by 21 days after dryoff. Numbers of environmental pathogens found on the teats vary greatly, depending on whether cows are exposed to a wet and dirty environment. Staph species

traditionally thought of as normal inhabitants of skin can also be associated with contaminated bedding. One study has shown that of the many environmental pathogens, *Streptococcus uberis* appears to be the most prominent cause of dry period infections because of its apparent greater ability to penetrate the teat canal.

### CONSEQUENCES OF INFECTIONS DURING THE DRY PERIOD

Pennsylvania and English studies have indicated that 40 to 50 percent of all new infections occur during the dry period. About 40% of the new infections occurring during the dry period cure spontaneously. The remaining 60% persist as clinical or subclinical cases into the lactation, resulting in lowered milk production. Spontaneous cure occurs more frequently when the cow is bagging up. Therefore, new infections that occur at the end of the dry period tend to have a more serious effect on subsequent milk production than do those that occur early. This relationship has been demonstrated nicely in English research (see Table 1).

Early lactation mastitis, whether clinical or subclinical, will reduce peak production. Peak production is important if maximum yield per lactation is to be achieved. Estimates are that for each pound of milk not achieved at peak production, there will be a 200-pound loss for the lactation.

**Table 1. Effect of dry period intramammary infections on milk production.\***

Time infection occurred		Decreases in milk production (%)
Near dryoff	Prior to calving	
Infected	Clean	11.3
Infected	Infected	33.2
Clean	Infected	36.6

\*A. Smith, F.H. Dodd and F.K. Neave, *Journal of Dairy Research*, 35:287-290, 1968.

### MANAGEMENT STRATEGIES TO PREVENT DRY PERIOD INFECTIONS

#### Dry Cow Treatment

The rationale for dry cow treatment came with English research during the 1960's. The treatment was designed to eliminate existing infections of *S. aureus* and *S. agalactiae* at dryoff and to prevent establishment of new *S. aureus* and *S. agalactiae* infections early in the dry period. Drug preparations for dry cow treatment traditionally have been formulated against these two infections. Some dry cow products are reasonably effective against the environmental pathogens as well as against *S. aureus* and *S. agalactiae*. Consulting with your

veterinarian is the best way to determine which dry cow product to use on your farm.

As a general recommendation, it is advised to dry cow treat all quarters of all cows. Since there is more stress on the udders of cows at dryoff as milk production continues to increase, it appears that dry cow treatment is more important today than ever before. Do not use multiple dose dry cow preparations. It is best to use single dose commercially prepared dry cow preparations.

### **Dry Cow Environment**

Sanitation. The dry cow or the springing heifer should be the cleanest animal on the farm. This idea has not been emphasized nearly enough and is an area that many dairymen neglect entirely. Exercise lots, loafing areas, stalls, and maternity pens for these animals often are wet and dirty. As previously mentioned, numbers of new infections relate directly to the bacteria population on teat surfaces. Increased udder pressure both early and late in the dry period results in dilation of the teat end and allows relatively easy access to bacterial colonization of the teat canal. Since these udders are un milked, pathogens are not flushed out during milking. Such contaminated teat canals can eventually lead to new intramammary infections.

Although dry cow treatment can help avoid establishment of new infections during the first three weeks of the dry period, the udder is very vulnerable during the last few weeks of the dry period. Special attention must be given to the bagging cow or springing heifer. These animals must be kept clean and dry if early lactation mastitis is to be avoided.

Teat dipping dry cows. Teat dipping with antibacterial disinfectants has been tried with limited success during the dry period. The problem is that most lactation teat dips do not persist in adequate concentration to be effective for long periods on the teat surface. Regardless, teat dipping dry cows two weeks prior to calving where this procedure is practical (i.e, where they are housed in a stall barn) is a good approach for reducing new infections during this vulnerable period.

Fly control. Fly control is important in reducing teat contamination during the summer months. Certain mastitis pathogens (e.g., *Corynebacterium pyogenes*) commonly are transmitted by flies. *C. pyogenes* is a common cause of clinical mastitis during the dry period.

Teat injury. Seventy-five percent of injured teats eventually result in intramammary infections. Where practical, udder supports should be used on valuable cows with large pendulous udders. This may prevent teat trauma during the close prepartum period when these cows are prone to stepping on teats. Protection of any cows, and especially bagging heifers, from severe cold is also important in prevention of frostbite.

## Dryoff Strategy

Dryoff strategies may have significant impact on infection rate, especially in high producing cows. Certainly those cows with mastitis (clinical or subclinical) at dryoff need special attention. Sound uddered low SCC cows can be dried off with less concern.

When milking is stopped for 18 hours or more, milk secretion will be reduced. This cessation of milk secretion is largely due to the effect of intramammary pressure on the milk secreting cells. There are two generally recognized methods of drying off cows: once-a-day milking for several days, or the abrupt cessation of milking. Researchers in the 1950's found no difference in the incidence of new infections when either system was used. New York studies done later revealed that as long as dry cow treatment was used in all quarters at dryoff, either drying off method worked satisfactorily. Based on this data we have recommended abrupt cessation of milking with the antibiotic treatment of all quarters in all cows as the method of choice.

With today's trend toward higher production, it is common for many cows in high production herds to be producing 50 to 60 pounds per day or more at dryoff. This level of production not only makes it more stressful for the cow but also more difficult for the dairy farmer. Careful attention to detail and good herd management are needed during this critical period to avoid problems.

Recent research conducted by mastitis researchers at the University of Tennessee compared the abrupt cessation of milking to the intermittent once-per-day methods for dryoff. They found the best dryoff strategy was to milk once-per-day for high producing cows the last week of lactation. The recommended procedure is as follows:

- 1) Remove the nutritional stimulus for milk production by reducing grain feeding two weeks prior to dryoff and feed only a poor quality forage the last week before dryoff.
- 2) During the last week before dryoff milk the cow only one time per day.
- 3) At dryoff treat all quarters with appropriate dry cow antibiotics.

This approach resulted in a 60% reduction in milk yield during the final week before dryoff.

Cows with subclinical mastitis at dryoff represent a more difficult challenge. To prevent flare-ups during the dryoff procedure itself, it may be necessary to treat these cows each day during the last week prior to actual dryoff. If this is done milk will have to be withheld from the bulk tank. Cows approaching the end of lactation with high somatic cell counts (SCC) should be observed very carefully and action taken to treat at the slightest sign of a clinical flare-up.

## SUMMARY

Recommended dryoff procedure:

- 1) Monitor SCC reports or do CMT tests on cows approaching dryoff to determine problem cows.
- 2) Culture high somatic cell count cows at dryoff and those that are positive at freshening to determine the type of mastitis producing bacteria predominate.
- 3) Stop grain feeding two weeks prior to anticipated dryoff date and feed only poor quality forage during the last week before dryoff.
- 4) Milk one time per day for the last week prior to dryoff.
- 5) Dry treat all quarters of all cows immediately after last milking with a single infusion package of an approved dry cow product.
- 6) Move cows to unfamiliar location (change stall or move to dry lot, etc.).
- 7) Place dry cows in clean, dry environment.
- 8) Teat dip several days following dryoff where this procedure is practical.
- 9) Observe dry cows daily until the udders are fully collapsed.