Factors Affecting The Success of Antibiotic Treatment at Dry Off

Dr. Donald E. Pritchard
Dairy Extension Specialist, North Carolina State University

At the recently held annual meeting of the National Mastitis Council (NMC) there was a presentation by researchers from Cornell University and Norway on studies that looked at factors affecting the success of antibiotic treatment at dry off (NMC 40th Annual Meeting Proceedings, February 11-14, 2001, page 80). Their report perhaps provides dairy managers with some new information about this mastitis management practice.

The National Mastitis Council currently recommends that all quarters of all cows be treated at time of dry off with antibiotics. However, as producers know, such treatment does not guarantee that all infections will be cured, nor that all new infections will be prevented. Studies show that the proportion that are cured is only between approximately 40 and 60%. Thus, somewhere between 40 to 60% of the cows infected with major pathogens at the time of dry off are not cured during the dry period.

Similarly, only between 5 - 10% of new infections by major pathogens that occur during the dry period are prevented with antibiotic treatment at dry off. Thus, anywhere between 90 - 95% of non-infected cows at dry off will not develop a new infection, whether treated with antibiotics at dry off or not. With these data to consider, producers may question the NMC’s blanket recommendation. But with the factors that are involved in determining what cows may be cured or may get a new infection not being fully understood, the NMC’s advice to treat all cows is still encouraged.

Researchers who have looked at what some of these factors are that affect cure rate or new infection rate have divided them into four main categories: cow factors, bacterial factors, antibiotic treatment factors, and other factors.

Cow factors:
Important cow factors that are associated with bacterial cure of major pathogens (usually considered to be Staph. aureus or environmental streptococci in most herds) are the age of the cow, the mean somatic cell count (SCC) before dry off, and the number of quarters infected. Older cows (they have had more lactations), cows with higher cell counts and cows with more than one infected quarter were shown to be less likely to cure.

Bacterial factors:
The bacterial factors looked at most frequently have been antibiotic susceptibility and production of enterotoxins. Infections caused be Staph. aureus strains that had penicillin resistance or produced B-lactamase were not as sensitive to the antibiotics, and thus there was a lower cull rate from dry off treatment. One study showed a cure rate of 69% in penicillin sensitive strains versus 30% in strains that were penicillin resistant.
Enterotoxins have been shown to be associated with modulating the immune response of susceptible lymphocytes, while certain groups of enterotoxins exhibited a relationship with more severe clinical mastitis. Thus, there may be a correlation between toxin production and the clinical outcome of an intramammary infection.

**Antibiotic Treatment factors:**
Choosing the proper antibiotics for infusion at the time of dry off has been shown to be somewhat associated with the expected cure of infections. There is some value in matching the in vitro antibiotic susceptibility to the choice of antibiotics to be used for infusion. This is especially the case for Staph. aureus isolates that produce B-lactamase.

**Other factors:**
Other factors that have been shown to be associated with observed cure include herd factors for hygiene level, bulk milk SCC level, number of new infections as judged by increase in SCC, and the observed presence of Staph. aureus in the herd. A higher level of hygiene practiced in the herd, a lower bulk milk SCC level, a lower level of new infections associated with lower SCC values, and a low prevalence of Staph. aureus in a herd have all been associated with higher cure rates of intramammary infections at time of dry off.

**Conclusions:**
This presentation pointed out that there are a number of factors that affect the cure rate of existing intramammary infections and the prevention rate of new infections at the time of dry off. Infusing antibiotics at time of dry off is an important tool, and should be practiced routinely. However, by considering the various factors mentioned above, dairy herd managers might be able to more precisely allocate treatment to cows that are expected to cure, and thus avoid the overuse of antibiotics or the use of ineffective antibiotics. Dairy producers might well find that discussing this topic with their veterinarian, coop/milk plant field man, or Area Dairy or County Extension Agent could be helpful in establishing a plan to realize better control and prevention of mastitis infections in their herds.