

Are there opportunities to reduce fresh cow mastitis by improved dry cow management in your herd?

Dr. Ann Godkin

Interest in reducing antibiotic use at dry-off in dairy cows has spurred a closer examination of all management activities around this time. Whether antibiotic use ends up being reduced or not, there are other concerns about what has commonly been done at this time. Closer examination of current practices makes it apparent that these should be reviewed regularly to ensure that the protocols in place are appropriate and do what we expect them to do.

Treatment with antibiotic at dry-off time has been a recommended practice for over 50 years. “Blanket” dry treatment (BDCT) is the treatment of all quarters of all cows with a long acting intramammary antibiotic tube after the last milking. The purpose of this treatment has been two-fold – to treat any infections the cow has incurred during the lactation that has just ended and to have antibiotic present to prevent new infections from starting in the early days of the dry period. BDCT has the advantage of not requiring any mastitis detection or decision-making before dry-off as all cows are treated the same way. Cows with long duration infections, but also those with undetected or recently contracted infections, all receive an antibiotic treatment. Not only are they treated, but, because a long acting preparation can be used, therapeutic levels of antibiotic can be present in the udder for a longer period of time resulting in a better cure rate for certain kinds of infections.

BDCT was specifically developed and tested to deal with the contagious mastitis bacterial infections, *Strep. ag. (Streptococcus agalactiae)* and *Staph. aureus (Staphylococcus aureus)*. Both of these infections live mainly in the bovine udder, and spread from cow to cow at milking time on liners carrying bacteria-laden milk, cleaning cloths or even the hands of milking personnel. Most of these infections are subclinical, meaning many cows and quarters can be infected with little or no change in the milk or udder, making them difficult to detect, especially before individual cow somatic cell counts (SCCs) were widely available. It therefore has been very successful to use antibiotic to try to cure these infections between lactations. Great progress in mastitis control has been made. Surveillance information from Lactanet and the animal health diagnostic laboratories shows that *Strep. ag.* is probably eradicated from most herds. More stringent milk quality requirements and better diagnostics means that chronically infected *Staph. aureus* cows are more rapidly identified and either “quarantined” at milking (milked last) or removed from the herd. It may be that the use of BDCT to treat infections from the lactation just ending is now potentially less justified in a lot of Ontario herds. Herd owners, in consultation with their vet and utilizing culture and Mast4 records, can make a decision about the importance of BDCT for this purpose in their own herds.

The second purpose of DCT, the prevention of new infections as the teats close and the udder undergoes involution, has less evidence to support its use. However, when cows are dried off and moved to different housing it has made sense to do this to help them through this high risk time for infection. But now because of concerns about Antimicrobial Resistance (AMR) all preventive use of

antibiotics in livestock production is under closer scrutiny. Preventive treatment can lead to the use of a greater volume of antibiotics and the unintended favouring of resistant bacteria. For dairy, the major use of antibiotics is for mastitis, with dry cow treatment now being mainly for infection prevention, not treatment of existing infections. The longer time presence of gradually lower levels of antibiotic, such as occurs after the use of dry cow products, may pose a risk for resistance enhancement. As the dry period begins cows are mainly at risk for new environmental infections, including *E coli* and those caused by other related gram negative bacteria but mastitis treatments are not successful for preventing infection with these families of bacteria. Considering these factors, it makes sense to re-evaluate whether dry cow antibiotic is needed and to think about other strategies that could be used to protect the cows teat ends from invasion with bacteria from her environment as she changes from a lactating cow to a dry one.

One mastitis prevention tool available now that wasn't when BDCT was developed is the use of internal teat sealants. Three products are currently available in Ontario, with a fourth to follow shortly. These products are infused into each teat at dry-off time to form a physical plug at the teat end to block the invasion of bacteria. From research done in Guelph by Dr.'s Ken Leslie and Randy Dingwell, we know that about 25% of teats across herds do not form a complete keratin plug naturally within 4 weeks of dry-off. Sealant products can help to protect these teat ends until the first milking post-calving. Many producers have found these products useful; adoption has been widespread since the first product came to market around 2002. In 2015, the responses from a representative group of 1054 herd owners from across Canada on the National Dairy Study showed 46% and 42% of producers were using an internal sealant product combined with either BDCT or SDCT (selective dry cow antibiotic therapy), respectively. As part of the Antimicrobial Stewardship project initiated this fall by DFO, a survey found 53% of 461 Ontario producers were using internal teat sealant; most used it on all cows. In herds with excellent control of lactating cow mastitis, sealant is the only treatment used as a preventive at dry-off time. For some herds too, it's clear that neither antibiotic nor sealant is needed, as the routine for drying off cows is excellent and the hygiene of the housing they are moved to is superior -- the major risks for mastitis have been mitigated.

As herd owners consider changing what they may be doing a complete review of all protocols, both new and existing, is warranted. Use of an internal teat sealant requires adherence to protocols for careful application at dry-off and complete removal after calving. In particular, as sealant is an inert compound and has no bacterial killing ability, care has to be taken to ensure that no bacteria are introduced into the teat end during application. This is especially true if dry cow antibiotic is not used (or is to be reduced) and its presence in the teat at the time of sealant insertion may have been "covering up" for an application routine with inadequate hygiene. Sealant companies have produced information in package inserts that suggests that the best sealant application protocols include the:

- wearing of clean gloves by the person doing the treatment;
- cleaning and disinfecting of teat ends after the final milking;
- use of one alcohol swab per teat end to thoroughly clean each teat orifice and the surrounding skin surfaces (and disinfection with alcohol again between antibiotic tube use and sealant application if both are used);

- “pinching” the teat barrel between fingers of the other hand where it attaches to the udder to stabilize the teat and to close the teat canal to help keep the sealant from migrating upwards into the udder;
- warming of the product to improve pliability (but not by inserting tubes in hot water);
- careful removal of the product tube cap, without touching the surface of the tube end and without allowing the tip to touch skin other than the teat orifice;
- insertion of the product tip only as far as necessary (“partial insertion”);
- use of a slow, steady pressure to instill the sealant product; and,
- use of a post-milking teat dip to dip each teat end after the product is inserted.

A detailed evaluation of what is currently being done, compared to what is recommended, is warranted. Sealant works as desired to prevent mastitis in the next lactation provided good application technique ensures no bacteria are introduced. The worst case scenario could be sloppy sealant use without dry-cow antibiotic, where cows go into a high risk dry cow environment and drying-off procedures are inadequate.

Sealant is designed to persist until physically removed after calving although recent information shows that this may not be the case for all cows. Research conducted on six Quebec farms in 2016 found that a sealant plug was not present at calving in 83% of quarters that received sealant prior to dry-off. Quarters receiving sealant alone were 2.6 times more likely to have a sealant plug present than quarters that received both sealant and antibiotic. Sealant plugs were more likely to be missing in older cows. Plug loss was not associated with milk production at the end of lactation, leaking after dry-off or with dry period length (DP length was between 35 and 75 days).

Fortunately the absence of the sealant plug at calving did not increase the risk of a new mastitis infection in the following lactation. The researchers suggest that the plug may have been present long enough to cover the time of highest risk and that removal or loss occurred close to the time of first milking. The presence of a calf with the cow for a long enough period of time could allow suckling to occur which may be a reason the sealant plug was gone, but this could not be confirmed in this study. Why sealant plugs persist and why some are lost remains to be fully determined.

The real importance of plug presence or loss may be that it appears to be a predictor of how quickly sealant leaves the udder after calving. For cows that had a plug present at first milking sealant residues were detected in cow’s milk for an average of 4.5 days into lactation, compared to an average of only 1.2 days for cows without a plug. Some cows, particularly older ones, had sealant detected for up to 12 days post-calving. Application method of sealant has been suggested to be a reason for slow sealant elimination from the udder. “Over-dispersion” as a result of too vigorous a sealant application has been suggested as a reason the sealant product doesn’t remain in the teat end, which could lead to more prolonged residues, however, this was not the finding in this project. In these Quebec cows the absence of a teat end plug was associated with a shorter residue persistence time. More research is needed to confirm this finding and to look further at factors that may affect the elimination rate of sealant after calving. Until we have more evidence it makes sense to continue to use teat pinching and to insert the product slowly and gently.

Persistence of some sealant components in milk has been associated with a defect in aged cheese called black spot. Although this is rarely reported there are references to this problem in producer guidelines for sealant use from both Australia and Ireland. It does appear that some sealant may bypass the milk filter, build up on milking equipment and can potentially enter the bulk tank. Thus, it is critical that sealant removal post-calving be done according to the recommendations. Current

recommendations are to strip each teat 10 -12 times vigorously at first milking, making sure the stripping starts at the teat base and works downward so that sealant is expelled and not forced upwards into the gland. Other jurisdictions strongly recommend that milk not be added to the bulk tank for a total of 4 days (8 milkings) to ensure sealant residues are fully removed. Our Ontario regulations stipulate diverting milk for at least 3 days or until it is free of colostrum; sealant removal is another reason for fulfilling this regulatory requirement.

Careful review of all aspects dry cow management with an objective observer such as your herd vet is a way producers can decide if protocols used at dry-off time are adequate and appropriate for their own herd. Even if changing antibiotic use is not under consideration now, a further improvement in fresh cow mastitis may be achieved by fine-tuning many other aspects of the dry-cow and dry-off program. Sealant use is just one of several management strategies that should be considered and carefully reviewed. Improving cow health, while also preserving milk quality, is each producer's responsibility.

As part of the Anti-microbial Stewardship project, a "Guidance" document and Risk Assessment Summary form have been developed to guide producers and their herd vet through a careful review of a range of important dry-off and cow management procedures. These documents can be found at www.SCC200.ca