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Mastitis, Antibiotics & Resistance Fact Sheet

On October 17th, 2017 we sat down over lunch with dairy clients of the practice and Dr. Rob Tremblay, to discuss the state of mastitis treatment and issues related to antibiotic resistance. Dr. Tremblay was previously a professor of large animal medicine at the Ontario Veterinary College and a veterinary scientist with OMAFRA. He is now a Technical Services Veterinarian with Boehringer Ingelheim Canada.

Some questions addressed at the meeting include:

1. Is there a way to determine whether treatment of a particular quarter with mastitis has been effective or ineffective?
2. How long should an affected quarter be treated (how many treatments, given how often)?
3. Which antibiotic will be most effective?
4. What quarters should be cultured?
5. What quarters should be dry-treated?
6. Why are veterinarians being asked to provide more oversight of antibiotic use on farms, and what will that mean to producers and how they manage their herds?
7. What is MRSA, and why should producers be concerned about it?

Producers were asked based on their experience, how many days it takes milk to return to normal after successful intramammary treatment, and the general consensus was 3-5 days. Dr. Tremblay reported that this estimate is in line with what mastitis research indicates.

Even with successful treatment, normal milk will not be present for 3-5 days post treatment. Dr. Tremblay then went on to point out that producers who elect to use more than the approved 2 treatments of Cefa Lak 12 hours apart are deciding to use additional off label antibiotics before they could reasonably expect to know if the initial treatment course worked.

He also reminded us that when using more treatments than directed by the label, producers could not know the necessary withdrawal time without specifically testing for drug residues.

When deciding which antibiotic is likely to be effective in treating clinical mastitis, we need to have some idea what type of organism is causing the infection. The common culprits of mastitis can be broken down into two broad groups, environmental organisms (bacteria, yeasts, algae) and Staphylococcus species. The way the cows become infected by these organisms and the treatment used for each is very different.

Environmental organisms are, as the name suggests picked up from the environment. A common way for the cow to become infected is lying down in contaminated bedding shortly after milking before the teat ends have had a chance to close.

The Staphylococcus species are, conversely, inhabitants of the udder itself; infection is spread between cows during milking when proper sanitation is not used.

The best way to find out what types of organisms are causing mastitis in our herds is to collect milk samples for culture. If this is not done, then any treatment given is not based on evidence, but is instead pure guess work.

In our own practice we have had several instances where yeasts or algae were determined to be the cause of mastitis in client herds. Neither of these infections will be resolved with antibiotics. Unless cultures are done, considerable money can be lost by treating with ineffective medications and holding milk out of the tank for unnecessary withdrawal times.

When asked why they would tend to NOT culture, producers reported issues such as cultures that yielded no growth, contaminated cultures, or results that did not come back until after the cow had recovered.

The last concern is inevitable, as the process of culturing requires not only adequate time for growth of the bacteria on a culture plate, but also growth on a secondary plate to determine drug sensitivity. From a herd health perspective, the delayed information is still valuable because you will know what is circulating in your herd and therefore how it may be prevented.

Other situations in which culture is valuable are those in which a cow has been treated repeatedly without effect. It can also be valuable in cases where mastitis keeps recurring in the same cow or quarter after apparently effective treatments.

Dr. Tremblay said that a negative culture could mean several things, and discussions between a producer and our veterinarians could often lead to a conclusion or to a plan for further investigation.

For example, if a cow has been treated and the milk has returned to normal appearance, but the somatic cell count remains high, the negative culture probably means that treatment was successful. It can take weeks to months for cell counts to return to normal after an episode of clinical mastitis. He reminded us that somatic cell count measures inflammation in the udder, not infection, and that the cell count will not drop until the inflammation has subsided.

Another situation in which cultures can be negative is more alarming: Some bacteria, notably Staphylococcus aureus, shed bacteria into the milk intermittently; if there are no live bacteria in the milk on the day the sample is taken for culture, there will be no growth; the cow is still infected, and remains a source of infection for other cows in the herd. In these situations, the DHI test for bacterial DNA can be very useful, since even dead bacteria will trigger a positive test. Repeatedly culturing those cows that return negative results may be necessary in order to confirm Staphylococcus aureus infection.

Knowing what organisms are causing mastitis in our herds helps us to make rational decisions about treatments. We may find environmental Streptococcus species on culture, and sensitivity testing can identify antibiotics that may be effective. Dr. Tremblay described a study published in the Journal of Dairy Science that showed Cefa Lak and Spectramast to be equally effective in treating these infections. If we find Staphylococcus aureus, we can expect most intramammary antibiotics to be ineffective when used during lactation. Dry treating cows with confirmed or suspected Staphylococcus aureus infections is likely to be the most effective, although a significant proportion will still remain infected. Treatment of cows with Micotil has not been proved to be effective, and causes serious risks of illegal residues in milk.

Dr. Tremblay discussed what we can expect dry treatment to do. Clearing up infections existing at the end of lactation and preventing new infections from occurring in the period immediately after drying off should result in few infections present when cows freshen.

We are all aware of new Health Canada regulations that will require increasing veterinary oversight of antibiotic use on farms. The reason for this is the concern about increasing antibiotic resistance in bacteria that cause human disease. Some of these bacteria can be acquired from animals as food-borne infections, such as E. coli in beef and Listeria in milk; others are bacteria that have acquired genes for antibiotic resistance from bacteria of animal origin.

The concern is justified, and the danger is real. We are therefore encouraged to use antibiotics in animals that are not of primary importance for human medicine. We should therefore not be using these Category 1 drugs unless others have proven to be ineffective. Class 1 drugs include antibiotics in Spectromast, Excenel, Excede, Special Formula, Draxin, and Baytril. First choice drugs could include penicillin, oxytetracycline, and Cefa Lak (cephapirin).

Veterinarians need to be involved to ensure that antibiotic use on farms is as effective as possible while reducing the opportunities for development of antibiotic resistance.

We also need to make note of the concern about MRSA, a strain of Staphylococcus aureus that causes disease in humans and is highly resistant to antibiotics, including methacillin.

Studies have shown that animals are often a source of MRSA, and the proportion of veterinarians and animal handlers who carry MRSA on their skin is higher than in the general population.