Streps . . . what we know and don't know

It turns out that Streps are much more complex organisms than we thought.

by Hal F. Schulte III and Ruth N. Zadoks

WE HEAR about "Streps" all of the time on the dairy, both in relation to the cows and to the tank. What are these "Streps," where do they come from, what do they do, and what can we do about them?

The term *Streptococci* is used to describe a large group of bacteria with some similar features and characteristics. These bacteria further are divided into species classifications such as *Streptococcus agalactiae, Strep uberis, Strep dysgalactiae,* and so on. Many of us in veterinary medicine and other professionals dealing with medical issues and mastitis control throw these terms around easily as if they describe simple diseases that are well understood and controlled.

Recent research that looks at the genetic makeup of bacteria shows that bacteria in general are far more complex than we thought. In fact, looking at bacteria like *Strep uberis*, for instance, is more like looking at the Class of 2005 from a large university rather than a single identical entity. Just as the Class of 2005 is made up of men and women as one differentiation, it also is made up of thousands of individuals who have something in common.

The same is true for the bacteria. Each species of bacteria in our world is made of individuals that share some common features. Each species is subdivided into "strains." "DNA fingerprinting" is a combination of techniques that can specifically identify individual bacteria by their DNA sequences. The same techniques that have recently become known in some criminal trials as tools for identifying individuals now are being used in our industry to identify bacteria and to trace those bacteria to their source.

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CONTROLLING STREPS involves very careful milking as is the case with other types of mastitis. Actually, Streps can fit into both the categories of contagious (easily spread during milking) and environmental, being found in cows' surroundings, such as in stalls and alleyways.

The Streps are found everywhere in the environment: in soil, bedding, manure, on the skin, in the respiratory tract, and the urogenital tract. They are considered to be major pathogens in mastitis. *Streptococcus agalactiae (Strep. ag.)* causes mastitis in cows and is one of the "contagious" mastitis bugs. It was thought only to live in cows' udders, and it responds very well to antibiotic therapy. It can be eliminated from the herd and is controlled relatively easily.

We recently have found, however, that a bacteria from human medicine which also is identified as *Strep. ag.* can cause mastitis on dairies. In humans, this pathogen is better known as "group B streptococcus" (GBS), and it has become very widespread. Healthy men and women can carry the bugs with them, but these pathogens can cause fatal disease when they infect newborn infants. To our relief, we have been able to demonstrate that, while human strains of *Strep. ag.* cause mastitis in dairy cows on rare occasions, the common cow strains of *Strep. ag.* do not cause disease in humans. So, even though these bacteria are called by the same name, they are different individuals.

Don't think that we've found a scapegoat here though . . . human *Strep. ag.* in cows is very rare. The vast majority of *Strep. ag.* problems are caused by introduction of infected cows and by poor milking procedures.

The group that we call environmental Streps is made up of many different bacterial species. The major species involved in mastitis are *Streptococcus uberis* and *Streptococcus dysgalactiae*. We have learned a lot about these pathogens over the past few years. For example, *Strep. dysgalactiae* really is more like *Strep. ag.* in that it is transmitted quite easily from cow to cow. In that respect, it is a contagious bug. Just to make things complicated, it also is found in the environment, so it really fits into both types of mastitis-causing organisms.

Treating mastitis due to the environmental Streps by the label directions leads to rather disappointing results. In general, we see about 40 percent cure rates by following the label duration of therapy. Using the same products in an extra label fashion (you must have your veterinarian's recommendation to do this), we can see up to 85 percent of these infections cured. This allows the milk from previously infected cows to return to low somatic cell counts, thus lowering the bulk tank somatic cell count. It also stops the damage being done to the infected quarter and can improve the cow's production after cure. Finally, it helps to prevent spread of the bacteria to other cows in the herd, especially in the case of *Strep. dysgalactiae*.

To help diagnose the cause of high standard plate counts (SPCs) or plate loop counts (PLCs), labs can perform a modified colony count (MCC) on both the bulk tank and the cow's sample. It shows that similar appearing bacteria from the cow and the tank are present in the samples. In this procedure, we count the bacteria in the sample and determine how many are Streps, Staphs, and so on. When we do a MCC on a bulk tank sample, we look at the plates, and when a majority of the bacteria look identical, we expect that a "point source" is causing the high count. Quite often, that point source is an infected quarter. On the other hand, when the high count is caused by many different bacteria, we suspect that dirty equipment or poor cooling is responsible.

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Sometimes, the number of bacteria that an infected cow can shed are astronomically high. The bacteria count in an infected quarter can exceed 250 million per cubic centimeter of milk! This can happen with little or no obvious sign of mastitis . . . no swelling, no clots or flakes, no discoloration of the milk, nothing! If this cow is a high producer, the milk from that infected quarter can cause the bulk tank standard plate count or plate loop count to exceed the regulatory limits, even in a 1,000-cow herd.

In many cases, we have been able to help the dairy and the inspector identify the cow that is causing the elevated counts. By withholding that cow's milk from the tank, we can cure the high bacteria count problem. The "DNA finger printing" techniques mentioned above can prove absolutely that the infected cow is the cause of the high count in the tank. Currently, though, the time that these procedures require is too great to allow doing this on a routine basis. But the cost of such testing is low, and technical improvements may make it feasible to use it as a diagnostic test in the near future.

Of course, we also have been fooled. We have found a few cases where a "point source" (udder) is the suspect only to find later, after a lot of sampling and work, that a dirty valve was the point source. In one case, that dirty valve had a nearly pure culture of Strep growing, just like an infected quarter would. The message here is take nothing for granted. If your first conclusion is not borne out by the findings, keep looking.

The Streps truly are worthy foes in our battle for milk quality and the health of our cows. We have learned a lot about them over the past few years, but this is another case of the more we seem to know, the more we need to learn. For now, we simply need to do everything possible to prevent these infections:

- Keep your cows as clean as possible.
- Make sure your milking routines are as good as you can make them.
- Keep your cows' immune systems well-tuned through good nutrition and reducing stress.

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