Are Mastitis Immune Cows In Your Future?

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

What if dairy producers could breed mastitis immunity into their dairy cows? Many currently try to breed at least a certain degree of resistance to mastitis through selecting sires that transmit characteristics onto their daughters that help make them less susceptible to getting mastitis. Producers want udders that are tight up against the body, teats that are just the right length, sphincter muscles on the teats that stay tightly closed between milkings, et cetera. And even though producers try to breed for those characteristics, the environment dairy cows and heifers are subjected to, as well as the inadequate management practices that are used on many farms, allows new cases of mastitis to continue to occur. Still, I encourage producers to continue employing those selection criteria in the sires they use in their herds. There certainly is the potential to make a difference through this selection process.

Rather than focusing on the physical characteristic traits that we desire in our cows that may help them be somewhat resistant to mastitis, I’m referring to changing the cow’s immune system through genetic manipulation so she will be not only resistant to, but also immune to mastitis causing organisms and the toxins they produce. Realizing this objective is the goal of researchers at the USDA-ARS Immunology and Disease Resistance Laboratory.

Coliform bacteria are everywhere in the environment on dairy farms, and cause at least half of the mastitis in the United States. Over three-fourths of the cows that get a coliform infection will get sick, have a large drop in milk production, may require treatment, may never return to the milking string, and are a significant expense to producers. Many die from the shock produced by the bacteria toxin or endotoxin. Because of the prominence of coliform mastitis in the U.S. dairy herd, Dr. Max Pappe and his colleagues at the USDA-ARS lab have been focusing their mastitis research on ways to control these gram negative organisms.

The researchers have found a gene that codes for a protective protein that is naturally suspended in cow’s milk and blood plasma. The protein binds to bacteria endotoxin and neutralizes it. The protein also sensitizes the lining of a cow’s mammary glands to very low levels of endotoxin - the amount produced by just a few bacteria. After being sensitized, the mammary cells can quickly start an attack against any infiltrating bacteria and destroy them before they get established in the udder and make the cow sick.

To date the researchers have conducted most of their tests on a small scale in the laboratory. They are working on being able to produce enough of the protein to test it on several cows. They are also working on the procedure to incorporate the gene that codes for the protective protein into the genetic code of dairy cows. That procedure has already been done by other researchers for a protein that promises to prevent infections caused by *Staphylococcus* organisms. So, Dr. Pappe and his colleagues are hopeful that a similar technique will allow them to do the same thing with the protein that protects against coliforms.

While the results of the studies by the USDA-ARS researchers are still several years away from providing mastitis immunity and protection to the U.S. dairy herd, they are indicative of what is possible when modern scientific techniques are used to fight diseases that have been around forever. Someday, hopefully soon, dairy producers should be able to have mastitis immune cows in their herds. Until then, they should continue to employ the recommended mastitis management practices that can minimize the incidence of this costly disease in their herds.