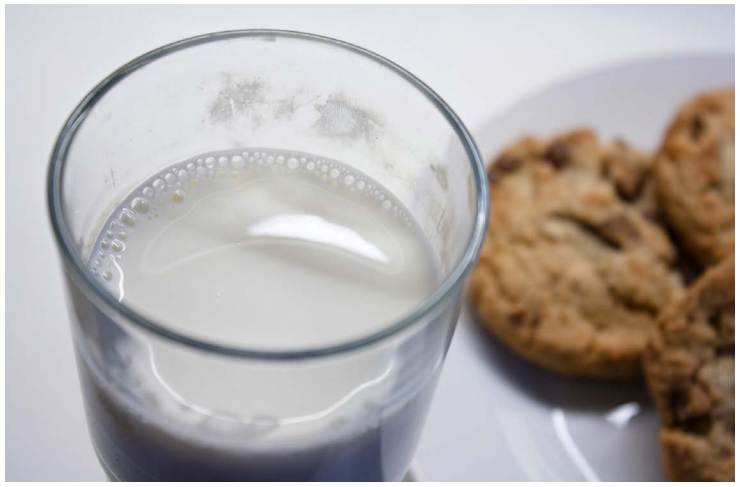
Mastitis Control & Dairy Food Safety

This project has advanced knowledge about bovine mastitis and developed tools, treatments, and dairy farm practices that reduce milk loss, enhance quality, and improve animal welfare.

Who cares and why?

The U.S. dairy industry contributes more than 65 billion dollars per year to the national economy and provides jobs for over one million Americans. However, the dairy industry is currently suffering losses related to bovine mastitis—a potentially fatal infectious disease that causes swelling, heat, hardness, and pain of the udder, leading to abnormalities in milk or complete cessation of milk production. Mastitis affects every dairy farm in the U.S., and approximately one third of dairy cows experience some form of mastitis during their annual lactation cycle. Estimated costs to the dairy industry due to reduced milk production, discarded milk, increased veterinary involvement, and cow morbidity exceed two billion dollars per year. Though antibiotic treatments are effective in some cases, milk from a treated cow is not marketable until drug residues have left the cow's system, and antibiotic usage is prohibited on organic dairy farms. Currently available vaccines have only limited effectiveness. Research and education are needed to develop appropriate treatments, vaccines, dietary supplements, and breeding strategies that improve dairy animal welfare, reduce production losses, maintain milk quality, and improve the global competitiveness of the U.S. dairy industry.

Dairy cows (above, USDA photo) do more than produce milk. The U.S. dairy industry contributes billions of dollars to the economy, provides jobs, and supports local businesses. Controlling diseases like mastitis is key to the sustainability of dairy farms and keeping dairy products safe and readily available for consumers to enjoy (below, photo by Pimthida, Flickr).



What has the project done so far?

Since 1977, the NE-1048 project has fostered collaboration among Extension professionals and researchers from 23 State Agricultural Experiment Stations and scientists from Canada, Scotland, and Belgium to address mastitis control. As a multistate effort, this project has helped research encompass a wide range of cow herds and dairy farm practices. Many researchers have focused on describing susceptibility and resistance to mastitis pathogens and enhancing dairy cows' defenses against the disease. In particular, researchers have studied changes in cows' immune system responses during various stages of lactation and periods of physiological stress. Researchers have also developed new technologies that have allowed the examination of previously unstudied mammary tissue cells. In addition, scientists have found a gene associated with mastitis susceptibility. Other NE-1048 scientists have studied the effectiveness of antibiotic treatments and researched new vaccines. One of these studies found that nutritional supplementation can help white blood cells kill mastitis pathogens. Researchers have also improved diagnostic tools and have developed new technologies that advance mastitis control, milk quality, and dairy food safety. These technologies include on-farm methods and rapid DNA-based methods for detecting pathogens, techniques for testing milk residue for antibiotics, methods for evaluating milk quality in

sheep and goats, and revised practices for dairy farms. For example, studies showed that fly control programs can help reduce mastitis spread. These findings combined with successful Extension efforts have had an enormous effect on reducing milk loss and animal morbidity. In the last five years, project members have published many book chapters and more than 200 peer-reviewed journal articles. Additionally, members have made numerous presentations and updated several websites, making information available to dairy farmers.

Impact Statements

Provided useful technology to the scientific community and the dairy industry

Heightened awareness and knowledge of mastitis, leading to increased adoption of effective control measures among dairy farmers and veterinarians

Enabled more accurate diagnosis of mastitis, leading to more informed treatment decisions

Developed new approaches for early detection of mastitis, enabling more successful intervention

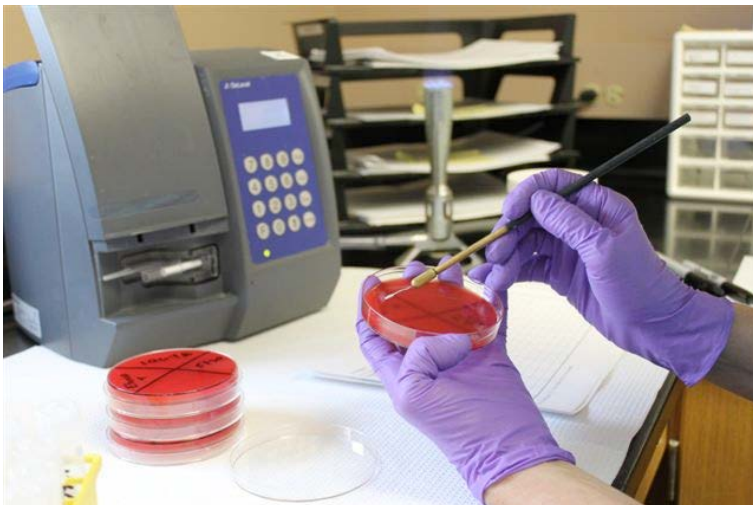
Assessed alternative mastitis treatments, potentially reducing use of antibiotics

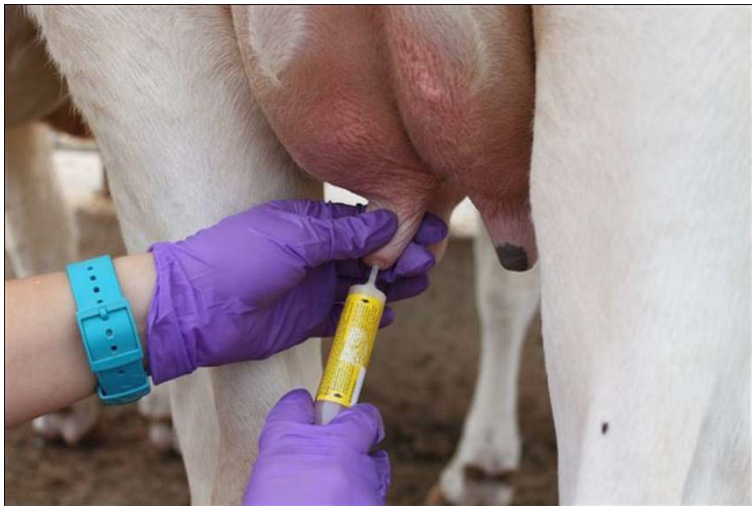
Enabled breeding and selection of animals that are more resistant to mastitis

Decreased the incidence of mastitis on U.S. dairy farms

What research is needed?

More research is needed to determine reasons why some cows are highly resistant to mastitis. In addition, scientists need a better understanding of how pathogens are transmitted from the environment, how they spread from cow to cow, and how they evade the immune system. Studies also need to determine the role of non-pathogenic bacteria in protecting against infection. Researchers need to improve mastitis detection and treatment, with particular attention to using antibiotics efficiently so that mastitis pathogens do not develop resistance to these treatments. More work is also needed to identify new vaccines. With all future research, scientists need to ensure that technology and information is transferred to producers.





To diagnose infections in cows' mammary glands, milk samples are drawn, spread onto plates, and then cultured for 48 hours before they are examined for pathogens (top photo). To cure existing cases of mastitis, scientists have recommended antibiotic therapy using injections of approved, commercially available products for lactating and nonlactating cows (bottom photo). Still, prevention is the key to managing this disease.

Want to know more?

Administrative Advisor:
Cameron Faustman (cameron.faustman@uconn.edu)

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Compiled and designed by Sara Delheimer