Controlling Respiratory Disease in Cattle

Bovine respiratory disease (BRD) is the leading cause of death of cattle and calves in the U.S. and causes nearly $1 billion in economic losses each year. Sometimes called "shipping fever pneumonia," BRD typically occurs when a viral infection combines with a bacterial infection and is aggravated by stress. Diagnosing and treating the disease are difficult because different cases involve different viruses, bacteria, and stress factors.

Land-grant universities are providing cutting-edge research and tools to help minimize the impacts of respiratory disease on cattle.

Researchers and Extension specialists from across the U.S. are part of a group that is studying the pathogens, environmental factors, and immune responses involved with BRD; developing state-of-the-art diagnostic tools; improving vaccines and treatments; recommending effective management practices; and developing educational programs and materials.

By providing scientists, educators, veterinarians, cattle producers, and policymakers with the latest research-based information and tools, this project is helping protect cattle health, sustain the cattle industry, and ensure a steady supply of beef and dairy products for consumers.

Better Diagnostic Tools

Accurate field diagnosis of BRD can be difficult, but researchers developed new methods and tools that help cattle producers quickly and accurately identify BRD and its underlying causes. For example:

- Virginia Tech University researchers developed a diagnostic tool that uses nanoscale fiber optic biosensors to detect BRD-causing bacteria. This process does not require skill or a sophisticated laboratory and can be done in under one hour, making it a useful tool for on-farm diagnoses.
- University of Nebraska researchers are using mass spectrometry technology to differentiate between the major types of *Mannheimia haemolytica,* the bacteria behind many severe cases of BRD. This process is a reliable, faster, cheaper alternative to other techniques. Identifying the responsible bacteria helps producers and veterinarians select the most effective treatment.
- Mississippi State University researchers are testing a system to identify respiratory viruses and bacteria in nursing calves, which are difficult to sample by traditional methods. This will help veterinarians and producers determine how to control BRD in calves.
- University of Wisconsin-Madison researchers are developing practical tools, including ultrasound technology and a digital Calf Health Scorer application, which can be used on farms to diagnose BRD in dairy calves.
- A new blood test to detect and measure antibodies to BRD provides an efficient and feasible way to identify tuberculosis-infected cattle at slaughter, or other points of concentration. Detection is the first step in controlling bovine tuberculosis.
- Guidance on how to interpret diagnostic tests helps veterinarians make accurate and informed decisions about BRD outbreaks.

Breeding Disease Resistance

Genetic research is revealing how to breed cattle that are less likely to get BRD. For example:

- University of Wisconsin-Madison researchers are looking at the relationship between genes and different forms of BRD in dairy calves.
- Researchers identified genetic regions associated with susceptibility to BRD.
- Scientists are testing whether cattle with high levels of antibodies against BRD pathogens will transfer this trait to their calves, making the calves more resistant to BRD.

Safer, More Effective Vaccines

Scientists are developing more effective vaccines and stimulants that improve the immune system response of cattle. For example:

- Researchers are developing safer vaccines that protect cattle from BRD even if the dormant virus used in the vaccine is later reactivated.
- Oklahoma State University researchers discovered proteins that could potentially be used in vaccines to protect cattle against BRD caused by *Mannheimia haemolytica* bacteria.

New Management Strategies

- University of California-Davis studies laid the foundation for a new risk assessment tool (available as a mobile app) that can estimate the prevalence of BRD in a calf herd. Risk assessment can help producers identify practices they can change to reduce BRD risk and improve cattle health.
- Mississippi State University researchers found that a calf's sex affects its BRD risk. This information may help producers manage BRD risk in their herds.
- Researchers have detected specific types of microbes that live in the respiratory systems of healthy calves, but not calves with BRD. Manipulating the respiratory microbial population may be a new way to protect calves from BRD.
- Researchers are finding ways to decrease lung damage and improve lung resistance to viral and bacterial infection.
- University of Georgia and South Dakota State University research is determining why some strains of bovine viral diarrhea virus make cattle sicker than others. This could shed light on specific ways to counteract the effects of virulent strains.
- Researchers are monitoring BRD resistance to antimicrobial therapies. This helps scientists and producers know when to modify treatment approaches to preserve their effectiveness.
- Scientists, veterinarians, and policymakers are working to minimize unnecessary use of antimicrobials by encouraging use of vaccines and management strategies to control BRD.

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This project has been renewed through 2021. Learn more: *bit.ly/NC-1192*.