By understanding how BRD develops, we aim to improve current prevention strategies by stimulating the animal’s own immune system as an alternative to the use of antimicrobials.

**WHY STUDY BOVINE RESPIRATORY DISEASE?**

**BEEF PRODUCTION**

Bovine respiratory disease is a common and economically important disease

**ONE HEALTH**

BRD has many similarities to community-acquired pneumonia in humans

**RESEARCH PROJECTS**

Research objectives are to understand how bacterial pneumonia develops in beef cattle and to discover improved methods for disease prevention.

**Stimulating protective innate immune responses for control of bovine respiratory disease**

- **Background:** Viral infections and the stresses of weaning and co-mingling are well-recognized risk factors for bovine respiratory disease. These risk factors alter innate immune responses in the respiratory tract, allowing bacterial pathogens in the nasal cavity to proliferate, colonize the lung, and cause pneumonia.
- **Research Focus:** We are developing methods to overcome this suppression of innate immunity, and test whether this can prevent naturally occurring and experimentally induced disease in cattle.
- **Outlook:** Immunomodulation is a novel strategy to prevent bovine respiratory disease, as an alternative to the preventive use of antibiotics.

**Mycoplasma bovis pneumonia in beef cattle**

- **Background:** Mycoplasma bovis has emerged as a major cause of disease in cattle, yet limited understanding of how this disease develops is a problem for developing effective control strategies.
- **Research focus:** Most feedlot beef cattle are infected with Mycoplasma bovis, yet few develop pneumonia. We study the determinants of disease: why some infected calves remain healthy while others develop severe chronic pneumonia.
- **Outlook:** Understanding how prior inflammation and lung damage affects the calf’s response to Mycoplasma bovis is necessary for developing improved methods to control the disease in beef cattle.

**Biomarkers of susceptibility to pneumonia in beef cattle**

- **Background:** Preventive strategies for bovine respiratory disease depend on classification of disease risk in different groups of animals. Traditional methods are subjective, qualitative and imprecise.
- **Research focus:** We identify biomarkers—including annexin A1 and odorant-binding protein—in nasal and lung fluids and in blood, that objectively predict the risk of later developing bacterial pneumonia.
- **Outlook:** Developing methods to use biomarkers for predicting disease risk at the group level may lead to more effective disease prevention.

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Pathobiology Research in Bovine Respiratory Disease

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