



SOLUTIONS THROUGH RESEARCH  
CATTLE DISEASES



## CURRENT RESEARCH IS FOCUSED ON THE FOLLOWING:

### PREVENTING BOVINE RESPIRATORY DISEASE (BRD) IN WEANED CALVES

Bovine respiratory disease (BRD), a bacterial infection that causes pneumonia, remains the primary animal health problem in weaned calves.

To reduce antibiotic use in livestock, we are trying to improve BRD prevention through vaccination. Our studies demonstrate that intranasal vaccines given to calves within the first 6 weeks of life induce immune memory that can be boosted after weaning.

Future vaccine trials will help us optimize the design of vaccine programs to prevent both summer pneumonias and BRD in weaned calves.

### A SINGLE SHOT FOOT ROT VACCINE

Foot rot, associated with *Fusobacterium necrophorum*, is one of the most frequent infectious diseases in cattle, and can cause lameness, lower weight gain and economic losses. Current treatment options are costly and raise concern for antimicrobial resistance.

We are developing a single dose multivalent vaccine to provide broader protection. The vaccine will include current strains of *F. necrophorum* circulating in Canada along with antigens of other pathogens associated with the disease.

### FINDING A SOLUTION FOR JOHNE'S DISEASE

Johne's disease, caused by *Mycobacterium avium subspecies paratuberculosis* (MAP), is a contagious and lifelong infection that eventually progresses to severe inflammation of the small intestine in cattle.

Currently, there is no treatment for Johne's disease and diagnostic tests are not reliable in detecting asymptomatic animals. To protect cattle, we aim to develop vaccines capable of preventing infection and disease in the small intestine and herd spread. Initial studies are focused on determining the immune responses needed to control MAP infection, and the optimal vaccine delivery route and timing for vaccination.

The Vaccine and Infectious Disease Organization (VIDO) is a world leader in infectious disease research and vaccine development.

Collaborating with national and international partners from government, academia, and industry, we aim to improve animal health, protect Canadian herds and ensure food safety by:

- Understanding how pathogens cause disease,
- Developing novel vaccines and therapeutics, and
- Improving vaccine formulations and delivery methods.

Our work has resulted in 6 vaccines for cattle including for calf scours, pasteurellosis, haemophilosis and *E. coli* as well as several others for swine and poultry.

We have also developed more potent adjuvants, which enhance the immune response of vaccines, and novel approaches for needle-free delivery.

## FIGHTING BOVINE TUBERCULOSIS ON TWO FRONTS

Bovine tuberculosis (bTB) is a serious disease that affects cattle and is transmissible to other mammals including bison and humans. We are attacking bTB from two fronts— firstly, developing a vaccine for the disease and secondly, developing companion diagnostics that will determine whether an animal was naturally infected or was vaccinated. Our vaccine could also help prevent the transmission of bTB to humans, and may eventually lead to an effective vaccine for human TB.

In addition, we are collaborating with Park's Canada and the University of Saskatchewan to protect wild bison by developing a combined bTB and brucellosis vaccine and diagnostic test. This approach will protect bison from disease and potentially eliminate the risk of transmission to cattle.

## DEFENDING AGAINST *MYCOPLASMA BOVIS* IN CALVES

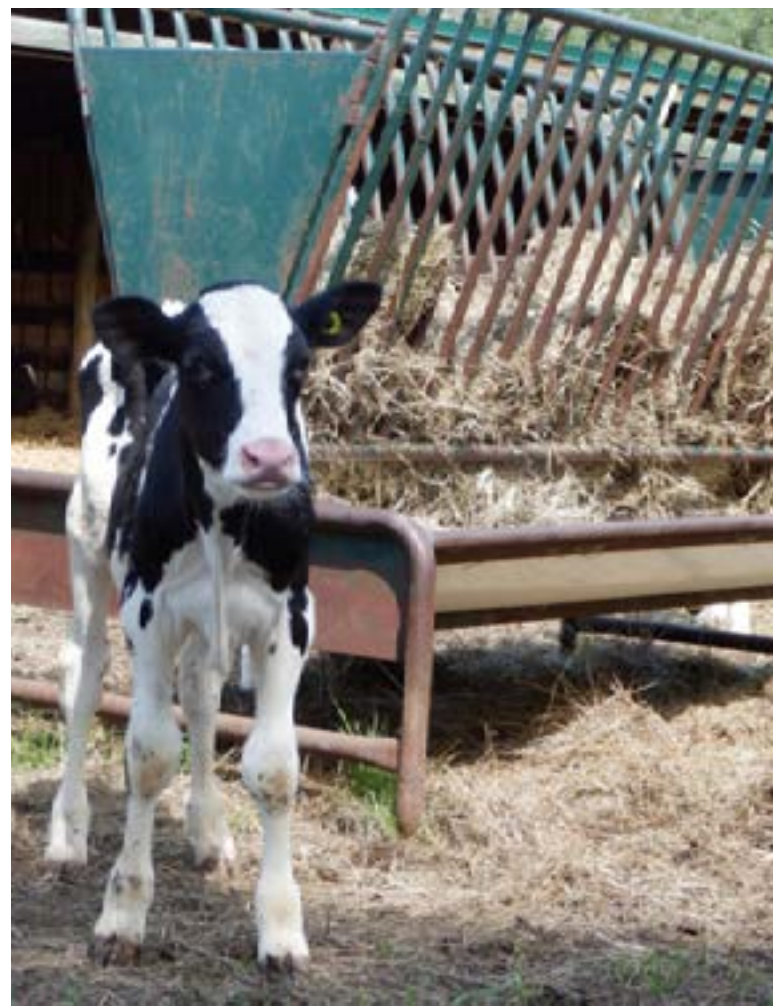
*Mycoplasma bovis* is a leading cause of shipping fever (bovine respiratory disease). Current prevention and treatment options include herd management (quarantine and/or culling) and antibiotic use. Available vaccines only offer limited protection.

We are developing a vaccine that would be given orally during branding with a boost immunization before cattle are shipped to feedlots.

## NEW STRATEGIES FOR PINKEYE

Infectious bovine keratoconjunctivitis, known as “pinkeye” in cattle, is an extremely contagious condition that causes pain and can lead to blindness. Beyond animal welfare issues, pinkeye is one of the most expensive cattle health issues due to the time and labour associated with treatment and the weight loss in affected animals.

Although vaccines are available they do not provide effective protection and often require multiple doses to induce an immune response—factors that make them impractical during an outbreak. We are developing a vaccine that accelerates antibody production at the surface of the eye early in life and a novel eyedrop delivery system.





## COMBATING SOME OF THE MOST COMMON CAUSES OF SHIPPING FEVER

Bovine herpesvirus 1 (BHV-1) and bovine viral diarrhoea virus (BVDV) are among the most common causes of shipping fever. BHV-1 results in respiratory and genital tract infections, but can also cause abortions in pregnant cows. Even if it is treated successfully, BHV-1 can reoccur as a result of stress such as inclement weather, transportation or overcrowding. BVDV causes fever, increased respiratory rate, diarrhoea, and low white blood cell counts.

To combat shipping fever, our goal is to develop effective vaccines for BHV-1 and BVDV.

## WORKING WITH PARTNERS IN AFRICA TO DEVELOP A VACCINE FOR “LUNG PLAGUE”

Contagious Bovine Pleuropneumonia (CBPP), also referred to as ‘lung plague’ is a highly contagious disease of cattle with a mortality rate of up to 50%. CBPP, causes significant economic losses to smallholder farmers in sub-Saharan Africa and is classified as a reportable disease in Canada.

With our partners in Kenya we developed a subunit vaccine that demonstrated efficacy in preliminary cattle trials. We are working on process development to help in manufacturing scale-up with a goal to transfer the process to our partners in Africa and ensure local area production.

## TACKLING THE THREAT OF SALMONELLA DUBLIN

*Salmonella* Dublin is a zoonotic pathogen emerging in Canada that causes severe disease in young calves and can be transmitted to humans through undercooked meat products and unpasteurized milk.

We are developing a vaccine to protection against disease, limit transmission of the bacteria within cattle herds, and prevent spread to humans by the food chain.

## FOR MORE INFORMATION CONTACT:

**Rob Stevens**

*Clinical Veterinarian and Producer Relations*  
robin.stevens@usask.ca

**Andrew Van Kessel**

*Director of Research*  
andrew.vankessel@usask.ca



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