THE ONE SHOT® FAMILY OF VACCINES

Highly effective protection against *Mannheimia haemolytica* — the No. 1 calf killer.
THE DEVASTATING COST OF BOVINE RESPIRATORY DISEASE

BRD INFECTION ALLOWS DAMAGING PATHOGENS TO MOVE INTO THE LUNGS

Bovine respiratory disease (BRD) in nursing calves costs the industry approximately $165 million per year in loss of calves, loss of production and treatment. Stress — from weaning, shipping, weather or commingling — weakens the immune system, leaving calves vulnerable to viral pathogens.

Viral pathogens, like bovine viral diarrhea (BVD) Types 1 and 2 viruses, bovine respiratory syncytial virus (BRSV), bovine herpes virus (IBR), and parainfluenza 3 (PI3), weaken the calf’s immune system.

A weakened immune system allows the aggressive and damaging bacterial pathogen Mannheimia haemolytica to move from the calf’s upper respiratory tract to the lungs.

*M. haemolytica:*

- Has explosive growth and colonization in a calf’s respiratory tract when the calf is stressed.
- Produces a deadly leukotoxin that kills white blood cells, releasing enzymes that, when released from *M. haemolytica* bacteria, destroy lung tissue, making protection from or antibodies to leukotoxin critical for prevention of pneumonia.

TARGETED TECHNOLOGY THAT STOPS *M. HAEMOLYTICA*

ONE SHOT® vaccines stimulate anti-leukotoxin antibodies to provide predictable protection against the leukotoxins produced by *M. haemolytica*. Protecting against damaging leukotoxins helps reduce lung lesions.

ONE SHOT® vaccines produce anti-leukotoxin antibodies (blue) and capsular antibodies (orange). The capsular antigens attach to the surface of the *M. haemolytica* bacteria (green), while the anti-leukotoxin antibodies neutralize leukotoxin (red). If leukotoxin isn’t neutralized, it attacks and destroys white blood cells in the lungs. With help from the capsular antibodies, white blood cells (purple) engulf and destroy *M. haemolytica*, and the anti-leukotoxin antibodies prevent leukotoxin from causing serious lung damage.
RELY ON ONE SHOT® VACCINES FOR BRD PREVENTION

ONE SHOT VACCINES HAVE BEEN RIGOROUSLY CHALLENGED. THESE STUDIES HAVE DEMONSTRATED ONE SHOT VACCINES PROVIDE HIGHLY EFFECTIVE PROTECTION AGAINST M. HAEMOLYTICA.

In a University of Minnesota challenge study, Holstein calves were given a single dose of ONE SHOT, Once PMH® or Presource®. Two weeks post-vaccination, the calves were challenged by direct interlobular deposition of Pasteurella haemolytica A-1 (now M. haemolytica). Researchers used serum measurements and pneumonic lung lesion scores to measure efficacy of the vaccines.

An Oklahoma State University study evaluated five commercial M. haemolytica vaccines (ONE SHOT, ONE SHOT ULTRA® 8, Pyramid® 4 + Presource SQ, Pulmo-Guard® PH-M, and Poly-Bac B® 1). Researchers measured whole-cell and leukotoxin (LKT) responses.

**DEMONSTRATED EFFECTIVENESS**
- ONE SHOT demonstrated a clear advantage in leukotoxin neutralizing antibody response over Once PMH and Presource.¹
- ONE SHOT significantly reduced lung lesions and provided protective immunity.⁵

**ONE SHOT DELIVERS FAST PROTECTION⁶**
- ONE SHOT and ONE SHOT ULTRA 8 were the only vaccines that induced antibody titers to M. haemolytica and leukotoxin that were significantly (P < 0.05) higher than the controls.³