



THE ONE SHOT[®] FAMILY OF VACCINES

Highly effective protection against
Mannheimia haemolytica —
the No. 1 calf killer.¹

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.² 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.

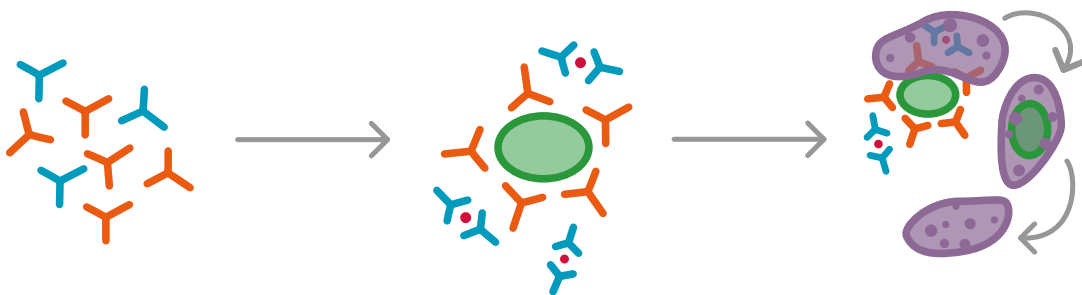
A weakened immune system allows the aggressive and damaging bacterial pathogen *Mannheimia haemolytica* to move from the calf's upper respiratory tract to the lungs.

M. haemolytica:

- Has explosive growth and colonization in a calf's respiratory tract when the calf is stressed.³
- 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.⁴



ONE SHOT[®] vaccines produce anti-leukotoxin antibodies (blue) and capsular antibodies (orange).

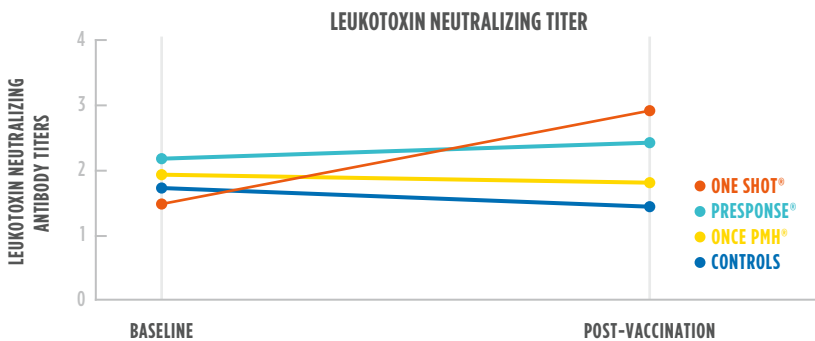
The capsular antigens attach to the surface of the *M. haemolytica* bacteria (green), while the anti-leukotoxin antibodies neutralize leukotoxin (red). If leukotoxin isn't neutralized, it attacks and destroys white blood cells in the lungs.

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*.

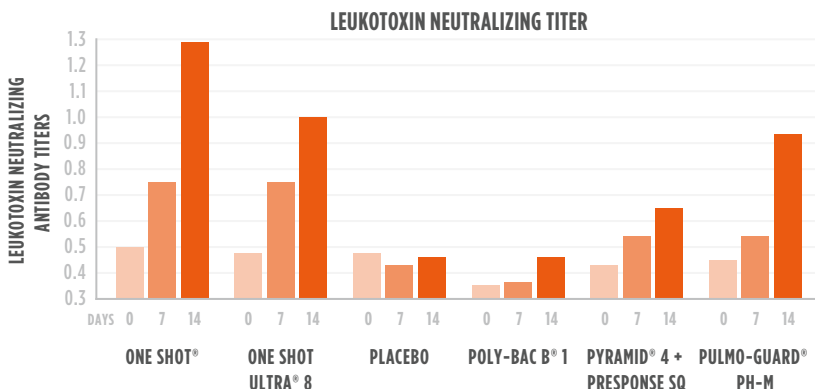
In a University of Minnesota challenge study, Holstein calves were given a single dose of ONE SHOT, Once PMH® or Presponse®. Two weeks post-vaccination, the calves were challenged by direct interlobular deposition of *Pasteurella haemolytica* A-1 (now *M. haemolytica*). Researchers used serum measurements and pneumonic lung lesion scores to measure efficacy of the vaccines.⁵



DEMONSTRATED EFFECTIVENESS

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

An Oklahoma State University study evaluated five commercial *M. haemolytica* vaccines (ONE SHOT, ONE SHOT ULTRA® 8, Pyramid® 4 + Presponse SQ, Pulmo-Guard® PH-M, and Poly-Bac B® 1). Researchers measured whole-cell and leukotoxin (LKT) responses.⁶



ONE SHOT DELIVERS FAST PROTECTION®

- 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.⁶

PUT BOVINE RESPIRATORY DISEASE ON NOTICE



ONE SHOT®



ONE SHOT ULTRA® 7/8



ONE SHOT® BVD



BOVI-SHIELD GOLD ONE SHOT®

TALK TO YOUR VETERINARIAN OR ANIMAL HEALTH SUPPLIER TO LEARN WHICH ONE SHOT® PRODUCT BEST FITS YOUR NEEDS.

¹ Griffin D. Bovine pasteurellosis and other bacterial infections of the respiratory tract. *Vet Clin Food Anim.* 2010;26(1):57-71.

² Wang M, Schneider LG, Hubbard KJ, Smith DR. Cost of bovine respiratory disease in preweaned calves on US beef cow/calf operations (2011-2015). *JAVMA.* 2018;253(5):624-631.

³ Whiteley LO, Maheswaran SK, Weiss DJ, et al. *Pasteurella haemolytica A1* and bovine respiratory disease: Pathogenesis. *J Vet Int Med.* 1992;6(1):11-22.

⁴ Data on file, Study Report No. 3131W-60-11-843, Zoetis Inc.

⁵ Srinand S, Maheswaran SK, Ames TR, Werdin RE, Hsuan SL. Evaluation of three commercial vaccines against experimental bovine pneumonic pasteurellosis. *Vet Microbiol.* 1996;52(1-2):81-89.

⁶ Confer AW, Montelongo M, Brown MJ, et al. Onset of serum antibodies to *Pasteurella (Mannheimia) haemolytica* following vaccination with five commercial vaccines. *Bov Pract.* 2001;35(2):141-148.