

Cell-Mediated Immune Response to Titanium® 5 L5 HB

Elanco Study No. TR-08

Study overview

Cell-mediated immunity (CMI) is the immune response that occurs when specialized cells, such as T-lymphocytes, destroy viruses or other invaders living within the body's own cells.

The three main types of T-lymphocytes are 1) T-helper lymphocytes (CD4+), 2) cytotoxic T-lymphocytes (CD8+) and 3) $\gamma\delta$ T-lymphocytes (gamma delta). Each of these recognizes and responds to antigens differently.

The swifter the post-vaccination CMI response, the quicker the animal can respond to an infectious agent.

This study was conducted to evaluate the speed and duration of the CMI response to bovine viral diarrhea (BVD) virus, types 1 and 2, infectious bovine rhinotracheitis (IBR) and bovine respiratory syncytial virus (BRSV) in calves vaccinated with Titanium® 5 L5 HB.

Background information

- Included 16 yearlings without prior exposure to BVD virus, types 1 and 2, IBR and BRSV as confirmed by serology and T-lymphocyte subset activation
- Cattle were assigned randomly to two treatment groups:
 1. Titanium 5 L5 HB administered intramuscularly¹ (IM) in the neck on Day 0 (10 head)
 2. Unvaccinated control animals (six head)
- Individual CMI responses were measured on Days 0, 3, 5, 7, 21, 60 and 90
 - Evaluated the three main types of T-lymphocytes
 - Calculated the CMI expression index (EI) based on the amount of interleukin-2 (IL-2) receptor (CD25 molecule) on the T-lymphocyte surface after incubation with the targeted viruses
 - An EI of 5 was considered a significant indicator of CMI
 - The Wilcoxin rank-sum test, a nonparametric procedure, was used for statistical analysis
- Titanium 5 L5 HB is a modified-live virus (MLV) vaccine that protects against BVD virus, types 1 and 2, IBR, parainfluenza₃ (PI₃) and BRSV, and includes a bacterin with killed *Leptospira canicola*, *L. grippotyphosa*, *L. hardjo*, *L. hardjo-bovis*, *L. icterohaemorrhagiae* and *L. pomona*.

Study results

Figure 1. IBR: Level of IL-2 receptor on T-helper lymphocytes

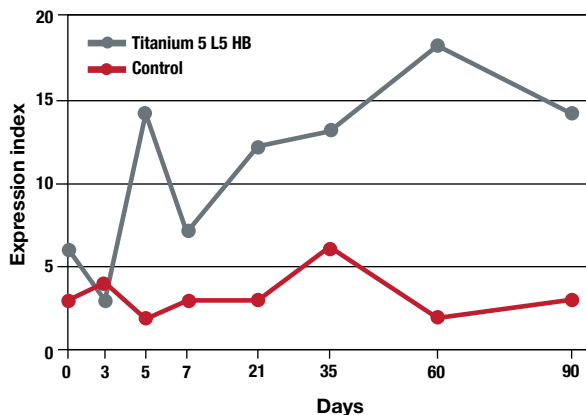


Figure 2. IBR: Level of IL-2 receptor on cytotoxic T-lymphocytes

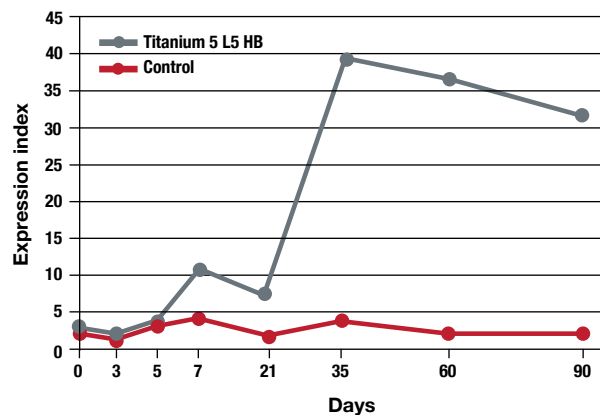


Figure 3. IBR: Level of IL-2 receptor on $\gamma\delta$ T-lymphocytes

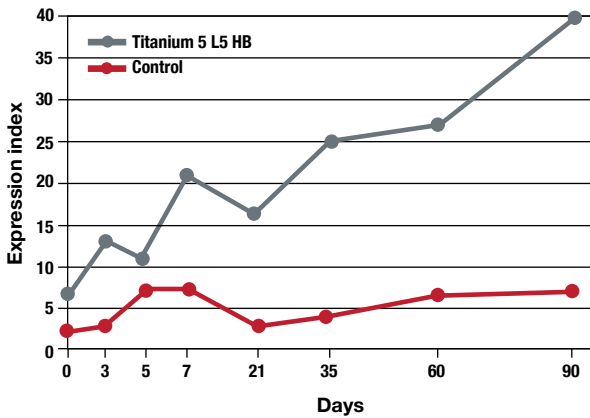


Figure 4. BVD, type 1: Level of IL-2 receptor on cytotoxic T-lymphocytes

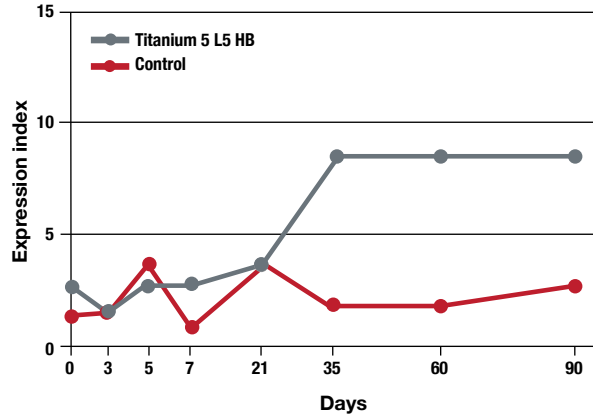


Figure 5. BVD, type 2: Level of IL-2 receptor on cytotoxic T-lymphocytes

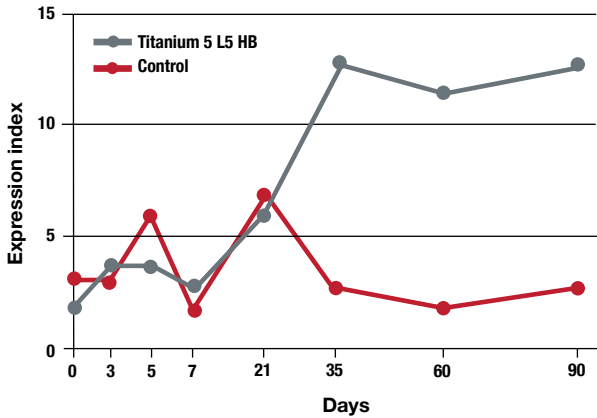
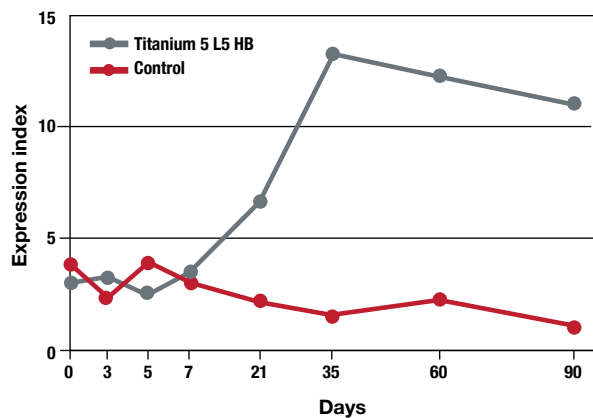


Figure 6. BRSV: Level of IL-2 receptor on $\gamma\delta$ T-lymphocytes



Key finding

Naive yearling calves vaccinated with Titanium 5 L5 HB showed a significant, enduring CMI response to BVD, types 1 and 2, and IBR.

¹At the time this research was conducted, label directions for Titanium 5 L5 HB allowed IM administration. Current label directions say to inject the vaccine subcutaneously.

The label contains complete use information, including cautions and warnings. Always read, understand and follow the label and use directions.

Do not vaccinate within 21 days of slaughter.

