Calves with Bovine Viral Diarrhea Virus (BVDV) Maternal Antibodies Vaccinated with a Modified Live BVDV Vaccine were Protected against a Virulent BVDV Type 2 Challenge

A Zimmerman[1], R Boots[1], L Valli[2], CCL Chase[1,3];

[1]Rural Technologies, Inc., Brookings, SD; [2]Wyeth Animal Health, Guelph, ON; [3]Department of Veterinary Science, South Dakota State University, Brookings, SD

Introduction

- Parenteral immunization of calves for BVDV is complicated by the presence of maternal antibody that may affect the efficacy of the vaccine.
- Intranasal innoculation of calves with maternal antibodies results in long term protection without detectable antibody levels.

Introduction

- This study was designed to evaluate the efficacy of an adjuvanted MLV BVDV vaccine given to calves in the presence or absence of maternal antibodies. The calves were challenged with a virulent type 2 BVDV strain (1373) 3-1/2 months following vaccination.

Materials and Methods

- Animals
  - 23 newborn dairy-cross calves
    - Group 1: negative control calves
    - Group 2: vaccinated—with no BVDV colostral antibodies
    - Group 3: vaccinated—with BVDV colostral antibodies

Materials and Methods

- Pre-challenge serology
  - All calves were tested for the presence of BVDV antibodies (type 1 & 2) by serum neutralization pre-colostrum, pre-vaccination, and post-vaccination.

Materials and Methods

- Challenge
  - All calves were challenged intranasally with 7.3×10^7 virus/mL (in 5 mL) of type 2 BVDV strain 1373 at 104 DPV.

Materials and Methods

- Post-challenge clinical observations
  - Calves were observed for clinical signs of BVDV infection for 14 days following challenge.
    - Rectal temperatures, nasal and ocular discharge, diarrhea, abnormal respiration, depression, and the presence of oral ulcers.

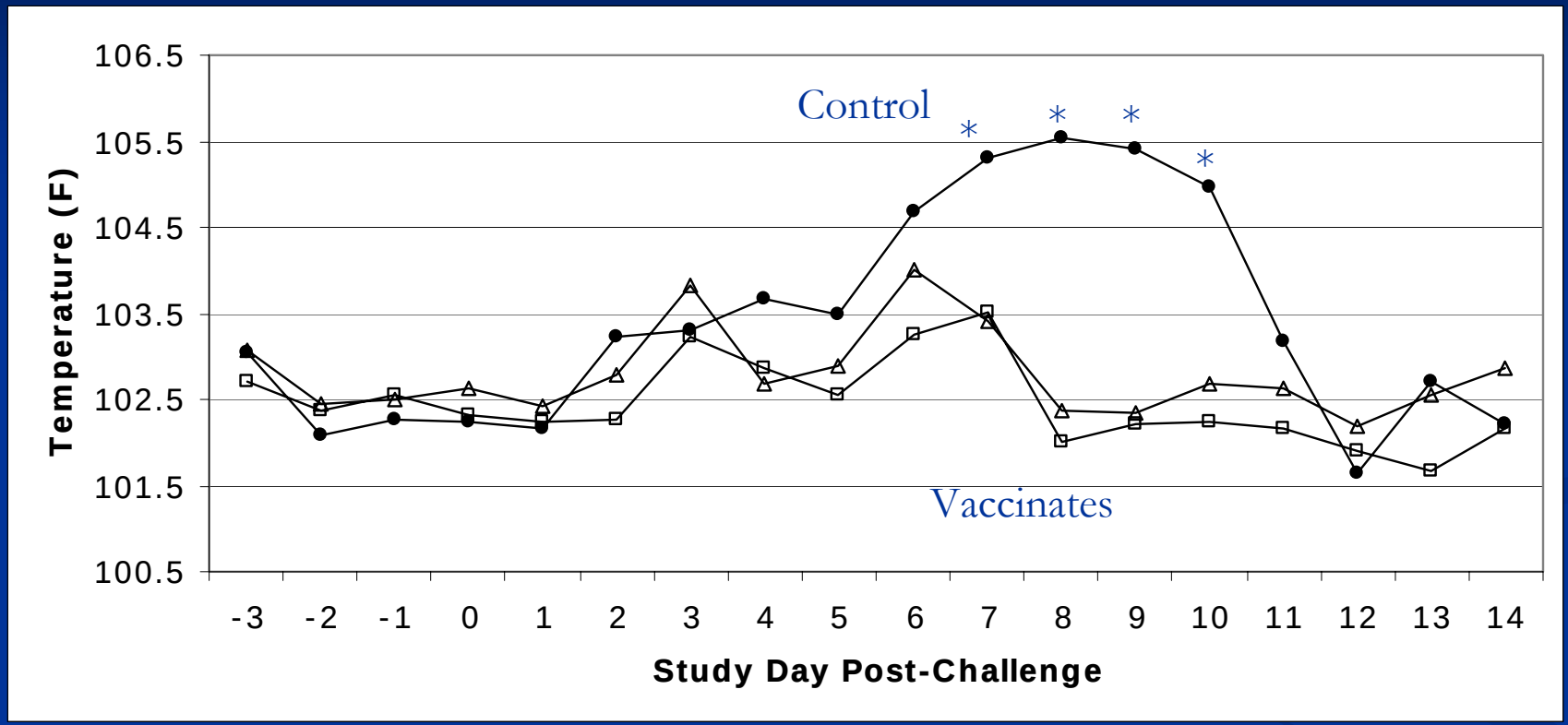
Materials and Methods

- Post-challenge sample collection
  - Whole blood was collected for:
    - Hematology (WBC) - two days prior to challenge to 14 days post-challenge (DPC).
    - Virus isolation (type 2) - every other day beginning one day prior to challenge and continuing to 13 DPC.
    - BVDV serology (type 1 & 2) - on the day of challenge (104 DPV), 7 DPC (111 DPV), and 14 DPC (118 DPV).

Materials and Methods

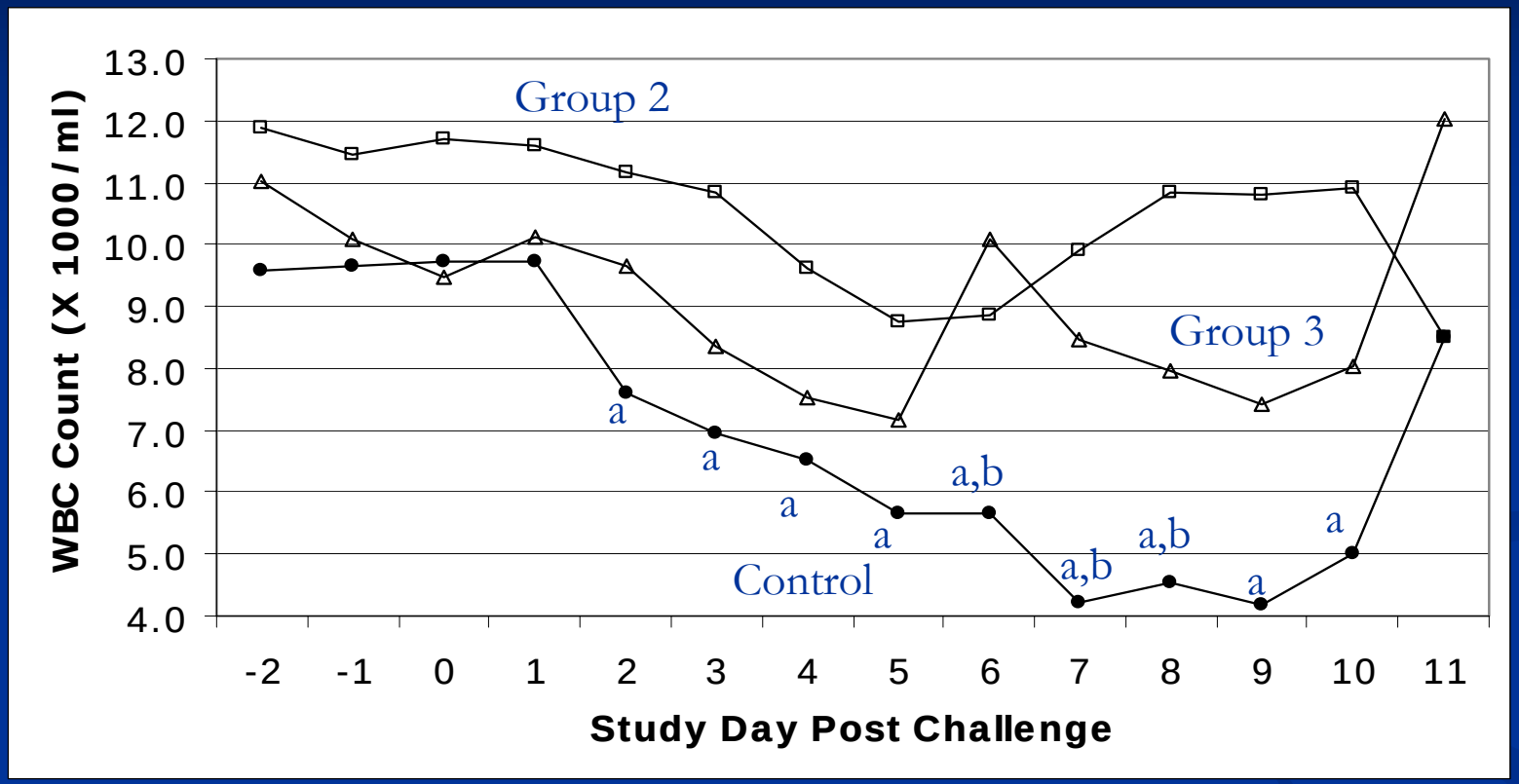
- Statistical analysis was performed using a general linear model with repeated measures to evaluate body temperature, white blood counts, clinical score data, and type 1 and 2 BVDV antibody titers

Results



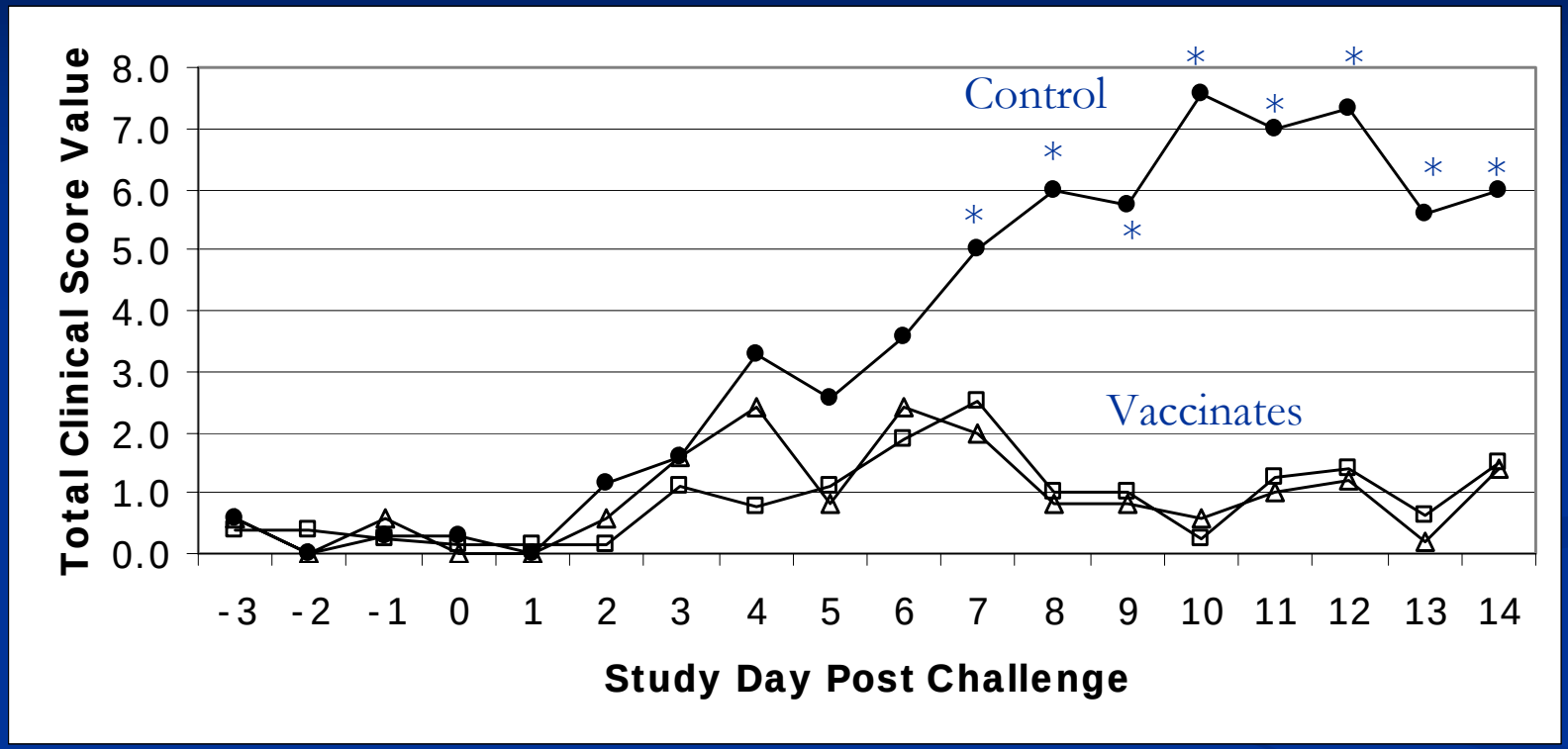
- Temperature data: Group 1 (controls) had statistically higher temperatures ($p<0.05$) than Groups 2 and 3 (vaccinates) on days 7-10 post challenge.

Results



- Group 1 had lower ($p<0.05$) WBC counts than Group 2 (a) and Group 3 (b) on various days post challenge.

Results



- Clinical scores: Group 1 (controls) had higher scores ($p<0.05$) than Group 2 and 3 from day 7 to 14 post challenge. 4/7 control animals died or were euthanized following challenge.

Results

Day Post-Challenge	-1	1	3	5	7	9	11	13
Number Positive	0/7	0/7	1/7	1/7	6/7	5/7	3/7	3/6
Percentage	0%	0%	14%	14%	86%	71%	43%	50%

- VI results: Only Group 1 (controls) had positive virus isolation results. Virus was isolated beginning on day 3 post-challenge and continuing to day 13.

Results

Serology results (log 2)

Day/BVDV type	Group 1	Group 2	Group 3
Precolostrum/type1	0.0	0.0	0.2 (0-1)
Precolostrum/type 2	0.0	0.0	0.0
Prevaccination/type 1	0.0	0.0	8.5 (6-11)
Prevaccination/type 2	0.0	0.0	8.7 (7-11)
Day 28/type 1	0.0	7.9 (5-10)	7.7 (3-11)
Day 28/type 2	0.0	5.5 (4-8)	7.0 (6-8)
Day 104 Challenge Day 0/type 1	0.0	9.4 (8-11)	5.8 (4-7)
Day 104 Challenge Day 0/type 2	0.0	5.6 (4-7)	4.2 (1-6)
Day 111 Challenge Day 7/type 1	0.0	9.5 (7-11)	5.6 (3-7)
Day 111 Challenge Day 7/type 2	1.3 (0-6)	8.6 (6-11)	4.4 (1-6)
Day 118 Challenge Day 14/type 1	5.6 (4-6)	12.6 (12-13)	9.8 (7-13)
Day 118 Challenge Day 14/type 2	6.6 (6-7)	12.4 (10-13)	7.0 (2-12)

Two-weeks post-challenge all 3 groups had significant ($p<0.05$) increases in both type 1 and 2 BVDV SN titers over the 7 DPC titers.

Summary

- Using the virulent 1373 challenge model, there was no difference in clinical signs, WBC, or viral shedding between vaccinates in the presence or absence of maternal antibody.
- An adjuvanted vaccine provided protection against a virulent challenge in the face of maternal antibody.

Future Studies

- Future studies are being planned to compare the non-adjuvanted vaccine to the adjuvanted vaccine.

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