

Efficacy of a core-antigen and immunostimulant vaccine program

to reduce the *Salmonella Dublin*-based health and performance effects in calves.

Introduction

Veterinarians and producers are finding *Salmonella dublin* challenging to control, prevent and treat in calves. It has been requested¹ to study the efficacy of Endovac-Dairy® with Immune Plus against *Salmonella dublin* infection in calves, as the vaccine has *Salmonella typhimurium* and *Salmonella choleraesuis* efficacy and has been shown to have cross protection to other gram-negative pathogens as well.

This study was designed to determine if neonatal calves vaccinated with Endovac-Dairy, a core-antigen and immunostimulant vaccine, would reduce the adverse health and performance effects of an experimentally-induced *Salmonella dublin* infection.

Materials And Methods

Study Location

Midwest Veterinary Services, Inc. (MVS)
Site Manager: Kelly Lechtenberg, DVM, PhD
Investigator: Charley Cull, DVM, PhD

Study Design

This study was a single-site, randomized, prospective, blinded, four-treatment-arm-controlled design.

Animals

Forty commercially-sourced, healthy, dairy-beef cross, day-old calves (male & female) weighing 32.8 kg - 50.8 kg were selected for inclusion in the study. All animals were colostrum deprived calves fed with two rounds of commercial colostrum replacer.

Vaccination

The investigative product (IVP) is Endovac-Dairy (Endovac Animal Health, Columbia, MO, USA). Each calf was vaccinated IM with 2 mL of either the vaccine or saline placebo (control product – CP). See table 1 for treatment protocols – 10 calves per group.

Table 1 — Treatment Protocols

Group	Investigational Material	Treatment Days
Control	CP – Prg. A	0, 4 & 10
Control	CP – Prg. B	1, 10 & 21
Vaccinate	IVP – Prg. A	0, 4 & 10
Vaccinate	IVP – Prg. B	1, 10 & 21

Challenge

All calves were challenged orally with approximately 40 mL of challenge material; 1×10^{10} CFU/mL of *Salmonella dublin* (Cornell University, Ithaca, NY). Treatment groups Prg. A were challenged on Study Day 7 and treatment groups Prg. B were challenged on Study Day 23.

Statistical Methods

Experimental Unit: individual animal was the experimental unit; 10 per treatment group.

Statistical analysis was performed by the Center of Outcomes Research and Epidemiology at Kansas State University.

References:

AABP Recent Graduate Conference Proceedings, VOL. 54, NO. 1, February 2021, Dr. D. Sockett.

Results

Bodyweights		
Day 0 by Treatment Group		
Treatment	Mean kgs	Mean lbs
Control	39.69	87.50
Vaccinate	41.37	91.21
There was no evidence that means differed (P = 0.28)		
Day 35 by Treatment Group ("deads-in")		
Treatment	Mean kgs	Mean lbs
Control	45.75	100.85
Vaccinate	51.13	112.73
Effect of Vaccination (P = 0.022)		

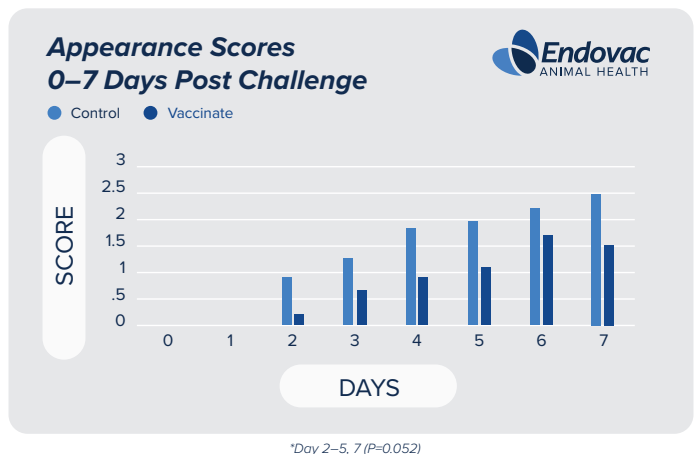
Mortality			
Treatment	Calves	Mortalities	%
Control	20	13	65%
Vaccinate	20	6	30%
Effect of Vaccination (P = 0.035)			

Morbidity			
Clinical Scoring Description			
Score	Appearance	Hunger	Dehydration
0	Good Clean Backside	Normal Suckle	No Dehydration
1	Mild Depression Backside Dirty-Dry	Moderate Suckle	Mild Dehydration
2	Moderate Depression Backside Very Dirty-Dry	Weak Suckle Require Assist	Moderate Dehydration
3	Severe Depression Backside Dirty-Wet	Unwilling To Suckle	Severe Dehydration
4	Moribund (Calf unlikely to recover, euthanasia required)		

Diarrhea Scoring Description

0 Normal – forms patty, 1 Mild – puddle, 2 Moderate – watery, 3 Severe – very watery

Means of Clinical Score Sums		
Day 0-12 Post Challenge		
	Control	Vaccinate
Diarrhea	6.97	3.93
General Impression	5.04	3.11
Hunger	3.37	1.93
Appearance	5.61	3.50
Dehydration	3.28	2.31
Effect of Vaccination (P<0.01)		



Summary of Results

Endovac-Dairy vaccinated calves had a decisive advantage in both health and performance over controls.

- **Mortality:** Controls had 117% higher mortality vs. Vaccinates.
- **Final Weight:** Controls final weight “deads-in” was less than Vaccinates by 10.5% (11.88 lbs less per calf on average).

Conclusion

Calves vaccinated with Endovac exhibited a decisive health advantage and increased survivability, providing a solution to the increased prevalence of *Salmonella dublin*. The data proves Endovac’s ability to protect neonates against numerous gram-negative diseases with one antigen, providing producers and calf raisers an excellent return on their investment to vaccinate calves with Endovac.