INFECTIOUS DISEASES

Assessment of Vaccine Interference Following Co-Administration of Two Modified-Live Viral Intranasal Vaccines to Colostrum-Fed Neonatal Calves with a Subsequent BHV-1 (IBR) Challenge

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INTRODUCTION

- Modified live Vaccines (MLV) have been used intranasally (IN) in very young calves to avoid maternal antibody interference.
- The effect of combining IN vaccines that induce interferon (ie. containing BHV-1) with vaccines known to be sensitive to effects of interferon (ie. containing Bovine Coronavirus) has not been assessed.

OBJECTIVE

- To compare immune responses of two commercial MLV containing IBR, PI3 and BRSV (N3) and Bovine Coronavirus (BCV), when each was given IN alone, or together, to young colostrum fed Holstein calves.
- To evaluate potential interference with prevention of infection or disease following an BHV-1 (IBR) challenge.

MATERIALS AND METHODS

- Thirty-six, male Holstein calves, colostrum fed (200grams IgG from Saskatoon Colostrum Co. within 4 hours of birth), BVD-PI negative, were gathered from a commercial dairy and allocated into 4 groups.
- At about 10 days of age, all calves were vaccinated IN with either vaccine diluent (placebo), (N3), (BCV), or both vaccines (N3+BCV) administered in separate nostrils. Revaccination of all animals occurred 4 weeks later.
- Calves were housed separately for the study duration with no contact between groups.
- Nasal secretions and blood were collected prior to enrollment, and weekly during the study. Three weeks after booster vaccines were given, the calves were challenged with BHV-1 and euthanized 10 days post-challenge to quantify total lung pathology. Lymphocytes isolated from lymph nodes were re-stimulated in vitro with BHV-1 glycoprotein D and purified BCV to measure antigen-specific cytokine secretion by T cells.

Intranasal Modified Live vaccines N3 (BHV-1+PI3+ BRSV) and BCV, can be co-administered to neonatal calves without a significant decrease in the immunogenicity or a reduction in the prevention of BHV-1 respiratory infection and disease. The BCV vaccine alone unexpectedly had a significant protective effect against total lung pathology after a BHV-1 challenge.

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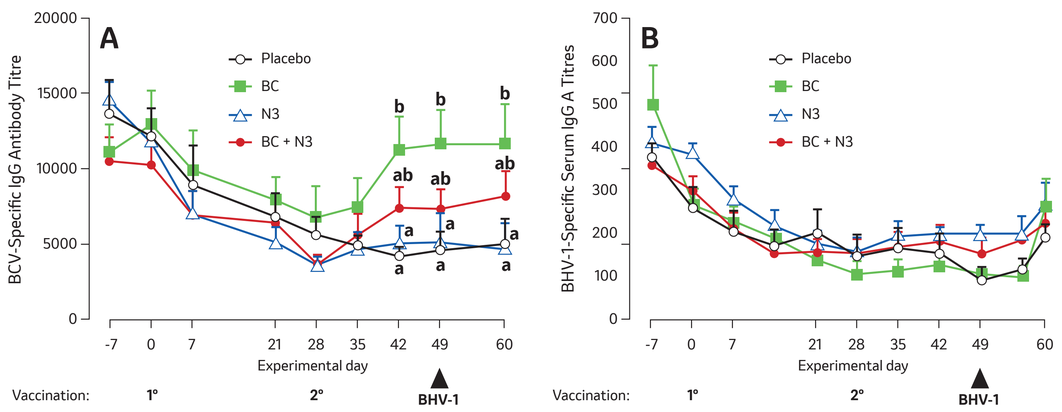
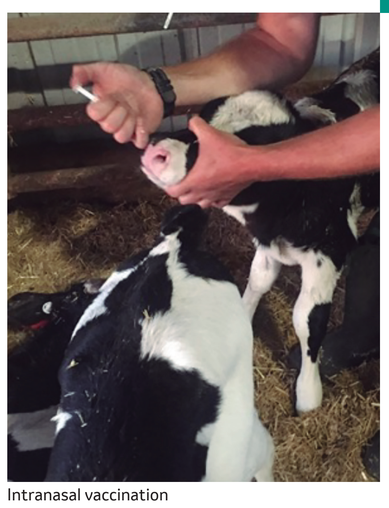
RESULTS

- All calves were seropositive for BHV-1 and BCV prior to vaccination due to presence of colostral antibodies.
- No significant differences were observed when comparing BCV-specific serum IgG and nasal IgA antibody responses in the BCV versus BCV+N3 group **(Fig 1A)** nor were there any significant differences when comparing BHV-1 specific serum IgG and nasal IgA antibody responses in the N3 versus BCV+N3 group **(Fig 1B).**
- Cytokine responses between groups were also not significantly altered.

FIGURE 1. Serum IgG antibody titres specific for BCV (A) and BHV-1 (B) prior to and following vaccination.

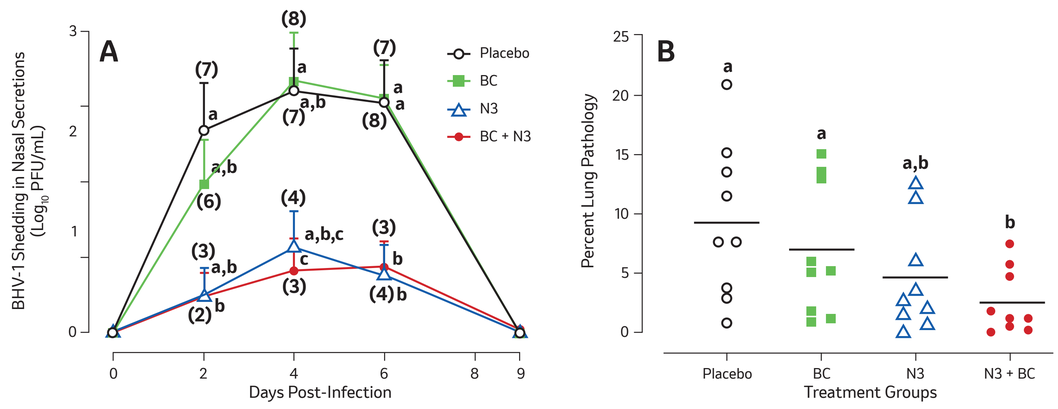


Significant differences ($p < 0.05$) among groups are indicated by letters (a,b)



Intranasal vaccination

FIGURE 2. Virus shedding in nasal secretions following BHV-1 challenge (A) and Percent Lung pathology following BHV-1 challenge (B).vaccination.



Significant (p-value < 0.05) differences among groups are indicated by different letters (a,b,c)

RESULTS

- Nasal BHV-1 shedding after the BHV-1 challenge was significantly reduced in both the N3 and BCV+N3 groups **(Fig 2A)**
- Significant reduction in lung pathology was observed when BCV+N3 group was compared with Placebo and BCV groups **(Fig 2B).**
- The BCV+N3 group had numerically lower lung lesions than N3 group alone after BHV1 challenge.
- Another interesting finding was BCV alone numerically reduced lung lesions compared to the diluent (control) group after BHV-1 challenge.

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