



PROFESSIONAL SERVICES

Boehringer Ingelheim Vetmedica, Inc.

TECHNICAL BULLETIN

## Efficacy of the BRSV Component in Express<sup>®</sup> Vaccine

Study completed by Dr. John Ellis<sup>1</sup> and Dr. Carol Rinehart<sup>2</sup>

<sup>1</sup>College of Veterinary Medicine, University of Saskatchewan, Saskatoon, Canada

<sup>2</sup>Boehringer Ingelheim Vetmedica, Inc., St. Joseph, MO

### KEY POINTS

- Calves vaccinated with Express<sup>®</sup> vaccine were protected against a virulent BRSV challenge as compared to non-vaccinated controls.
- Calves vaccinated with Express<sup>®</sup> vaccine had a statistically significant reduction in lung lesion scores, virus shedding, respiration rate and clinical scores and a significantly higher level of arterial blood oxygen.

### OBJECTIVE

To evaluate the efficacy of the BRSV component in the Express<sup>®</sup> line of vaccines.

### STUDY DESIGN

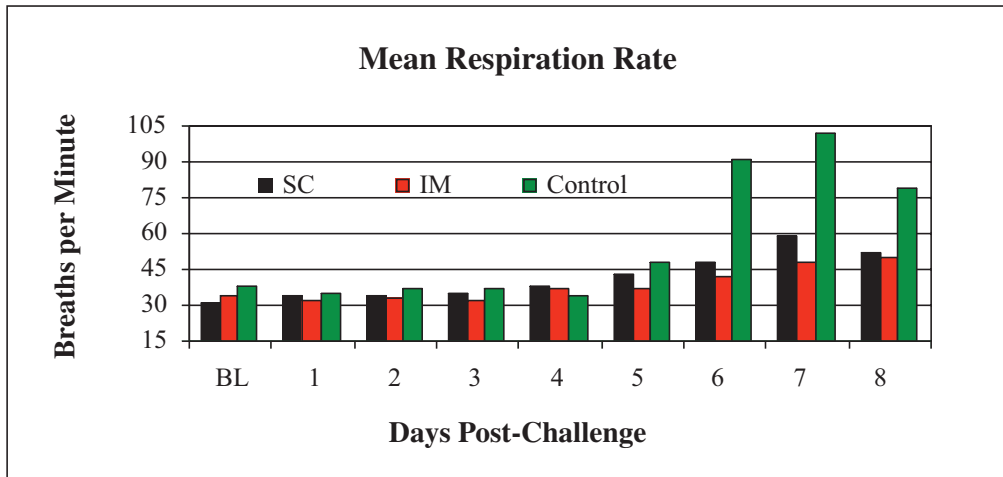
Twenty-four, 6 month old, Holstein calves were randomly assigned to one of three treatment groups. Eight calves were vaccinated intramuscularly (IM) and 8 calves were vaccinated subcutaneously (SC) with two doses of Express<sup>®</sup> 10 (modified live IBR, BVD 1 & 2, PI<sub>3</sub>, BRSV and *Leptospira canicola-grippotyphosa-hardjo-icterohaemorrhagiae-pomona*, *Histophilus somni* bacterin). Eight calves served as non-vaccinated controls.

The calves were challenged twenty-one days following the second vaccination with the Asquith strain of BRSV. The parameters evaluated post-challenge included respiration rate, blood dissolved oxygen level (PO<sub>2</sub> in mmHg), virus shedding and clinical scores. Eight days following challenge, all calves were euthanized and lung lesions measured.

## RESULTS

### RESPIRATION RATES

Respiration rate was measured prior to challenge to establish a baseline (BL) and then daily for 8 days post challenge (DPC). Following challenge, the mean respiration rate was significantly lower in vaccinates compared to controls on Day 5 ( $P \leq 0.0284$ ) and Days 6, 7 and 8 ( $P \leq 0.0008$ ).



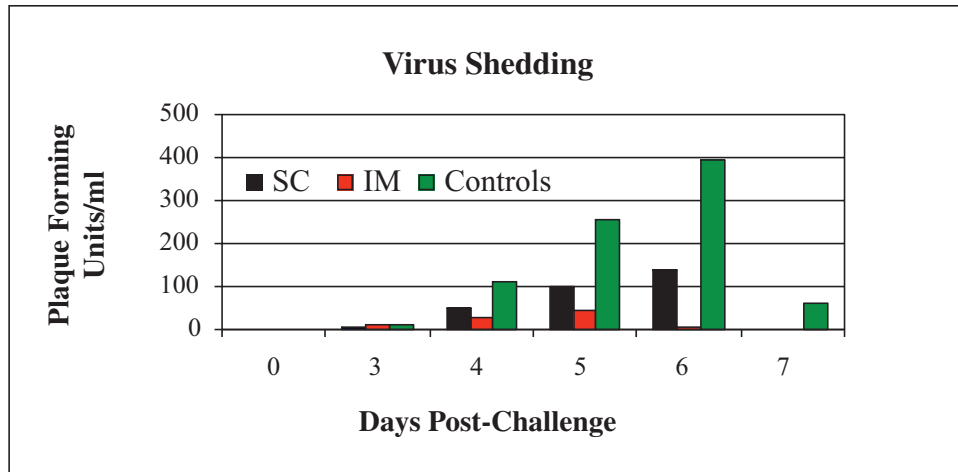
### PO<sub>2</sub> - BLOOD DISSOLVED OXYGEN LEVELS

Arterial blood was drawn on day 7 post-challenge to measure the dissolved oxygen level (PO<sub>2</sub>). Mean PO<sub>2</sub> levels differed significantly among groups. The vaccinated calves had significantly higher levels of oxygen saturation in the blood.

Treatment Group	Mean PO <sub>2</sub> (mmHg)	P Values
SC	75.0	SC vs. Controls = 0.001
IM	79.2	IM vs. Controls = 0.0002
Controls	56.1	

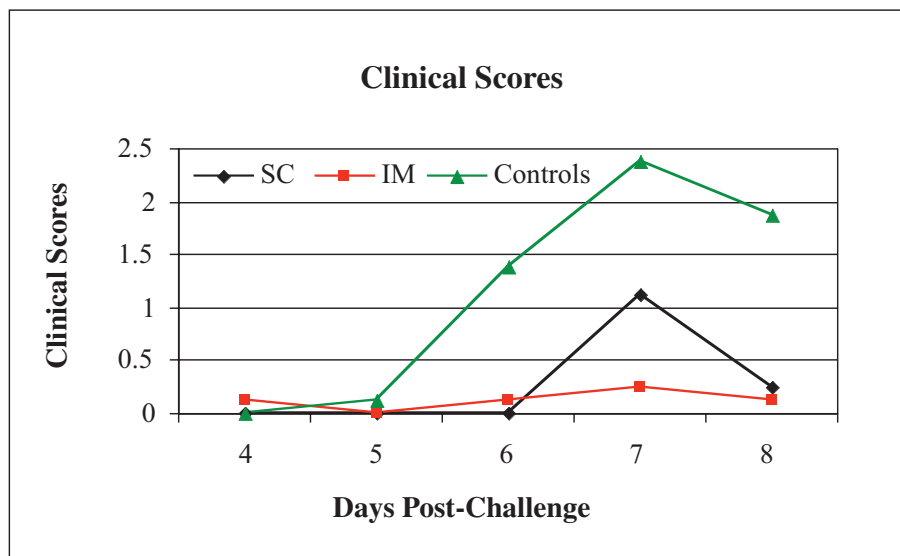
## VIRUS SHEDDING

Nasal swab samples were obtained for virus isolation on days 0, 3, 4, 5, 6, and 7 post-challenge. The daily mean virus shedding (plaque forming units (PFU) per ml) is shown below. Both IM and SC treatment groups shed significantly less BRSV on days 5 and 6 post challenge ( $P \leq 0.0073$ ). All vaccinated calves had quit shedding virus by day 7 post-challenge.



## CLINICAL SCORES

Clinical signs were scored daily post-challenge. Assigned scores were based on coughing, dyspnea and nasal and ocular discharge. Clinical signs associated with challenge did not manifest until day 4 post-challenge. As compared to controls, the clinical scores were significantly lower on post-challenge days 6, 7 and 8 for IM vaccinates ( $P \leq 0.0384$ ) and post-challenge days 6 and 8 for SC vaccinates ( $P \leq 0.0279$ ).



## LUNG LESIONS

Lung lesion scores were determined from the enrolled calves based upon measurements taken at necropsy on day 8 post-challenge. Dorsal and ventral lung measurements were made based on established methods published by Dr. John Ellis.<sup>1,2</sup> The range and mean percent lung lesion involvement by treatment group is listed in the table below. The mean percent lung lesion involvement for the SC and IM groups was significantly lower ( $P < 0.0001$ ) versus the control group.

Percent Lung Lesion Involvement			
Group	Low	High	Mean
SC	1.3	18.4	13.6
IM	1.0	20.0	8.9
Controls	31.0	65.1	47.1

## CONCLUSIONS

Results from this study showed calves vaccinated with Express<sup>®</sup> vaccine were protected against a virulent BRSV challenge when compared to unvaccinated control calves. The clinical data showed that the vaccinates had a statistically significant, as well as biologically significant, improvement for all measured clinical parameters and a highly significant reduction in lung lesions.

### REFERENCES:

1. Ellis, John, et. al. Response of calves to challenge exposure with virulent bovine respiratory syncytial virus following intranasal administration of vaccines formulated for parenteral administration. JAVMA, Vol. 230, No. 2. (2007). 233-243.
2. West, Keith, et. al. The effect of formalin-inactivated vaccine on respiratory disease associated with bovine respiratory syncytial virus infection in calves. Vaccine, Vol. 17 (1999). 809-820.