Demonstration of Protection Provided by a Single Dose Modified Live BRSV Vaccine against Virulent BRSV Challenge

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Introduction

Bovine respiratory syncytial virus (BRSV) is an economically important cause of respiratory disease in cattle worldwide. The virus is an important respiratory pathogen in naïve cattle of all ages, but as with other respiratory syncytial viruses, it primarily affects young calves. The virus has also been implicated as one of the viral agents involved in the inducing phase of bovine respiratory disease complex. Efficacy of vaccines developed to protect against BRSV related respiratory disease must be demonstrated in models that exhibit clinically relevant respiratory disease in susceptible cattle. The model used in this trial involves experimental infection with a virulent field isolate of BRSV, resulting in induction of severe clinical disease and associated pneumonic lesions.

Materials and Methods

The efficacy of vaccination with a single dose of the BRSV component of a modified live five-way combination viral vaccine (Express 5‰, Boehringer Ingelheim Vetmedica, Inc.) was investigated using this model. The lyophilized test vaccine was rehydrated with a proprietary adjuvanted diluent at the time of use. Nine colostrum-deprived, BRSV seronegative calves were vaccinated on Day 0 with a single 2-mL dose of test vaccine. Nine control calves from the same source were vaccinated with placebo. All calves were challenged on Day 42 with a virulent BRSV obtained from a lung wash of an infected newborn calf. Nasal swab samples were collected on Day 41 (pre-challenge) and Days 45 through 50 (post-challenge). Arterial blood was taken for pO_2 measurement on Day 49. Clinical signs, including temperature, dyspnea, coughing, respiration rate and nasal discharge, were observed from Day 41 through Day 50. On Day 50 all animals were sacrificed, the lungs removed and lung lesions measured. Three of nine vaccinated calves and one of ten control calves were removed from the study due to prior exposure to BRSV and were not included in the statistical analysis.

Results and Conclusions

A statistically significant difference was seen between vaccinates (n=6) and controls (n=8) in lung lesions ($P=0.009$) and pO_2 measurements ($P=0.005$). Peak clinical signs and temperatures were significantly lower in vaccinates than in controls. ($P<0.05$). Vaccinates also had significantly less post-challenge viral shedding than the controls ($P<0.05$). This trial demonstrates the ability of a single dose of the modified live BRSV component of Express 5‰ vaccine to provide protection against challenge with a virulent BRSV.