Efficacy of a *Pasteurella haemolytica* Vaccine/ Bacterial Extract in the Prevention of Bovine Respiratory Disease in Recently Shipped Feedlot Calves

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A study was undertaken in the fall of 1987 to investigate the efficacy of a recently developed *Pasteurella haemolytica* vaccine/bacterial extract (Presponse, Langford Laboratories, Guelph, Ontario). Although laboratory studies to date had shown the product to be effective when administered twice before a controlled challenge with *P. haemolytica* (1), the purpose of the current study was to evaluate the vaccine when administered to recently weaned and shipped calves upon arrival in the feedlot. A secondary objective of the study was to assess the compatibility of Presponse with Bovilan (Langford Laboratories, Guelph, Ontario), an intramuscular modified-live virus infectious bovine rhinotracheitis/parainfluenza-3 (IBR/PI3) vaccine when Presponse was used as the diluent to reconstitute the IBR/PI3 vaccine. Bovine practitioners are being, and will be, faced with questions from cattlemen about this recently licenced vaccine. Although the results reported here are only preliminary, it is hoped that they will provide some assistance in dealing with these inquiries.

Two hundred and sixty-five calves were utilized in the inital stages of this trial. At the Ridgetown College of Agricultural Technology (RCAT), two groups (n = 59 and 60) of medium-frame calves averaging 268 kg arrived from British Columbia on October 29, 1987. Two groups (n = 83 and 65) of large-frame steer calves averaging 255 kg arrived at the Elora Beef Research Centre (EBRC) from Saskatchewan on November 2 and 5, 1987. Within 24 hours of arrival, each of the animals was weighed, eartagged, bled by jugular venipuncture to collect 10 mL of blood and assigned on a formal random basis to receive one of three vaccine treatments. One third of the calves received Presponse, one third received Presponse combined with Bovilan, and the other third remained as unvaccinated controls. All vaccines were administered with a 16 ga 2.5 cm needle into the gluteal muscles. The Presponse vaccine, which was supplied in an aqueous form, was used as the diluent for the freeze-dried Bovilan in place of the usual sterile diluent supplied with that product. This is not a label recommendation but was done at the manufacturer's request to test the compatibility of the two products. The staff responsible for detection and treatment of sick calves remained blind as to the three different treatments imposed.

At RCAT, the calves were housed seven per pen, and at EBRC four animals were placed in each pen. Calves from the three different vaccine treatments were comingled in each pen but calves from different arrival groups were not mixed. Over the next four weeks, no other procedures were performed and the calves were adjusted to corn silage-based diets. Calves were monitored for visual signs of respiratory disease (depression, anorexia, gauntness, or polypnea) and if upon examination found to be febrile ($\geq$ 39.5°C), treated according to a standard antimicrobial therapy protocol. Satisfactory response to treatment was defined as a temperature of $<$ 40°C at 48 hours after the start of therapy. A relapse was an animal that completed a course of treatment and was determined to be ill again one or more days later. All dead calves were examined by necropsy.

At 28 days postarrival, all calves were weighed and bled again by jugular venipuncture. Any required processing such as the administration of growth implants and anthelmintics was performed at this time. The approximately two-thirds of calves not previously vaccinated against IBR/PI3 were given Bovilan at this time.

The clotted blood collected upon arrival and at 28 days was delivered within 24 hours to Langford Inc. for separation of the sera and subsequent determination of IBR, PI3 and *P. haemolytica* titers. Weights will be measured every 28 days throughout the feeding period and the rates of gain will be analyzed for the three treatment groups. These results will be reported later.

The data collected to date are presented in Table 1. The highest morbidity was experienced by the calves vaccinated with the Presponse/Bovilan combination. In this group, 46% of the calves required therapy while 37% of the controls and 32% of the Presponse vaccinates were treated. In the Presponse/Bovilan group, 71% of the calves responded to initial therapy versus 84% of the controls and 90% of the Presponse vaccinates. None of the Presponse-vaccinated calves suffered a relapse compared to 10% of the Presponse/Bovilan vaccinates and 13% of the controls. Two of the Presponse/Bovilan vaccinated calves died of acute fibrinous pneumonia; both were on their second day of therapy. Presponse-vaccinated and control groups did not experience any mortality.

Vaccination with Presponse/Bovilan was associated with elevated treatment rates in comparison to the controls in two of four groups, lower response rates in two of four groups, and a higher mortality rate in two of the four groups.

Presponse vaccination was associated with lower morbidity compared to control calves in three of the four groups. Relapse rates in two groups were lower than those experienced by control calves, and, in the

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TABLE 1
Efficacy of Vaccination with Presponse upon Arrival in the Control of Undifferentiated Bovine Respiratory Disease in Ontario Feedlots

Treatment[a]	No. of Calves	Morbidity Rate (%)	Response Rate (%)	Relapse Rate (%)	Mortality Rate (%)
1	86	32/86 (37)	26/31[b] (84)	4/31 (13)	0/86 (0)
2	90	29/90 (32)	26/29 (90)	0/29 (0)	0/90 (0)
3	89	41/89 (46)	29/41 (71)	4/38[c] (10)	2/89 (2)

[a]1 = Control, 2 = Presponse, 3 = Presponse/Bovilan
[b]Denominator is less than in previous column because of incorrect treatment protocol
[c]Denominator is less than in previous column because of two mortalities and one incorrect treatment protocol

Vaccination of recently shipped nonpreconditioned calves with this *P. haemolytica* vaccine/bacterial extract may result in a slight decrease in morbidity, slight improvement in response rates, and perhaps important reduction in relapse rates

other two groups were equivalent to the controls with both groups experiencing no relapses.

Despite the fact that these results are based on a small number of calves, the findings are consistent with those reported in observational studies where modified-live virus vaccines against respiratory disease have been administered to calves in the first few days after arrival in the feedlot (2). Unfortunately, clinical trials to investigate the potential impact of the modified-live virus vaccines given upon arrival at the feedlot have not been carried out. Many cattlemen continue to vaccinate upon arrival with only anecdotal evidence to justify the procedure at this time.

These results are only preliminary. Proper evaluation of this vaccine will require greater than 700 Presponse vaccinates and an equivalent number of appropriate controls in order to have the power to declare differences in morbidity as large as 6% to be significant with the risk of a type I error set at 5% and type II error of 20% (3). *Should the trend continue*, vaccination of recently shipped nonpreconditioned calves with this *P. haemolytica* vaccine/bacterial extract may result in a slight decrease in morbidity, slight improvement in response rates, and perhaps important reduction in relapse rates. In conditions similar to those described here, where mortality rates are low, vaccine efficacy will have to be measured in terms of the previously mentioned differences rather than in reduction of mortality rates. A close examination of the potential cost/benefit ratio will be necessary in order to gain maximum advantage from this (or any other) preventive procedure.

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