

A Field Trial of Preshipment Vaccination of Calves

W. MARTIN, S. ACRES, E. JANZEN, P. WILLSON AND B. ALLEN

Ontario Veterinary College, University of Guelph, Guelph, Ontario
N1G 2W1 (Martin and Allen), Veterinary Infectious Disease Organization,
124 Veterinary Road, Saskatoon, Saskatchewan S7N 0W0 (Acres and Willson)
and Western College of Veterinary Medicine, University of Saskatchewan,
Saskatoon, Saskatchewan S7N 0W0 (Janzen)

SUMMARY

A field trial to investigate the efficacy of vitamins ADE, a *Haemophilus somnus* bacterin, a *Pasteurella bacterin*, and two intranasal infectious bovine rhinotracheitis-parainfluenza type 3 vaccines administered to beef calves at least three weeks prior to weaning and shipment was conducted.

Over 1000 calves were vaccinated, but of the 692 calves shipped from the ranch of origin, only 276 calves were located in Ontario, or Quebec, feedlots. The average treatment rate was 30%. Neither vitamins ADE, *H. somnus* bacterin, *Pasteurella bacterin* or the porcine tissue culture infectious bovine rhinotracheitis-parainfluenza type 3 vaccine had a significant effect on treatment rates for respiratory disease. Calves vaccinated with the temperature sensitive infectious bovine rhinotracheitis-parainfluenza type 3 vaccine had a significantly ($p < 0.05$) lower treatment rate than the nonvaccinated, and the porcine tissue culture infectious bovine rhinotracheitis-parainfluenza type 3 vaccinated, calves. Calves vaccinated with the temperature sensitive infectious bovine rhinotracheitis-parainfluenza type 3 vaccine did not have a significantly reduced treatment rate in comparison to nonvaccinated calves from the same source.

Key words: Field trial, respiratory disease, vaccine, bacterin, preimmunization.

RÉSUMÉ

Une expérience clinique relative à la vaccination des veaux de boucherie,

avant leur transport dans des parcs d'engraissement

Cette expérience clinique visait à déterminer l'efficacité de l'administration des vitamines ADE, d'une bactérienne *Haemophilus somnus*, d'une bactérienne *Pasteurella haemolyticamultocida* et de deux vaccins intranasaux IBR-PI₃, à des veaux de boucherie, au moins trois semaines avant leur sevrage et leur transport dans des parcs d'engraissement.

Au delà de 1 000 veaux reçurent les vaccins précités, mais des 692 qu'on transporta de leur ranch natal, seulement 276 se retrouvèrent dans des parcs d'engraissement de l'Ontario ou du Québec. La moyenne du taux de traitement fut de 30%. Ni les vitamines, ni les bactériennes, ni le vaccin IBR-PI₃, préparé sur feuillets de cellules porcines, n'exercèrent d'influence appréciable sur le taux de traitement contre les maladies respiratoires. Les veaux immunisés avec le vaccin IBR-PI₃, sensible à la température, affichèrent un taux de traitement sensiblement plus faible ($p < 0,05$) que les veaux témoins ou ceux qui avaient reçu l'autre vaccin IBR-PI₃. Les veaux immunisés avec le vaccin IBR-PI₃, sensible à la température, ne présentèrent pas un taux de traitement sensiblement inférieur à celui des veaux témoins d'un même ranch.

Mots clés: expérience clinique, maladie respiratoire, vaccin, bactérienne, préimmunisation.

INTRODUCTION

Each fall, thousands of calves are transported from ranches in western Canada

to feedlots in Ontario and Quebec. Many of these calves are vaccinated, usually on arrival at the feedlot, in an attempt to minimize the occurrence of the shipping fever complex (SFC). However, vaccination of recently arrived calves against respiratory disease is of questionable value (1,2,3).

This field trial investigated the efficacy of selected vaccines, administered to calves in western Canada prior to weaning and transportation to feedlots, to reduce treatment rates and death losses. The study was a cooperative effort among the Veterinary Infectious Disease Organization (VIDO), the Western College of Veterinary Medicine (WCVM) and the Ontario Veterinary College (OVC), during the fall of 1980.

MATERIALS AND METHODS

Collaborating farmers, in Saskatchewan, were identified and the nature of the trial and the specific procedures to be given their calves described. In most instances, a handling fee was paid to each farmer for his collaboration.

The spectrum of products included two infectious bovine rhinotracheitis-parainfluenza type 3 vaccines (IBR-PI₃) a *Pasteurella haemolyticamultocida* bacterin,¹ a hemophilus bacterin,² and a vitamin ADE preparation. The IBR-PI₃ vaccines were live preparations which were administered intranasally, one was of porcine tissue culture origin (IBR-PI₃/PTC)³ and the other, of bovine tissue culture origin, contained a temperature sensitive mutant of IBR virus (IBR-PI₃/TS).⁴

The field trial, a split-split plot

¹Econ P, Philips-Roxane Inc. St. Joseph, Missouri.

²Somnugen, Philips-Roxane Inc. St. Joseph, Missouri.

³Contravac, Connaught Laboratories, Toronto, Ontario.

⁴TSV 2, Norden, Lincoln, Nebraska.

design, represented a compromise between the ideal of a completely randomized design and the necessity that the design be manageable in the field. Thus, calves in groups of 18 were randomly assigned to receive or not receive a vitamin ADE injection. Half of these 18 calves were randomly assigned, in groups of nine, to receive or not receive one injection of hemophilus bacterin. Finally, calves were randomly assigned on an individual basis to receive or not receive one of the IBR-PI₃ vaccines and/or the pasteurilla bacterin. It was intended that 70% of all the calves on the trial would receive one of the IBR-PI₃ vaccines, 50% vitamin ADE, 50% the hemophilus bacterin and 30% the pasteurilla bacterin. Approximately 17% of the calves would not be vaccinated with the pasteurilla bacterin nor either of the IBR-PI₃ vaccines. Only one of the two IBR-PI₃ vaccines was used on a given farm.

The original injections were given to calves a minimum of three weeks prior to shipment. All treatments were administered according to the manufacturers instructions, with the exception that only one injection of the hemophilus bacterin was given. The second injection of the pasteurilla bacterin was administered at the time of sale, just prior to transportation. All calves were identified with an ear-tag at the time of initial pretreatment.

Feedlot owners in Ontario and Quebec who purchased calves were identified and their cooperation in recording sickness, treatments and deaths sought. In addition, an agreement to examine all dead animals without cost to the owner was made.

Analyses were performed using analysis of variance techniques, appropriate for split plot designs. The effects of individual treatments are presented here-in, analyzed by chi-square and exact probability methods (4).

RESULTS

A total of 1056 calves was pretreated on 16 different premises in Saskatchewan. Of these, only 276 calves were shipped to Ontario or Quebec; 416 were located in Alberta or Saskatchewan feedlots, and 364 calves remained on their farms of origin. Six feedlot owners in Ontario and one in Quebec

TABLE I
THE PERCENTAGE OF CALVES TREATED FOR THE SHIPPING FEVER COMPLEX (SFC)
ACCORDING TO PRETREATMENT STATUS

Pretreatment		Treated for SFC		Percent Treated	Chi-square
		Yes	No		
Vitamins ADE	Yes	29	55	84	34.5%
	No	18	53	71	25.4%
<i>H. somnus</i> bacterin	Yes	21	55	76	27.6%
	No	26	53	79	32.9%
Pasteurella bacterin	Yes	12	37	49	24.5%
	No	35	71	106	33.0%
IBR-PI ₃ /TS	Yes	3	27	30	10.0%
	No	27	49	77	35.1%
IBR-PI ₃ /PTC	Yes	3	27	30	10.0%
	No	17	32	50	34.0%

^aSignificant at $p < 0.05$ compared to nonvaccinated calves.

purchased at least 25 pretreated calves, two directly from the farm of origin, and the remainder from a salesbarn in North Battleford, Saskatchewan.

Although owners of calves in Ontario and Quebec were identified within one week of purchase and the purpose of the study explained to them, few purchasers maintained adequate treatment records. Thus complete treatment and mortality data were available on only 155 calves, while mortality data only were available on an additional lot of 94 cross-bred heifers shipped directly from the farm of origin to an Ontario feedlot.

None of the following pretreatments, vitamins ADE, hemophilus bacterin or pasteurilla bacterin, had a significant effect on treatment rates (Table I). The treatment rate in IBR-PI₃/TS vaccinated cattle was significantly lower than the treatment rate in IBR-PI₃/PTC vaccinated calves ($\chi^2 = 5.71$ $p < 0.05$) and the rate in unvaccinated (IBR-PI₃) calves ($\chi^2 = 4.77$ $p < 0.05$).

The treatment rates classified according to various combinations of the IBR-PI₃ vaccines and pasteurilla

bacterin are shown in Table II. The effect of the IBR-PI₃/TS vaccine noted previously was the only significant effect, statistically. Although not significant statistically, the treatment rates were lower in calves receiving the pasteurilla bacterin.

The data were further subdivided according to farm of origin and according to feedlot (Table III). The IBR-PI₃/TS vaccinated calves came from four different farms and the treatment rate in these calves was significantly lower than in calves from other farms. Twenty percent of nonvaccinated calves and 10% of IBR-PI₃/TS vaccinated calves from these four farms were treated, but these differences were not statistically significant.

Five of the 94 cross-bred heifers died within three weeks of arrival in Ontario; two of 66 IBR-PI₃/PTC vaccinated calves (3%) and three of 28 unvaccinated calves (10.7%). Four of the five had extensive pneumonia; the other had lesions suggestive of thromboembolic meningoencephalitis. These differences were not significant statistically ($p = 0.15$). Subsequently, three more

TABLE II
THE PERCENTAGE OF CALVES TREATED FOR THE SHIPPING FEVER COMPLEX (SFC)
ACCORDING TO VACCINE COMBINATIONS

Pretreatment	Vaccine	Combination	Number of Calves	Percent Treated	Exact Probability Level ^a
IBR-PI ₃ /TS	Pasteurella bacterin	IBR-PI ₃ /PTC	0/9	0.0%	0.04
		-	3/21	14.3%	0.13
	-	+	8/28	28.6%	0.36
		-	19/49	38.8%	0.49
	+	-	4/12	33.3%	1.00
		-	-	13/36	36.1%

^aFishers two-tailed test, comparing each group to the nonvaccinated (---) group.

TABLE III
THE PERCENTAGE OF CALVES TREATED FOR THE SHIPPING FEVER COMPLEX (SFC)
ACCORDING TO VACCINE STATUS AND SOURCE OF CALVES

Calves ^a From	Pretreatment		Number of Calves	Percent Treated	Exact Probability Level ^b
IBR-PI ₃ /TS source farms	IBR-PI ₃ /TS	Yes	30	10%	0.37
		No	10	20%	
IBR-PI ₃ /PTC source farms	IBR-PT ₃ /PTC	Yes	77	35.1%	0.35
		No	40	37.5%	

^aOnly one type of IBR-PI₃ vaccine was used on each farm of origin.

^bFishers two-tailed test comparing treatment rates in vaccinated and unvaccinated calves from same source farm. The treatment rates on farms where IBR-PI₃/TS vaccine was used were significantly less than those on farms where IBR-PI₃/PTC vaccine was used.

vaccinated animals died during the next month. One animal died at the feedlot in Quebec, however tissues were too autolyzed for diagnostic examination.

DISCUSSION

At the time this study was initiated, prevaccination and preconditioning programs were of great interest to producers and special cattle sales were being organized. Calves from these sales were traced to a number of feedlots in Ontario and their health status compared to nonprevaccinated and/or nonpreconditioned calves from the same salesyard. Preconditioned calves (i.e. weaned, creep-fed and vaccinated against IBR-PI₃) had the lowest treatment rates, nonvaccinated calves the highest rates and prevaccinated calves (i.e. vaccinated against IBR-PI₃, but not weaned or creep-fed) intermediate treatment rates in Ontario feedlots (5).

Although we were able to trace and obtain complete treatment records on only a small percentage of the originally vaccinated calves, the results reported in this paper are derived from, what we assume to be, a repre-

sentative subset of the initially vaccinated calves.

Bearing in mind limitations due to sample size, few, if any, of the pretreatments, including vaccines, produced a significant reduction in subsequent treatment rates, almost all of which were given for undifferentiated respiratory disease. Little, if any, reduction in treatment rates subsequent to prevaccination are the most frequent findings reported in the literature (1). The temperature sensitive IBR-PI₃ vaccine appeared to be of some benefit, however the treatment rates were lower in calves from farms where this vaccine was used regardless of whether the calves were vaccinated or not. Thus, whether this reduction was a farm effect — having nothing to do with vaccination — or was a result of herd immunity after vaccinating 70% of the calves on the farm, is unknown. Since no apparent benefit was observed in a more recent field trial (6), a reasonable explanation is that a farm effect produced the difference. Certainly, farm to farm variation in health status of calves is quite large and accounts for a statistically signifi-

cant percentage of the variation in treatment rates in calves (6).

The results of this field trial indicate that although prevaccination is practiced, farmers and veterinarians should not expect a large reduction of treatment rates in calves prevaccinated with currently available IBR-PI₃ intranasal vaccines, intramuscular bacterins or pretreated with vitamins ADE. Although not within the objectives of this study, the complete preconditioning program appears to give better results, in terms of health status during the first two weeks after arrival in feedlots (5).

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