RESPIRATORY SYNCYTIAL VIRUS VACCINE FOR STRESSED STOCKER CATTLE

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Story in Brief

The effects of bovine respiratory syncytial virus (BRSV) vaccine on health and performance of stressed stocker cattle were measured in six trials using 754 newly received steer and bull calves and yearlings. Vaccination with bovine respiratory syncytial virus vaccine increased daily gains (1.56 vs 1.45 lb/day) and showed improvements in feed intake and feed efficiency over non-vaccinated calves. However, medical treatments required per head were higher (3.03 vs 2.88) and morbidity was increased by 5.6% with the vaccine. Additionally, the data was analyzed with those animals detected as sick during the first three days excluded because medical treatment could not have had an affect on the cattle that were sick at processing. Daily gains improved (1.63 vs 1.52), medical treatments increased (1.34 vs 1.23) and morbidity was higher (34.66 vs 30.09) in the vaccine group. Although, the incidence of bovine respiratory disease complex was increased, these data indicate that the administration of bovine respiratory syncytial virus vaccine improved weight gains and may have improved consumption and utilization of feed.

(Key Words: Bovine Respiratory Syncytial Virus, Stressed Stocker Cattle)

Introduction

Bovine respiratory syncytial virus (BRSV) has been isolated from nasal and ocular secretions following outbreaks of respiratory disease in calves (Jacobs and Eddington, 1971; Rosenquist, 1974; Lehmkuhl et al., 1979). Antibody surveys have shown that the virus is widely distributed and common in cattle populations (Rosenquist, 1983). In 1984, a modified live virus vaccine was licensed; however, it was later recalled. A new vaccine has since been developed and marketed for use in cattle. The objective of this research was to study the effect of BRSV vaccine on the health and performance of newly arrived stocker and feeder cattle.

Materials and Methods

Seven hundred fifty four head of cattle were assembled by order buyers and shipped to Pawhuska, Oklahoma in 1987. The origin, arrival date and weight, number of head and transit shrink for each trial are summarized in Table 1. Upon arrival, cattle were weighed individually, ear tagged and randomly placed in one of eight pens which had been assigned to one of the following treatments: unvaccinated controls or intramuscular vaccination with BRSV vaccine[5]. The vaccination treatments were applied at the time of processing.

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Table 1. Origin, arrival date, number of head, arrival weight and intransit shrink for each load of cattle.

	Origin	Arrival Date	Number of Head	Arrival Wt., lb	% Shrink
Trial 1	OK	1-17-1987	94	529	4.08
Trial 2	AR	1-18-1987	174	514	4.55
Trial 3	KY	2-16-1987	86	514	4.46
Trial 4	KY	2-20-1987	92	488	7.83
Trial 5	AL	9-07-1987	134	334	NA[a]
Trial 6	NC	9-16-1987	174	231	NA[a]

[a]NA=not available.

On the morning following arrival, individual cattle in each pen were processed as follows:

1. Body temperature and time were recorded
2. Cattle were vaccinated with IBR-PI3 (MLV) intermuscularly, Leptospira pomona bacterin, and Clostridia chavoei, septicum, novyi and sordellii bacterin and dewormed with Ivomec[6].
3. Cattle assigned to BRSV treatment received an intramuscular injection of bovine respiratory syncytial virus vaccine[5].
4. Cattle with clinical signs of illness or a body temperature of 104F or greater received antibiotic treatment and sick animals were placed in the hospital pen and healthy animals were returned to their home pen.

Cattle were checked twice daily for signs of illness. Sick animals were moved to the processing area where body temperature was measured and severity of illness was clinically appraised. If body temperature exceeded 104 F, the animal was considered sick. Sick animals received a medical treatment based on a specified sequence of antimicrobial drugs. If body temperature decreased within 24 h, the drug was continued for two more days. If no improvement was apparent within 24 h, the next drug in the sequence was administered. This process was repeated until a health improvement was detected.

In trials 1 through 4, cattle had free access to prairie hay and were fed 2 lb/head/day a pelleted feed supplement (Table 2) for the first 21 days. Supplement was decreased to 1 lb/head/day during days 22-28. Cattle in trial 5 and 6 had ad libitum access to a 70% pelleted concentrate (Table 3) and received 2 lb prairie hay per head each day. Two hospital pens were maintained to avoid mixing of treatment animals while out of their home pen.

Least squares analysis of variance was performed on data for all response criteria. Responses to the BRSV treatments were analyzed using individuals as the experimental unit except for the feed efficiency and feed intake responses which were analyzed using pens as the experimental unit. The initial models for weight gains, medical treatment, morbidity, feed intake and feed efficiency included trial (truck load), BRSV treatment and trial by BRSV treatment interaction as class variables. All models, excluding BRSV treatment, were reduced when sources of variation had observed significance levels greater than .20.

[6]MSD Agvet, Rahway, NJ 070650

Table 2. Composition of feed supplement--Trial 1, 2, 3, 4

Ingredient	% As Fed
Soybean meal	88.94
Cottonseed meal	5.00
Salt	3.00
Dicalcium phosphate	2.75
Vitamin A-30,000 IU/g	.11
Bovatec 68[a]	.15
Rovimix E 50% SD[b]	.09

[a]To provide 100 mg lasalocid per lb.
[b]DL-alpha-tocopherol acetate, to provide 200 IU/lb Vitamin E. Hoffmann-La Roche, Inc., Nutley, NJ 07110.

Table 3. Composition of feed supplement--Trial 5, 6

Ingredient	% As Fed
Corn, #2 ground	20.72
Soybean hulls	19.65
Wheat middlings	27.47
Cottonseed hulls	9.94
Rice meal-run by-products	9.94
Soybean meal	6.16
Cane molasses	4.77
Calcium carbonate	.95
Salt	.28
Zinpro-100[ab]	.08
Vitamin A-30,000 IU/g	.01
Rovimix E 50% SD[c]	.01
Bovatec 68[d]	.02

[a]not included in control diet.
[b]Zinpro, Inc., Chaska, MN 55318.
[c]DL-alpha-Tocopherol acetate, to provide 50 IU/lb Vitamin E, Hoffman-La Roche, Inc., Nutley, NJ 07110
[d]To provide 15 mg of lasalocid per lb.

Results and Discussion

Effects of bovine respiratory syncytial virus vaccine on daily gains, sick pen days, morbidity and mortality are shown in Table 4. Daily weight gains tended to be improved (p=.12) with BRSV treatment from 1.45 to 1.56 lbs. However, the average number of medical treatments per head was lower in the control group vs the BRSV group (2.88 vs 3.03). Morbidity was high in both groups, but was lower (p=.07) in the nonvaccinated controls (59.09 vs 64.68%). Death loss among both groups of cattle were similiar (2.72 vs 2.69).

Feed intakes and gain to feed ratios are reported in Table 5. BRSV treament showed an increase in feed intake and gain to feed ratios

Table 4. Effect of BRSV vaccine on weight gains, morbidity and mortality in stressed cattle.

Treatment	Control	BRSV
Number of head	372	367
Number of head never sick	156	128
Arrival weight, lb	419	419
Daily gain, lb[a]	1.45	1.56
Daily gain of head never sick, lb[a]	1.62	1.72
Medical treatments per head[a]	2.88	3.03
Morbidity, %[a]	59.09	64.68
Total Mortality, %	2.69	2.72

[a]Expressed as least square means.

Table 5. Effects of BRSV vaccine on feed intake and gain to feed ratio.

	Control	BRSV
Number of pens	20	20
Feed intake, lb[a]	13.86	14.10
Gain/feed[a]	.103	.110

[a]Expressed as least square means.

by 1.7 and 6.8% respectively. These results as well as those above were not influenced by superimposed feed treatments. With increased morbidity and more medical treatments required per head, one might expect to see reduced weight gains and feed intake by vaccinated cattle. This was not the case.

The effects of BRSV vaccine on daily gains and medical treatments in the cattle that became sick during the trial are reported in Table 6. Although nonsignificant, daily gains of sick cattle favored the control cattle over the vaccinated cattle (1.50 vs 1.45 lbs. respectively) as well as the number of cattle repulled as sick (28.71 and 30.33).

There is a delay between vaccination and an immune response in animals. Due to this delay, the initial illness that occurs before the third day after vaccination usually can not be attributed the BRSV

Table 6. Effect of BRSV vaccine on daily gains and medical treatments in sick cattle.

	Control	BRSV
Number of head	214	238
Average daily gain, lb[a]	1.50	1.45
Medical treatments per head[a]	4.96	4.94
Repulls as sick, %[a]	28.71	30.33

[a]Expressed as least square means.

vaccine. Hence, the data were also analyzed with those cattle pulled as sick on the first three days excluded from the model (141 control head and 145 BRSV head). BRSV vaccine did not appear to effect the number of cattle detected sick during the first three days. The effects of BRSV vaccine on weight gains, medical treatments per head and morbidity with these head excluded are summarized in Table 7. Cattle which were vaccinated with BRSV had higher weight gains (1.63 vs 1.52 lb/head/day), required more medical treatments per head (1.34 vs 1.23) and had higher morbidity (34.66 vs 33.66) than nonvaccinated controls.

The effects of BRSV on the health and performance of the cattle that became sick during the trials excluding those pulled during the first three days are presented in Table 8. Average daily gains were improved ($p<.07$) by 11% (1.50 vs 1.23) and mean medical treatments decreased in vaccinated cattle. However, the sick cattle that required repulling increased (23.15% vs 16.33%) in the BRSV group.

Under the conditions of this study, weight gains of newly arrived cattle were improved by treatment with intramuscular bovine respiratory syncytial virus vaccine. This probably was due to the tendency for an increased feed intake. However, because of poorer health response to BRSV vaccine, further studies need to be conducted with BRSV before definite conclusions concerning its efficacy can be drawn.

Table 7. Effects of BRSV vaccine on daily gains, medical treatments and morbidity in stressed cattle with sick head pulled at proccessing or on day 1 or day 2 excluded.

	Controls	BRSV
Number of head	231	225
Arrival weight, lb	450	451
Average daily gain, lb[a]	1.52	1.63
Medical treatments per head[a]	1.23	1.34
Morbidity, %[a]	30.09	34.66

[a]Expressed as least square means.
[b,c]Means with different superscripts differ ($p<.02$).

Table 8. Effect of BRSV vaccine on daily gains, medical treatments, and repulls in sick cattle with head pulled during the first three days excluded

	Controls	BRSV
Number of head	75	97
Average daily gain, lb[a]	1.23	1.50
Medical treatments per head[a]	4.22	4.12
Repulls as sick, %[a]	16.33	23.15

[a]Expressed as least square means.

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