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EFFECTS OF ROUTE OF ADMINISTRATION OF A COMMERCIALLY AVAILABLE *MANNHEIMIA* (PASTEURELLA) *HAEMOLYTICA* VACCINE ON TITER LEVELS

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Summary

One hundred thirteen Hereford x Angus heifer calves (average weight = 515 lb) were allotted to one of three treatments: 1) control, no vaccine; 2) a 2-cc subcutaneous injection of One-Shot® (Pfizer Animal Health), a *Mannheimia* (pasteurella) *haemolytica* vaccine, three weeks before weaning; or 3) a ½-cc intradermal injection of One-Shot, three weeks before weaning. All heifers were weighed and blood samples harvested at time of injection, three weeks later at weaning, and then 28 days later. After weaning, heifers were confined to a common pen and fed free-choice brome hay and approximately 5 lb/head daily of a concentrate. Blood samples from 30 heifers were shipped to a laboratory for titer analysis. No differences were found in animal performance and sickness during the preconditioning period. Heifers injected by the subcutaneous route had greater increases in whole-cell and leukotoxin-neutralizing antibody titer levels than the intradermal or control treatments. These data suggest that beef producers should follow label recommendations for dosage and route of administration to maximize vaccine efficacy.

Introduction

Mannheimia haemolytica is the major bacterium responsible for severe disease (bovine respiratory disease) and economic losses in cattle. Research has indicated that weanling calves vaccinated subcutaneously for *M. haemolytica* with One-Shot® (Pfizer Animal Health) responded with a significant increase in whole-cell and leukotoxin-neutralizing antibody titers. Increasing titers would indicate that the animal's immune system reacted to the vaccine and is better prepared to defend the body against disease challenges. This study was conducted to determine if use of an intradermal route of administration with a smaller dosage would elevate antibody titers and have the potential to reduce morbidity and increase performance in cattle.

Experimental Procedures

One hundred thirteen Hereford x Angus, spring-born heifers were randomly assigned to treatments three weeks before weaning (September 24, 2002). Heifers were weighed, and blood samples were harvested before vaccination and were properly stored. Heifers were then processed with FORTRESS 7® (Pfizer

[1]Pfizer Animal Health, Cooperstown, North Dakota.

Animal Health) and CATTLEMASTER 4® (Pfizer Animal Health). According to treatment assignment, heifers received one of three injection treatments of a *M. haemolytica* vaccine (One-Shot®, Pfizer Animal Health): 1) control, no vaccine administered; 2) a 2-cc subcutaneous injection of the *M. haemolytica* vaccine; or 3) a ½-cc intradermal injection of the *M. haemolytica* vaccine. Twenty-one days later (October 14), heifers were again weighed and blood samples taken and properly stored. Samples from both sampling days were forwarded to Oklahoma State University for whole-cell and leukotoxin-neutralizing antibody analysis. Two blood samples were not analyzed. All injections were given in the calves' neck region, following standard KSU/ KVMA/KLA Beef Quality Assurance guidelines.

Results and Discussion

The initial weight of heifers treated intradermally was less than heifers in other treatments, but initial weight had no effect on gain or blood-work results (Table 1). Weight gains and morbidity were similar between treatments. No differences in basal titer levels were noted between treatments groups (Table 2). Changes in whole-cell titer in response to vaccination were not different among treatments ($P>0.55$). However, the leukotoxin-neutralizing antibody tests indicated that the subcutaneous treatment resulted in a greater increase in antibody concentration than either the control ($P=0.004$) or intradermal ($P=0.21$) treatments.

These heifers were neither transported nor commingled with externally sourced cattle during this trial. Health records reflected this management program, in as much as no heifers were treated for bovine respiratory disease or died during the preconditioning period.

One-Shot vaccine was effective in increasing the leukotoxin-neutralizing antibody titer levels in weaning-age calves, whereas whole-cell titers were less responsive. The recommended route of administration and dosage seems to give best results.

Table 1. Effects of Volume and Route of Administration of a *Mannheimia haemolytica* Vaccine (One-Shot®, Pfizer Animal Health) on Animal Performance

Item:	Control/ No Vaccine	2 cc Subcutaneous	½ cc Intradermal	SEM
Initial weight, lb	512[a]	521[a]	500[b]	6.2
Average daily gain, lb/day				
September 24 to October 15	1.6	1.7	1.7	0.12
October 15 to November 12	1.3	1.4	1.2	0.10
September 24 to November 12	1.5	1.5	1.5	0.04

[ab]Means with different superscripts within row differ (P<0.05).

Table 2. Effects of Volume and Route of Administration of a *Mannheimia haemolytica* Vaccine (One-Shot®, Pfizer Animal Health) on Serological Test Results

Item:	Control/ No Vaccine	2 cc Subcutaneous	½ cc Intradermal	SEM
Titer level, September 24				
Whole cell	0.28	0.32	0.43	0.11
LktNA*	0.16	0.18	0.15	0.050
Titer level, October 14				
Whole cell	0.37	0.64	0.54	0.12
LktNA*	0.22[a]	0.48[b]	0.33[a]	0.063
Change in titer level, September 24 to October 14				
Whole cell	0.04	0.30	0.21	0.12
LktNA*	0.05[a]	0.33[b]	0.17[a]	0.069

*Leukotoxin-neutralizing antibody.

[ab]Means with different superscripts within row differ (P<0.10).