

## SEROLOGICAL RESPONSES TO IBR VIRAL VACCINE AND *MANNHEIMIA HAEMOLYTICA* BACTERIN/LEUKOTOXOID ADMINISTERED WITH NEEDLE-FREE INJECTION TECHNOLOGY

L. C. Hollis, J. F. Smith, B. J. Johnson, S. Kapil<sup>1</sup>, and D. A. Mosier<sup>1</sup>

### Summary

Yearling steers were randomized to treatment and vaccinated with 5-way modified live viral vaccine and *Mannheimia haemolytica* bacterin/toxoid by using either needle-free or standard needle injection. Blood samples were collected from all animals at the time of vaccination and 21 days later, and the serum was analyzed for antibody titers to infectious bovine rhinotracheitis (IBR) virus and *M. haemolytica* leukotoxoid. Serological responses to the IBR viral fraction of the 5-way viral vaccine were significantly greater on day 21 after administration with the needle-free injection system. Serological responses to the *M. haemolytica* leukotoxoid tended to be greater on day 21 after administration with the needle-free injection system.

### Introduction

Beef quality-assurance guidelines recommend that the most tissue-friendly route of administration of injectable products be used whenever possible. One new technology that offers potential to meet that objective is the use of a needle-free injection device (Felton 250 Pulse<sup>TM</sup> Needle-Free Injector), a pneumatically powered device (Figure 1) that uses air pressure to administer the vaccine through the skin and into the underlying subcutaneous or muscle tissues (Figure 2). The question arises: Do the cattle respond to the vaccines

the same way as when vaccinated with conventional needle and syringe? The purpose of this study was to compare efficacy, as measured by seroconversion, when a vaccine and a bacterin/leukotoxoid were injected with either needle-free or traditional needle injection methods.

### Procedures

One hundred eleven uniform yearling steers (806 lb) from a single ranch were used for the study. Animals were individually identified, blood samples were collected, and serum was harvested from blood and frozen. All animals were vaccinated with a 5-way modified live respiratory viral vaccine (Bovi-Shield<sup>®</sup> Gold 5) and a *M. haemolytica* bacterin/leukotoxoid (One Shot<sup>®</sup>). Needle-free and standard needle routes of administration were randomized between pairs of animals as they entered the squeeze chute. Those animals selected to receive the viral vaccine by needle-free injection received the bacterin/leukotoxoid by standard needle injection. The other animal of each pair received the viral vaccine by needle injection and the bacterin/leukotoxoid by needle-free injection. The Felton needle-free injector was set to 85 psi to ensure intramuscular injection of the viral vaccine, and it was set at 75 psi to ensure subcutaneous injection of the bacterin/leukotoxoid. On day 21, blood samples were collected from all steers, and the serum

---

<sup>1</sup>Diagnostic Medicine/Pathobiology.

was harvested. All serum samples were forwarded to the Kansas State University Veterinary Diagnostic Laboratory and were analyzed for antibody titers to IBR virus and *M. haemolytica* leukotoxin. Antibody titers from day 0 and day 21 were compared and statistically analyzed (Table 1).

### Results and Discussion

Serological responses to the IBR fraction of the 5-way viral vaccine were significantly

greater ( $P=0.0014$ ) on day 21 after administration with the needle-free injection system than with the standard needle route of administration. Serological responses to the *M. haemolytica* bacterin/toxin also tended to be greater ( $P=0.06$ ) on day 21 after administration with the needle-free injection system. This study indicated that use of a needle-free injection system resulted in serological responses at least as good as traditional needle injection methods.

**Table 1. Serological Responses to IBR Vaccine and *Mannheimia haemolytica* Bacterin/Toxin**

Treatment	Day 0 Titer	SEM	Day 21 Titer	SEM
<b>IBR</b>				
Needle	2.0	0.67	42 <sup>b</sup>	5.9
Needle-free	2.5	0.47	70 <sup>a</sup>	10.8
P value	0.95		0.0014	
<b><i>Mannheimia haemolytica</i></b>				
Needle	0.240	0.009	0.299	0.011
Needle-free	0.259	0.011	0.326	0.011
P value	0.20		0.06	

<sup>ab</sup>Values differ,  $P \leq 0.05$ .



**Figure 1. Felton Pulse 250 Needle-free Injection System.**



**Figure 2. Felton Needle-free Injector.**