Comparison of the Efficacy of Various Autogenous *Streptococcus suis* Vaccine Formulations containing Stabligen™ Adjuvants in Reducing Piglet Mortality

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SWINE

INTRODUCTION:

Streptococcus suis is a costly bacterium that primarily affects nursing and recently weaned piglets and can cause infection that leads to septicemia, arthritis, and meningitis. There are 35 different *S. suis* serotypes (STs) based on the capsule with serotypes 1, 2, and ½ being some of the most prevalent in the United States. Because of its genetic and geographic variability *S. suis* remains a difficult pathogen to protect against. In this study, several autogenous *S. suis* vaccines containing Bimeda® Biologicals' proprietary Stabligen™ B adjuvants were examined for protection against a *S. suis* challenge. The challenge was designed to mimic the *S. suis* problem a particular producer was having and therefore included the two *S. suis* field strains that were isolated and identified from their specific operation. The results indicated that a two-dose regiment of bivalent *S. suis* or a multivalent *S. suis/M. hyorhinis* vaccine adjuvanted with Stabligen B as well as a single-dose monovalent *S. suis* vaccine containing Stabligen B+ were all effective at decreasing mortality in the challenged piglets compared to the control.

OBJECTIVE:

Determine the effectiveness of three different formulations of autogenous *S. suis* vaccines adjuvanted with Stabligen B or Stabligen B+ in lowering piglet mortality following a challenge that used two field strains of *S. suis* serotype 2 that were isolated by a third-party laboratory from a specific operation that has been routinely experiencing 20-30% mortality caused by the two strains.

METHODS:

Piglets, Screening, Randomization, and Maintenance – Forty (40) 18- to 21-day old, weaned piglets were received at the testing facility and nasal swabs were collected and sent to Iowa State University Veterinary Diagnostic Lab (ISU VDL) for isolation and identification of *S. suis* for background observation. Initial screening for *S. suis* showed low levels across all piglets with only four positive nasal swabs (all *S. suis* ST21) showing culture positive. The piglets were randomized by weight into four treatment groups of ten piglets each. Water and appropriate feed rations were provided *ad libitum* throughout the study. The barn and all piglets were monitored daily to maintain conditions and monitor health.

Treatment Groups - Each of the four treatment groups are described in the table below.

Treatment Group	Vaccine Type	Antigens	Adjuvant	ROA	Dosage	Nº. of Doses
1	Monovalent	*S. suis* ST2	Stabligen B+	IM, side of neck	1cc	One
2	Bivalent	*S. suis* ST1 + ST2	Stabligen B	IM, side of neck	1cc	Two
3	Multivalent	*S. suis* ST2 + *M. hyorhinis*	Stabligen B	IM, side of neck	1cc	Two
4	Control	Phosphate-Buffered Saline (PBS)	Stabligen B	IM, side of neck	1cc	Two

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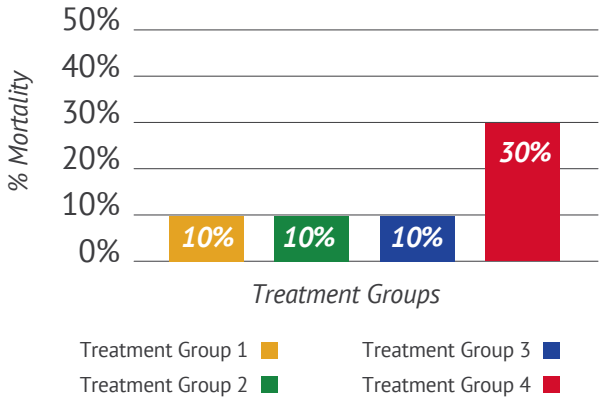
Vaccine Administration– On day 0 of the trial, all piglets received their first vaccine (1cc administered intramuscularly in the side of the neck) according to their Treatment Group. On day 14, piglets in Treatment Groups 2, 3, and 4 received a booster vaccination.

Challenge Design and Monitoring - On day 21, all piglets received a challenge culture that was comprised of a 1:1 mix of two *S. suis* Serotype 2 field strains. Each piglet received two injections of the challenge culture: 2cc intramuscular (IM) injection and 2cc intraperitoneal injection. For the next seven days post challenge (days 22-28), piglets were monitored closely for clinical signs of *S. suis* infection.

RESULTS:

Following vaccination, none of the piglets from any of the Treatment Groups displayed any negative symptoms associated with the vaccines including anaphylaxis, visible injection site reactions, or death. All groups had at least one piglet die on the first day following the challenge (1DPC). The controls (Treatment Group 4) had 20% mortality on 1DPC with one additional death on 7DPC which brought the group's total mortality to 30% for the trial period. Treatment Groups 1, 2, and 3 had no additional deaths after 1DPC and, at the end of the trial, had 10% mortality (Figure 1). *S. suis* ST2 was recovered from the brain stem samples of dead pigs from all four Treatment Groups indicating that the challenge model was successful.

FIGURE 1: Cumulative Mortality by Treatment Group



CONCULSIONS:

Based on the results of this trial, we identified several different autogenous *S. suis* vaccines containing Stabligen B or Stabligen B$^+$—formulated for either a two-dose or single-dose regiment— can be used in piglets and be effective in lowering mortality against the two *S. suis* Serotype 2 strains that have been routinely causing 20-30% mortality in the herd of origin. Through this study we also demonstrated that Stabligen B can be incorporated into multivalent autogenous vaccines that contain *S. suis* and *M. hyorhinis*—an antigen that is known for its propensity to act as a destabilizing antigen that causes interference—and still provide protection against a *S. suis* challenge equal to that from alternative formulations of autogenous vaccines that contain *S. suis* only.

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