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Comparison of Serologic Response to Three Immunization Strategies with Multiple Antigens

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Introduction

The serologic or clinical response to multiple antigens administered simultaneously has not been well documented in the literature[1]. While companies are required to prove safety and efficacy for multiple antigen vaccines for license approval[2], immunization strategies in practice commonly include several different products. The immunologic interaction and subsequent response to those strategies is generally evaluated based upon subjective observation or anecdotal evidence of success or failure.

Factors to consider when immunizing with multiple antigens include the use of modified live vaccines, the use of gram negative bacterins, and the timing of exposure to maximize immunologic response. When immunizing naive animals to multiple antigens during the isolation/acclimation stage, some or all of these factors may impact the response.

Objective

The objective of this clinical study was to compare the serologic response of "naïve" boars to multiple antigens as an evaluation of three potential vaccination strategies.

Materials and Methods:

One-hundred six (106) boars were placed in isolation facilities at approximately six months of age. The boars were randomly allocated to one of three treatments (immunization strategies) following placement into individual stalls within a single air space. The immunization schedule for each treatment group are described in Table 1. The vaccines and dosages for all groups were the same. The timing of administration varied by group. There was no evidence of clinical disease in the boars during the study.

Blood samples were obtained from boars at the time of placement and six (6) weeks post placement. In addition, boars in groups 1 and 2 were bled five (5) weeks post placement and boars in group 3 were bled seven (7) weeks post placement to provide samples five weeks following primary vaccination (Table 1). Serum was harvested and frozen (at - 70^0 C). Serum samples were analyzed following the completion of the study using the PRRSV ELISA (BI/NOBL), SIV hemagglutination inhibition (ISU), and Leptospira micro-agglutination (ISU).

Analysis of Variance (ANOVA) was used to evaluate the magnitude of serologic response and chi-square analysis was used to evaluate the proportion of animals classified as positive or negative for each assay.

Results

PRRS ELISA No difference in PRRS S/P ratio ($p>.05$) or percent classified as positive ($p>.05$) was detected between groups six weeks post PRRS vaccination. The S/P ratios were consistent with previous vaccination studies with naïve animals[3]. Six (6) boars were classified as positive on ELISA prior to vaccination at placement, but were classified as negative on IFA and SN testing. PRRS S/P ratios from those animals were excluded from the analysis.

SIV HI No difference in percent positive for SIV ($p>.05$) was detected between groups at five weeks past SIV vaccination. The titers were consistent with previous studies[4] and were not different ($p>.05$) between groups.

Lepto MAT Serologic responses were inconsistent for the Leptospira serovars tested, a common finding following vaccination[3]. Differences in percent positive ($p=0.04$) were detected between groups for *L. canicola*, with group 2 significantly lower than group 1.

Conclusions

This study failed to prove a difference between immunization strategies in the serologic response to PRRS and SIV. There was a difference detected in the serologic responses to *Leptospira* suggesting that administrating multiple antigens and the timing of immunization may impact the response to antigens which typically stimulate an inconsistent response.

Based only on the antibody response, these results suggest that the convenience of simultaneous use of multiple vaccines did not impair the humoral immune response to PRRS and SIV. However, this study was not designed to measure the subsequent clinical protection or impact on disease transmission. In addition, it is important to consider that the impact on the cell-mediated response may be different from the humoral response measured in this study.

References

1. Carmel DK, Barao SM, Douglass LW. *Effects of vaccination against 18 immuniogens in beef replacement heifers at weaning.* JAVMA 1992, 201 (4): 587-590.
2. Code of Federal Register USDA-APHIS-VS CVB LPD, General Licensing Consideration: No. 800.200.
3. Unpublished data.
4. Brown GB, McMillen JK. MaxiVac: Evaluation of the Safety and Efficacy of a Swine Influenza Vaccine. Proc AASP 1994: 37-39.

Table 1

Immunization Schedule

Week	Group 1 n=35	Group 2 n=36	Group 3 n=35
0	PRRSV[1] MH/HP[2], HP[3] (Bleed)	PRRSV[1] MH/HP[2], HP[3] PPV/Lepto[4], SIV[5] (Bleed)	PRRSV[1] (Bleed)
1	PPV/Lepto[4], SIV[5]		
2			MH/HP[2], HP[3] PPV/Lepto[4], SIV[5]
3	MH/HP[2], HP[3]	MH/HP[2], HP[3] PPV/Lepto[4], SIV[5]	
4	PPV/Lepto[4], SIV[5]		
5	(Bleed)	(Bleed)	MH/HP[2], HP[3] PPV/Lepto[4], SIV[5]
6	(Bleed)	(Bleed)	(Bleed)
7			(Bleed)

1. RespPRRS® Boehringer Ingelheim/NOBL
2. Respifend MH/HP® American Home Products
3. Ingelvac HP® Boehringer Ingelheim/NOBL
4. FarrowSure B® Pfizer Animal Health
5. MaxiVac Flu® Schering Plough Animal Health