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Improving food & health

Why repeatability and strain matters

By: Chr. Hansen Swine Technical Service Team

In swine production today, we are constantly seeking repeatability of results. Added to this desire for repeatability is a need to adequately address complex, pertinent-to-the-industry challenges, like PRRS. We, at Chr. Hansen, are looking for ways to address these challenges successfully and repeatably.

In the original **BIOPLUS® 2B** feeding – PRRS challenge study (Chr. Hansen study 80638), piglets from dams fed for 31 days on a prefarrowing ration and thereafter on a lactation ration containing **BIOPLUS® 2B** (1.65×10^6 CFU/gram of complete feed) were compared to control animals raised on the same farm, and whose dams had not been fed any probiotic product prefarrowing or during lactation. If a pig was born to a sow being fed **BIOPLUS® 2B**, that pig continued on a ration containing **BIOPLUS® 2B** post-weaning (1.10×10^6 CFU/gram of complete feed).

Similarly, pigs born to control sows were fed a ration containing no probiotics once placed in the nursery. All piglets were challenged at seven days post-weaning with a 1-7-4 PRRS virus and monitored for the next three weeks.

Pigs born of **BIOPLUS® 2B**-fed sows and consuming **BIOPLUS® 2B** in the nursery were nearly 1.75 pounds heavier at the end of the nursery phase and 35% fewer pigs died during the post-challenge period compared to their control counterparts.

Table 1.

Sows	Control		BIOPLUS® 2B	
Nursery pigs	**Control**		**BIOPLUS® 2B**	
Total Pigs per Group	100	100	100	100
Vaccination (Day 0)	Yes	No	Yes	No
PRRS Challenge (Day 21)	Yes	Yes	Yes	Yes
Extended Subset	25 pigs	25 pigs	25 pigs	25 pigs

Can this be repeated, and, what happens if my pigs are vaccinated?

We planned to answer that question in a subsequent study*. Pigs were backgrounded similarly to the original PRRS challenge evaluation (reference Table 1):

- Two sow treatments – **BIOPLUS® 2B** and Control delivered via top dress beginning 31 days prefarrowing and continuing through lactation.
  - Sows received **BIOPLUS® 2B** at a rate of 1.65×10^6 CFU/g.
- Piglets were identified by sow treatment group and continued with the same probiotic feeding program throughout the nursery phase.
  - Weaned pigs received **BIOPLUS® 2B** at a rate of 1.10×10^6 CFU/g.

On the day of weaning, this study deviated from the original as pigs from each sow treatment group (control or **BIOPLUS® 2B**) were divided equally, with half receiving a single dose of PRRS MLV vaccine and half remaining non-vaccinated. Vaccinates and non-vaccinates were housed separately upon arrival at the nursery.

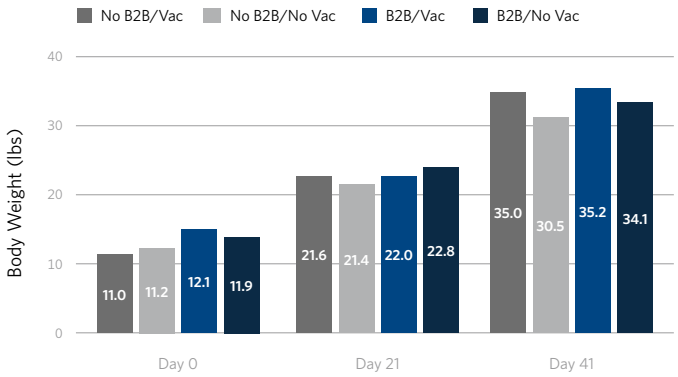
- Incoming weights were collected on all pigs.
- Pigs were given 21 days to adapt to nursery environment before being challenged.
- All pigs were weighed and challenged with a 1-18-2 PRRS virus on Day 21.
- Over the next 3 weeks,
  - Samples of blood were collected from extended subset (see Table 1) – PRRS PCR, qPCR, ELISA, and Interferon-gamma ELISPOT;
  - All pigs were weighed on Day 41
  - Necropsies and scoring of gross lung lesions were done on extended subset animals remaining on Day 42

*Chr. Hansen study 80700

RESULTS

A. PERFORMANCE AND BODY WEIGHT:

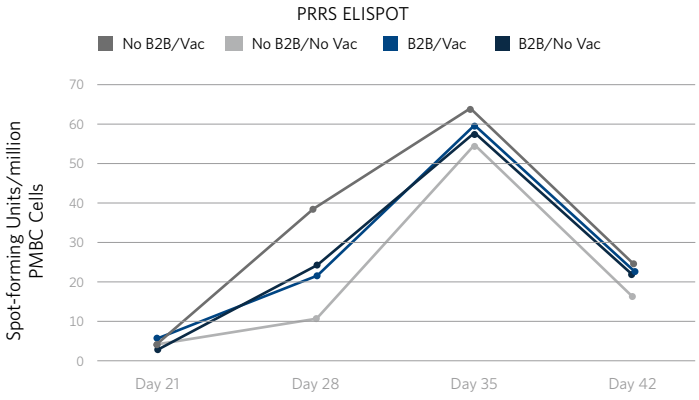
- No statistical differences in ADG, ADFI, or F:G were observed during the pre-challenge period.
- On Day 41 (end of study, 20 days post-challenge) compared to control animals:
  - ADG and ADFI were better ($P<0.005$ and $P<0.05$, respectively) in the **BIOPLUS® 2B** + Vaccine and Vaccine alone groups.
  - ADG tended to be better ($P<0.06$) with daily feeding of **BIOPLUS® 2B** alone.
  - F:G was better ($P<0.05$) in the **BIOPLUS® 2B** + Vaccine, **BIOPLUS® 2B**, and Vaccine alone groups.
- Body weights were better at Day 0 ($P<0.05$) for pigs starting the nursery phase of the study from sows fed **BIOPLUS® 2B** compared to pigs from control sows.



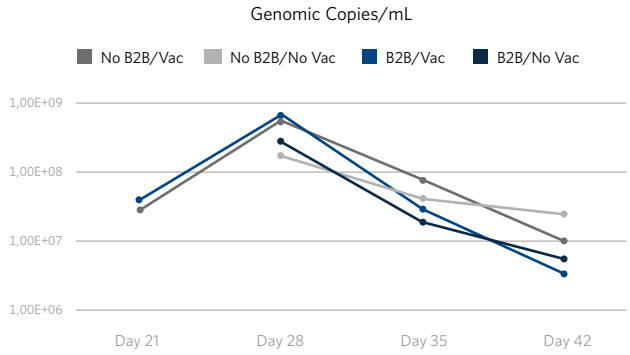
- Body weights tended to be better at Day 21 ($P<0.10$) for pigs fed **BIOPLUS® 2B** during the pre-challenge period versus control animals.
- Pigs in the **BIOPLUS® 2B**, Vaccine alone, and **BIOPLUS®2B** + Vaccine groups were on average, at least 3.5 pounds heavier at Day 41 ($P<0.05$) compared to pigs in the unvaccinated control group.

B. IMMUNE RESPONSE/GROSS LUNG LESIONS:

- The specific response to the PRRS virus challenge, measured as a change in INF-γ, was greatest in the Vaccine alone group and weakest in the control group.
- Regardless of vaccination status, **BIOPLUS® 2B** appears to have affected the immune response, measured as a change in INF-γ.
- Gross lung lesion scores were lower ($P<0.01$: 18.40 ± 3.24 vs. 28.68 ± 3.24) in pigs fed **BIOPLUS® 2B** versus control, mirroring the differences in INF-γ observed in those groups.



- While of limited protective value, among non-vaccinated groups, those fed **BIOPLUS® 2B** experienced more rapid seroconversion ($P<0.05$: 45.8% vs. 26.1% and 100.0% vs. 92.0%) at 7- and 14-days post-challenge compared to control, respectively.
- Regardless of vaccination status, pigs fed **BIOPLUS® 2B** had fewer genomic copies of PRRS virus per mL of serum at 14- and 21-days post-challenge.
- Only two treatment groups contained any PRRS PCR negative pigs at any point during the 21-day period post-challenge, and both treatment groups were fed **BIOPLUS® 2B**.



- Pigs fed BIOPLUS® 2B displayed:
  - Fewer PRRS PCR positive pigs at 21-days post-challenge,
  - Less circulating virus in those animals that were PRRS PCR positive at 14- and 21-days post-challenge,
  - A positively altered INF-γ response, and
  - Lower gross lung lesion scores.

Reduced mortality and improved weight gain are only a couple of the benefits observed when feeding **BIOPLUS® 2B** during a PRRS challenge. As this second study reinforces, an effective *Bacillus*-based multi-strain probiotic solution like **BIOPLUS® 2B** can positively impact the performance, mortality, morbidity (lung lesions), and immune responses of pigs during a difficult respiratory challenge from PRRS.

When conditions in the market demand action, for example, with high commodity prices, high value of hogs, and severe challenges from PRRS, isn't it important to consider using a cost-effective, safe, reliable, repeatable, solution? For roughly $0.25 per pig for the entire program, you can have the peace-of-mind in knowing that you've done all you can to support the animals in your care and to secure success for your operation during times of tremendous volatility.

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