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Formatting
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David Brown
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Logo Design
Ruth Cronje, and Jan Swanson;
based on the original design by Dr. Robert Dunlop

Considerations for managing the pregnant sow and offspring during a PRRS virus infection

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How to best manage the pregnant sow and offspring during an active PRRS infection continues to be a challenge. The further we advance our understanding of immunity in the pregnant animal, both its capabilities and limitations and these effects on the offspring, the better we can address this issue. The purpose of this paper is to review PRRS virus challenge studies in the pregnant sow that examines how the sow and offspring are affected. Specific challenge studies will include the following:

- PRRS positive gilts challenged with a heterologous virus shown to be 98.3% similar based on ORF5 and full genome sequencing
- PRRS positive gilts challenged with a homologous virus shown to be 100% identical based on ORF5 and full genome sequencing
- PRRS naieve sows challenged with identical virus as in group two

Outcomes evaluated will include clinical abortions, fever profiles, and viral load in offspring. Additionally we will look at how PRRS naieve pigs respond to same virus as used in group two sow study and its impact on viral load and fever profile. Finally we will look at a field example of viral load in weaned pigs and farrowing room management strategies during and post a PRRS break in a sow herd.

Clinical response in pregnant animal groups

In three different studies animals were challenged with a 1-8-4 virus at 90 days of gestation. The groups included.

- Group 1 (heterologous); Acclimated with a 1-8-4 (A) virus at 120 days of age and challenged with a 1-8-4 (B) virus at 90 days of gestation
- Group 2 (homologous); Acclimated with a 1-8-4 (B) virus at 120 days of age and challenged with a 1-8-4 (B) virus at 90 days of gestation
- Group 3 (naieve); Challenged with a 1-8-4 (B) virus at 90 days of gestation

Table 1 shows abortion results. From this data abortions started at day five post challenge. Interestingly abortions occurred in the heterologous and homologous group and no abortions occurred in the naieve group even though all these groups were challenged with the exact same dose and virus. The heterologous and homologous groups consisted of gilts only while the naïve group was composed of parity 4 or older sow. Perhaps some parity effect on abortions based on maturity of animals and their immune systems even when animals have already previously been exposed to the same virus. In many cases in the field we will see a higher percentage of problems in the gilt population handling the infection and stabilizing to the infection.

Table 2 shows fever profiles of pregnant sows post challenge. In general, fevers started between 24 to 48 hours post challenge and stayed elevated for three days of ten days recorded. However, tremendous variation in fevers within animals and groups was noted. Some individuals peaked at 105˚F, some individual showed multiple continuous days of elevated fever, some had cyclic fevers where elevated for one day than normal for two than elevated again, and some had no fevers during entire period.

Table 3 shows PRRS PCR status and viral load of pigs at birth and 21 days of age. Viremic pigs were demonstrated in all groups, however differences in viral load. On an individual litter basis, no litter was ever 100% viremic from the positive PRRS challenged gilts. In fact, the majority of the time half or less than half of the offspring

Table 1

Group #	Day 4 post challenge	Day 5 post challenge	Day 6 post challenge	Total abortions
1	0	1	1	2 of 15 (13%)
2	0	1	1	2 of 14 (14%)
3	0	0	0	0 of 5

Table 2

Group #	Day 1 post challenge (˚F)	Day 2	Day 3	Day 4	Day 5
1	100.1	102.0	101.9	101.8	100.6
2	100.2	100.8	100.9	100.5	100.5
3	99.9	101.1	103.7	101.2	101.0

were viremic either at day 1 or day 21. The naieve sow offspring data is still be processed.

Clinical response in 18 day PRRS naieve weaned pigs

Pigs were inoculated with the same PRRS virus as pregnant animal challenge studies (1-8-4 B). Table 4 shows the fever response. In general the fever response was more delayed yet longer in duration than noted in pregnant animals. Fevers did not become significantly elevated until day five post challenge and tended to last for up to ten days. Viral load data is still being processed.

Clinical response in pigs in a commercial setting looking at viral load

Table 5 show durations of PRRS over a ten week period post clinical disease. Viral load is being determined by use of a quantitative PRRS PCR that calculates ORF6 copies per ml and Infectous Virus Particles per ml (IVP's). From the data, it shows that as sows get further out from peak infection the visually good pigs show a downward trend in viral load, however the visually bad pigs continue to show an elevated viral load as compared to visually good pigs but is trending downward just not as quickly.

Farrowing room management of pig movement during an active PRRS infection

Table 6 shows how pig movement can potentially perpetuate a PRRS infection in the farrowing rooms if not thought through. In this example virus continued to be detected in weaned pigs out through ten weeks post peak clinical disease, however the question that needs to be asked, would it linger longer if pig movement protocols were not implemented as long of a time period.

Considerations for the field

- Fever dynamics are shorter in duration and peak faster in sows versus pigs
- Heterologous immunity appears to reduce viral load. Perhaps a maternal antibody component
- High viral load levels can remain in pigs for several weeks. Less pig movement can potentially help reduce overall viral load at weaning. Continuing to identical strategies to reduce viral load in piglets during a PRRS break will likely greatly benefit the nursery phase of production

Table 3

Group #	Day 1 (PRRS PCR positive)	Day 1 (Viral load)	Day 21 (PRRS PCR positive)	Day 21 (Viral load)
1	23 of 144 (16%)	10^3 to 10^4	36 of 123 (29%)	10^3 to 10^4
2	2 of 148 (1.3%)	10^1 to 10^2	11 of 112 (9.8%)	10^1 to 10^2
3	N/A	N/A	N/A	N/A

Table 4

Day 1 (˚F)	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10	Day 11	Day 12	Day 13	Day 14
101.8	102.2	102.5	103.0	102.9	102.9	102.8	103.5	103.5	103.7	103.4	103.7	103.5	103.5

Table 5

Stage of infection	Viral load visually normal	Viral load visually poor
Peak- wk 1	N/A	4×10^9 / 2975
Peak -wk 2	N/A	3.9×10^9 / 16,000
Wk 3	2.4×10^9 / 918	5.6×10^9 / 2195
Wk 4	2.1×10^9 / 626	2.8×10^9 / 867
Wk 5	1.6×10^8 / 66	3×10^9 / 955
Wk 6	3.8×10^8 / 150	5.7×10^8 / 831
Wk 7	4.1×10^6 / 177	1.1×10^8 / 29
Wk 8	10.6×10^3 / < 1	5.2×10^7 / 84
Wk 9	8.3×10^2 / < 1	4.3×10^7 / 81
Wk 10	1.4×10^8 / < 1	5.6×10^6 / 23
Wk 12	1.4×10^8 / 55	4.2×10^8 / 54
Wk 13	7.7×10^6 / 1.8	0 / 0

Table 6

Period	Percent litters moved	Percent litters not moved
Wk 1-2	78%	22%
Wk 3-4	22%	78%
Wk 5-6	3%	97%
Wk 7-8	2%	98%
Wk 9-10	3%	97%
Wk 11-12	3%	97%