

As prevalence of PRRS at weaning decreases over time, does the amount of virus in those infected pigs also decrease?

Key point:

- Yes, as prevalence at weaning decreases, amount of virus in positive samples also decreases.

We received a data set of 10 farms from Carthage Veterinary Services with the date of PRRS infection, number of pool samples positive over time (weeks) and their corresponding Ct values for PRRS quantitative PCR. Our objective was to investigate the relationship between percent pools positive at a particular point in time and the average Ct-value in the positive pools. We hypothesized that as prevalence of PRRS at weaning decreases over time, the amount of virus in those infected pigs likely also decreases.

In real time PCR, Ct-value (cycle threshold) is defined as the number of cycles required for the fluorescent signal to cross the threshold that helps in declaring any sample as positive or negative. As such, it reflects the time it takes to detect the amount of nucleic acid that is present in the sample. Ct- values are inversely proportional to the amount of DNA/RNA present in the sample. As the amount of target nucleic acid in a sample decreases, the Ct-value increases, and vice-versa.

We had 111 weeks that had at least 2 pools / sample where at least 1 pool was positive from pigs at weaning from 10 farms. We plotted the relationship between % positive and corresponding average Ct value (figure 1). There was a negative correlation between Ct-values and percentage pools positives over time ($r = -0.50$; $p < 0.001$).

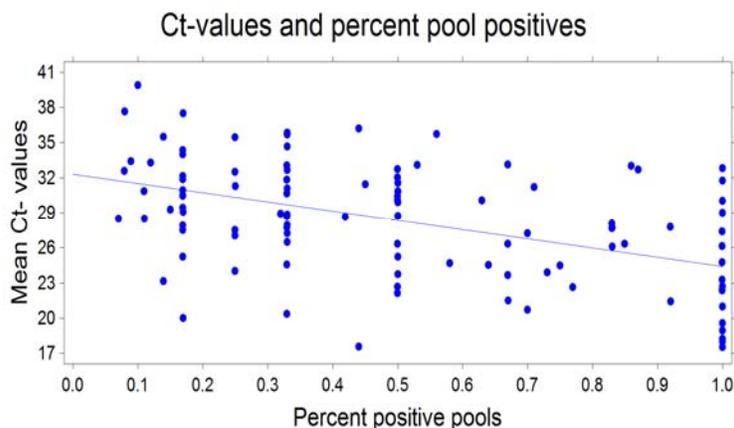


Figure 1: Scatter plot of mean Ct-values and percent pool positives

At a farm that is pursuing stability, we can watch the proportion of positive pools at weaning gradually decrease over time. The negative correlation with Ct means that the concentration of virus will also be decreasing. This means that there is less virus circulating in the farrowing area. Since ID50, defined as the amount of infectious organism required to infect 50% of the pigs, does not change, we would expect incidence of infection to decrease. This helps explain why PRRS (and other pathogens) can “die out” in a population. And we help this process occur by our biosecurity protocols aimed at giving the virus less opportunity to transmit within farrowing.

In conclusion, after a herd is infected, the percentage of viremic pigs at weaning will approach 100%. The increase in sow herd immunity will lead to a gradual decrease in the proportion of pigs born viremic and the increased maternal immunity will lead to decreased likelihood of transmission among suckling pigs. We use strict biosecurity protocols in farrowing to further decrease transmission likelihood. Percent positive pools at weaning decrease, virus concentration in piglets decreases, all of which leads to the virus dying out and the herd becoming stable. At least, that’s the theory.

We appreciate Carthage Veterinary Service sharing these data for analysis. Next week we will discuss the time to stability (TTS) in 4 days old piglets.

Thank you for your participation and ongoing support.

Deepak Kumar, Doug Marthaler, Carl Betlach & Bob Morrison.