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Should diets for sick pigs use same matrix values?

IT is known that sick pigs grow more slowly and tend to be less efficient than high-health pigs. A recent study by Schweer et al. (2017) explored the concept of how disease affects the underlying digestibility of a diet, making it an interesting notion to consider.

In this study, the authors used 30 littermate-matched pairs of pigs. Littermate pairs were split and housed in either a porcine reproductive and respiratory syndrome (PRRS)-inoculated challenged barn or a non-challenged barn from about 70 lb. to 280 lb., and growth was performance measured.

Additionally, animals were assessed for body composition using a DEXA system, and ending carcass measurements were obtained from a subsample of animals. Serology was conducted to monitor PRRS status. Fecal samples were obtained to monitor apparent total tract digestibility (ATTD).

As expected, animals inoculated with PRRS virus did get sick, were shown to have viremia and were judged to have seroconverted by about 35 days post-inoculation. Roughly corresponding to this window of viremia, pig growth was reduced by about 20%, and feed intake was reduced by about 10% versus pigs from the non-challenged barn.

In the period after seroconversion, feed intake was actually greater (but not statistically significant) in the challenged pigs than for the non-challenged control animals. However, gain was still reduced by about 10% in the challenged group, which resulted in a trend toward poorer feed efficiency during this window of time.

These gain reductions were confirmed using both serial measurements of body composition as well the final carcass measurements. Challenged pigs measured using DEXA overlapping the window prior to seroconversion had about 0.32 lb. less lean gain per day and 0.1 lb. less fat gain per day. In the period subsequent to seroconversion, lean tissue gain was not statistically affected, but fat gain was still reduced by about 0.1 lb. per day.

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Bottom Line

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Another interesting aspect of this study was the effect the PRRS challenge had on total tract digestibility (Table). During the viremic window of infection (days 19-22), challenged pigs had reduced dry matter, nitrogen (protein) and gross energy digestibility.

This observation, while important, was generally expected. It does stand to reason that a pig with an active disease challenge would have poorer digestibility due to disease-mediated changes in gut function and likely to changes in metabolic priorities toward disease control. However, in the period after viremia (days 65-70), the authors observed a continued reduction in diet apparent digestibility, again with dry matter, nitrogen and gross energy all being negatively affected by the challenge.

Disease exposure is, of course, not desired in animal production, but clearly, regardless of the sophistication of biosecurity used, pigs will continue to have both acute and chronic disease exposure.

WHILE the causes of the long-term digestibility impact in this study are unknown, the assumptions built into a formulation system around nutrient uptake are not correct in this disease situation. It is interesting that PRRS is considered to be largely a respiratory disease when it clearly affects the whole body, as evidenced by the impact on digestibility.

Several questions arise from this area:

- After the viremic phase, does the reduction in digested nutrients limit growth in PRRS-infected pigs, or is growth just permanently impaired, regardless of digestible nutrient levels?
- Is digestion permanently affected, and if so, what influence does this have on nutrition in sows affected by PRRS?
- Do other diseases elicit a similar reduction in digestibility?
- Should formulation matrix values be adjusted for the digestibility reduction caused by disease?

The Bottom Line

This study documents the performance reductions that are known to occur in PRRS-infected pigs, but in addition, it adds to the understanding of the acute and chronic impacts PRRS has on diet digestibility.

Questions remain that make practical utilization of these data difficult, but they serve as an important starting point in documenting the long-term effect of PRRS and perhaps other diseases as well.

Reference

Schweer, W., K. Schwartzi, J.F. Patience, L. Karriker, C. Sparks, M. Weaver, M. Fitzsimmons, T.E. Burkey and N.K. Gabler. 2017. Porcine reproductive and respiratory syndrome virus reduces feed efficiency, digestibility and lean tissue accretion in grow-finish pigs. Transl. Animal Science 1:480-488. ■

PRRS reduces ATTD of dry matter, nitrogen and energy

Parameter	Control	Challenged	Std. error of means	P-value
19-22 days post-challenge, ATTD coefficients, %				
Dry matter	83.9	81.3	0.54	< 0.001
Nitrogen	81.8	77.3	0.84	< 0.001
Gross energy	81.0	77.8	0.64	< 0.001
65-70 days post-challenge, ATTD coefficient, %				
Dry matter	81.5	79.8	0.62	0.008
Nitrogen	80.1	78.0	0.82	0.018
Gross energy	78.1	76.3	0.76	0.02