

ANIMAL SCIENCE

Title: Determining the optimal dietary lysine:energy ratios for health challenged grow-finish pigs – NPB #16-062

Investigator: Nicholas Gabler

Institution: Iowa State University

Date Submitted: January 9th, 2018

Scientific Abstract:

Porcine reproductive and respiratory virus (PRRSV) significantly reduces pig performance. The AA requirements and Lys:ME of health challenged pigs for optimum performance are poorly understood. Two experiments were conducted to evaluate the effect of increasing SID Lys:ME (g SID Lys per Mcal ME) on growth performance during a PRRSV challenge. In Exp. 1, 379 barrows (51.3 ± 0.3 kg BW) were allotted to one of six diets (1.87 to 3.41 Lys:ME) for a 35-d growth study. In Exp. 2, 389 barrows (29.2 ± 0.23 kg BW) were allotted to one of six diets (2.39 to 3.91 Lys:ME) for a 49-d growth study. These isocaloric diets represented 80 to 130% of NRC SID Lys requirement. For each Exp., pigs were randomly allocated to two barns of 24 pens each with 7-9 pigs/pen (4 pens/diet/health status). On day 0, one barn was inoculated with live PRRSV, one barn sham inoculated (control), and all pigs were started on experimental diets. Pen growth performance and feed intake were recorded weekly and G:F calculated. Breakpoint analysis was used to determine the Lys:ME ratio that maximized ADG and G:F over the 35 or 49-d test periods for Exp. 1 and 2, respectively. In Exp. 1 increasing Lys:ME increased ADG (quadratic $P = 0.01$) and G:F (linear and quadratic $P = 0.04$) in control pigs over 35-d. In PRRSV pigs, ADG and G:F increased linearly with increasing Lys:ME ($P < 0.01$). The Lys:ME for optimum ADG and G:F during PRRSV challenge was 2.83 and 3.17, respectively, compared to 2.24 and 2.83, respectively, in control pigs using a one-slope broken-line model. In Exp. 2 control pigs became naturally infected after 21 dpi. Prior to infection, ADG and G:F increased with increasing Lys:ME in control and PRRSV pigs (linear and quadratic $P < 0.05$) with optimum ADG and G:F achieved at 3.02 and 2.92, respectively, in PRRSV pigs compared to 2.82 and 3.22 Lys:ME, respectively, in control pigs. Over the 49-d period, increasing Lys:ME improved ADG ($P < 0.01$, linear and quadratic) and G:F (linear $P < 0.01$) in naturally infected pigs. The response was similar in experimental infection for ADG ($P < 0.01$, linear and quadratic) and G:F (linear $P = 0.01$). The optimum ratio for ADG (2.86 vs. 3.12 Lys:ME) and G:F (3.18 vs. 3.08 Lys:ME) was similar between natural and experimental infection. In summary, increasing Lys:ME ratio by 110 to 120% improved performance and feed efficiency during a PRRSV challenge. This response was similar in experimental and natural PRRSV infections.

These research results were submitted in fulfillment of checkoff-funded research projects. This report is published directly as submitted by the project's principal investigator. This report has not been peer-reviewed.

For more information contact:

National Pork Board • PO Box 9114 • Des Moines, IA 50306 USA • 800-456-7675 • Fax: 515-223-2646 • pork.org
