

Pigs Selected for Increased Feed Efficiency Are Less Affected by Experimental Infection with the PRRS Virus

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Jenelle Dunkelberger, Graduate Student, ISU;
Nicholas Boddicker, Research Geneticist, Genesis;
Jennifer Young, Post-doctoral Research Associate, ISU;
Dinesh Thekkoot, Graduate Student, ISU;
Bob Rowland, professor, Department of Diagnostic
Medicine and Pathobiology, KSU;
Jack Dekkers, Professor, Department of Animal Science,
ISU

Summary and Implications

Analyses of average daily gain (ADG) and viral load (VL) suggest that selection for increased feed efficiency based on residual feed intake (RFI) does not increase the impact of Porcine Reproductive and Respiratory Syndrome (PRRS) infection on these two traits. In fact, the results show that growth of the more efficient pigs was less affected by PRRS infection than that of the inefficient line. These findings provide commercial farmers with additional incentives to invest in feed-efficient pigs.

Introduction

Feed efficiency is of great importance to the swine industry, yet little research has been performed to evaluate the robustness of pigs selected for increased feed efficiency to disease. Feed efficiency measured using RFI is defined as the difference between observed versus expected feed intake based on growth and backfat. Pigs that eat less than expected (negative RFI) are more efficient. Recent theories suggest that more efficient animals may be more susceptible to disease as a result of having less available energy to mount an immune response. Since PRRS is the most economically devastating disease to the US swine industry, the objective of this study was to analyze the effect of PRRS on lines of pigs divergently selected for low versus high RFI. The hypothesis was that efficient low RFI pigs would have a greater reduction in ADG and greater VL upon infection with the PRRS virus, compared to pigs selected for high RFI (reduced feed efficiency).

Materials and Methods

Two hundred piglets from generation 8 of the ISU high and low RFI selection lines (HRFI and LRFI, respectively), were shipped to Kansas State University upon weaning and received an intranasal/oral dose of the NVSL 97-7985 PRRS strain one week post-arrival. Blood samples were collected on 0, 4, 7, 11, and 14 days post infection (dpi) and weekly thereafter. Viral load was calculated as area under the curve for 0-21 dpi of the log of PCR-based serum viremia. Body weights were collected weekly and used to calculate ADG. For comparison, body weights for ADG were also collected on 489 non-challenged full-siblings and half-siblings in the nursery at the Iowa State Lauren Christian Swine Research Center.

Results

For the PRRS challenged pigs, VL tended to be slightly lower ($p=0.12$) and ADG slightly higher ($p=0.10$) for the more efficient LRFI line. In contrast, for the non-challenged pigs, ADG was slightly lower for the LRFI line but again not significantly ($p=0.20$). A joint analysis of challenged and non-challenged pigs demonstrated that growth of the LRFI line was less reduced by PRRS-challenge than growth of the HRFI line ($p=0.04$).

Discussion

The initial hypothesis was that LRFI pigs would experience a greater reduction in ADG and greater VL upon infection with PRRS virus compared to HRFI pigs. However, results of analyses for VL and ADG did not support this hypothesis. Instead, results demonstrate that selection for increased feed efficiency based on RFI does not increase the impact of PRRS infection on VL or ADG. In fact, growth of the more efficient pigs was less affected by PRRS infection than that of the inefficient line.

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