

Performance of Yorkshire Pigs Selected for Low Residual Feed Intake under Ad Libitum and Restricted Feeding

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Summary and Implications

Growth and performance of 40 Yorkshire pigs (74.8±9.9 kg or 164.9±21.8 lbs), 20 pigs from a line selected for low residual feed intake for 5 generations and 20 pigs from a control line, was observed while fed on either an ad libitum or NRC maintenance (weight-stasis ration) basis over a 6 week period. The aim of the later diet treatment was to keep pigs at a constant weight for six weeks. In the ad libitum treatment, there was no difference in initial or in final body weights of these pigs. However, the select line ad libitum pigs consumed 9% less feed over this period. Pigs on the weight stasis treatment were targeted to maintain constant body weight throughout the trial, but this was difficult to obtain for the select line which was slightly heavier than the control line at the end of the experiment, despite consuming 10% less feed than the control line during the 6 week trial. These data show that the line selected for low residual feed intake is more efficient under both ad libitum feeding and restricted feeding.

Introduction

Feed cost is a growing concern for swine producers, contributing to approximately 70% of the variable costs. Selecting for pigs that use feed more efficiently will decrease that cost. Residual Feed Intake (RFI) is a measure of feed efficiency and is computed as the observed feed intake minus the expected feed intake based on the pig's growth and backfat. Measuring RFI is labor intensive, costly, and ultimately not feasible in a production setting. The purpose of this study was to compare growth performance and feed intake of a Yorkshire line that has been selected for low residual feed intake for 5 generations to pigs from a randomly selected control line under ad libitum feeding and restricted feeding for 6 weeks.

Materials and Methods

Forty Yorkshire pigs (74.8±9.9 kg), 20 from the control line and 20 from the low residual feed intake selection line, were paired based on line, age, weight, and litter and assigned to individual pens. The pigs were blocked into 10 repetitions and assigned to one of two feeding levels, either ad libitum or weight stasis ration. The weight stasis ration was designed to maintain body weight constant for the

whole test period. The initial feeding level used as the weight stasis treatment was based on initial body weight and calculated using National Research Council requirements. The weight stasis pigs were weighed twice per week, and their feed intake was adjusted based on the difference of the current body weight to body weight at the start of the 6 week test period.

Average daily feed intake (ADFI) and average daily gain (ADG) were calculated on a weekly basis for all treatments. Results were analyzed using PROC MIXED in SAS.

Results and Discussion

At the start of the test period, there was no difference in body weight ($p = .52$) between pigs that were allocated to the different line by treatment combinations. There was no difference in body weight in the ad libitum treatment between lines at the end of the test period ($p = .79$). Furthermore, both the select and control line pigs grew at the same rate during the 6 week period (Figure 1). However, the select line consumed 9% less feed than the control pigs (Figure 2), but this difference was not significant ($p = .50$). The weight stasis treatment was designed to maintain body weight constant through the 6 week test period, but this was difficult to accomplish. The average body weight of the control pigs on the weight stasis treatment remained approximately constant over the 6 week period, but increased slightly for the select line pigs. This was reflected in the body weight at the end of the test period which was significantly greater ($p = .050$) for the select line pigs. Furthermore, there was also a 10% difference in ADFI ($p = .0513$) between the lines, with the select line consuming less feed relative to the control line across the 6-week period. By the end of the test period at week 6, the select pigs consumed 20% less feed than the control pigs consuming the weight stasis ration.

Implications

These data demonstrate that the line selected for low RFI is more efficient both under ad libitum feeding and when fed restrictively. Overall, the low RFI Yorkshires consumed less feed for the same amount of growth under ad libitum conditions. The weight stasis treatment suggests that part of the increased efficiency is the result of lower maintenance requirement. Further work is underway to evaluate line and treatment differences in blood metabolites and immune cell counts as well as carcass composition (i.e. percent water, protein, fat, and bone mass). Further studies will be conducted to analyze tissue protein and gene expression differences in metabolism that may explain why the select line is more efficient.

The differences in feed efficiency between the two lines have important economic implications. Considering the differences observed for the ad libitum treatment, feed costs would be \$4,260 lower per 1000 head of pigs, if pigs were from the low RFI versus the control line of pigs. This assumes feed costs of \$400 per ton and considers only 6 weeks of the growth period. The savings would be greater for the entire growing period.

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