

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

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Summary and Implications

Growth performance and carcass composition 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) basis over a 6 week period. The aim of the latter diet treatment was to keep pigs at a constant weight for six weeks. In the ad libitum treatment, there was no difference in initial ($p < 0.49$) or final body weights ($p < 0.65$) but the low residual feed intake line consumed 9% less feed compared to the control ($p < 0.08$). Similarly, there was no difference in LEA ($p < 0.57$) but the low residual feed intake line had slightly less backfat compared to the control ($p < 0.21$). These same results were found from chemical analysis of the carcass, as there was no difference in protein percentage ($p < 0.60$), but the ad libitum low residual feed intake pigs had a slightly lower fat percentage ($p < 0.21$). For the weight stasis treatment, the low residual feed intake pigs weighed 3.5% more than the control ($p < 0.08$), despite attempts to maintain a static body weight, and consumed 7.6% less feed overall ($p < 0.09$). Both lines had a decrease in backfat; however, the low residual feed intake line had an increase in loin eye area while the control line had a decrease. No differences were observed in chemical carcass composition between the two lines on the weight stasis treatment. These data show that the low residual feed intake line is more efficient, with only slight differences in carcass composition.

Introduction

Feed efficiency has always been of great concern to the swine industry, especially now with low profit margins and high feed costs for the producers. Residual feed intake (RFI) is a measure of feed efficiency that is computed as the observed feed intake minus the expected feed intake based on the pig's growth and backfat. The objective of this study was to compare growth performance, feed intake, and carcass composition of a Yorkshire line that has been selected for low residual feed

intake (increased feed efficiency) for 5 generations to a randomly selected control line under ad libitum 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 line, were paired by age and weight, and assigned to individual pens. The pigs were blocked into 8 replicates and assigned to one of two feeding levels, either ad libitum or weight stasis. The weight stasis treatment was designed to maintain a constant body weight for the six week test period. National Research Council requirements were used to establish the initial daily feed allowance of the weight stasis treatment; thereafter, feed intake was adjusted twice per week based on the change of a pig's body weight from that at the start of the 6 week test period.

Average daily feed intake (ADFI) and body weight were calculated on a weekly basis for both treatments. Pigs were harvested upon completion of the 6 week test period and chemical carcass composition was determined using the Kjeldahl procedure for protein %, ether extract for fat %, drying oven for moisture %, and incineration for bone %. Results were analyzed using PROC MIXED in SAS.

Results and Discussion

There was no difference in body weight between pigs at the start of the test period ($p = 0.52$). In the ad libitum treatment, there was no difference in body weight at the end of the test ($p = 0.79$); however, the low RFI pigs consumed 9% less feed versus the control pigs ($p < 0.09$). Using real-time ultra sound data, the ad libitum low RFI pigs had slightly less backfat ($p = 0.21$), which coincides with slightly less carcass fat % ($p < 0.21$). No line differences were observed for loin eye area and carcass protein %, . Similarly, there was no difference in carcass moisture % or bone % between the two lines under ad libitum feeding.

Interestingly, the low RFI pigs under weight stasis feeding consumed 7.6% less feed overall and 18% less at week 6 ($p < 0.02$) compared to the control pigs. There was no difference in backfat or loin eye area between the two lines; however, the low RFI pigs lost less backfat versus the control pigs and had an increase in loin eye area ($p = 0.27$), while the control pigs had a slight loss in loin eye area ($p = 0.90$). There was no difference in any of

the carcass chemical composition traits between the two lines under weight stasis feeding.

Since the goal of the weight stasis treatment was to maintain static body weight for each pig and the low RFI pigs consumed less feed, this indicates that the low RFI pigs have lower maintenance requirements. Using regression analysis, it appears that the low RFI pigs require 16.5 ± 10.8 Mcal less energy for maintenance ($p < 0.13$).

Implications

These data show that selection for low RFI is more efficient under ad libitum and restricted feeding. Selection for low RFI Yorkshire pigs reduces feed consumption with no detrimental effects on growth and overall composition of the carcass, with the exception of a

slightly leaner carcass, under ad libitum conditions. The weight stasis treatment shows that this difference in feed intake can partially be explained by low RFI pigs having lower maintenance requirements. Further work is underway to evaluate the same traits presented here but at an earlier growth phase.

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Figure 1. Carcass composition (%) of low RFI and control pigs under Ad libitum (Ad) or Weight stasis (WS) feeding n = 8 per treatment combination.

