

Feed Intake, Feed Efficiency, and Growth of Pigs Selected for Divergent RFI Fed High Versus Low Energy Diets

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Summary and Implications

With the price of corn on the rise, producers are looking for alternative feedstuffs that would allow them to finish pigs at a cheaper price. However, this would result in feeding pigs a low energy, high fiber (LEHF) diet while pigs were selected for efficiency and growth on a high energy, low fiber (HELFB) diet. The objective of this experiment was to determine if pigs from a line selected for low RFI (more efficient) on a HELFB diet maintained their superiority in feed intake and efficiency to pigs selected for high RFI when fed LEHF diet. The results of this study showed that pigs from the low RFI line have greater feed efficiency than pigs from the high RFI line when fed a standard HELFB diet, but this difference disappeared when they were fed a LEHF diet. Diet did not affect feed intake of the low RFI pigs but resulted in a reduction in feed intake of the high RFI line which resulted in both lines consuming the same amount of feed on the LEHF diet. Pigs grow slower on the LEHF diet but there was no difference between lines for either diet. The results of this study suggest that, as feed costs rise and producers look more and more towards alternative feedstuffs, selection may need to be based on performance on such diets, rather than a traditional corn-soy diet.

Introduction

The largest cost component of pork production is feed. Recent increases in feed costs have motivated producers to look for better ways to improve feed efficiency, as well as looking for alternative feedstuffs. Residual feed intake (RFI) is a measure of feed efficiency that is defined as the difference between a pig's observed and expected feed intake based on its growth and backfat. Therefore, low RFI (LRFI) pigs are more efficient than high RFI (HRFI) pigs. The objective of this study was to determine if pigs divergently selected for RFI based on high energy low fiber (HELFB) diets would perform equally well and if LRFI pigs would maintain their superiority in feed intake and efficiency if they were reared on low energy high fiber (LEHF) diets.

Materials and Methods

Pigs in this study came from the Iowa State University RFI selection experiment. Using purebred Yorkshire pigs, a selection line for decreased RFI (LRFI line) and a randomly selected control line were initiated in 2001. After 5 generations, the randomly selected control line was selected for increased RFI (HRFI line) to increase divergence between the lines. Using pigs from the second parity of the eighth generation of the RFI selection experiment, barrows and gilts (Table 1) from the LRFI and HRFI lines were placed on either HELFB (3.31 Mcal ME/kg; 9.5% NDF) and LEHF (2.91 Mcal ME/kg; 24.6% NDF) diets in pens that contained a single-space electronic feeder that allowed for individual feed intake recording.

Using data collected from the electronic feeders, ADFI was calculated for each pig. All pigs were weighed every two weeks and these data were used to estimate ADG. Using the values for ADG and ADFI, gain:feed ratio (G:F) was calculated for each pig. Then ADFI, ADG, and G:F were analyzed using the mixed procedure of SAS (SAS Inst. Inc., Cary, NC) with fixed effects of line, diet, sex, and the interaction of line and diet, covariates of age at on-test and its interaction with line, and random effects of pen and litter.

Results and Discussion

Performance data

Pigs from the LRFI line ate less than pigs from the HRFI line when fed the HELFB diet (1.41 vs. 1.62 kg/d, $P < 0.01$), but not when fed the LEHF diet (1.40 vs. 1.47 kg/d, $P = 0.23$). Diet did not affect the ADFI of the LRFI pigs ($P = 0.92$). However, the HRFI pigs had lower ADFI when fed the LEHF vs. the HELFB diet (1.47 vs. 1.62 kg/d, respectively, $P = 0.14$).

ADG did not differ between the LRFI and HRFI lines whether pigs were fed the HELFB diet (637 vs. 645 g/d, $P = 0.61$) or the LEHF diet (514 vs. 533 g, $P = 0.20$). Although there was no line effect on growth, pigs fed the LEHF diet grew significantly slower than those pigs fed the HELFB diet (523 vs. 641 g/d, $P < 0.0001$).

Pigs from the LRFI line had a better G:F ratio than pigs from the HRFI line when fed the HELFB diet (0.46 vs. 0.40, $P < 0.001$), but this difference disappeared when feeding the LEHF diet (0.35 vs. 0.35, $P = 0.83$). Both lines had improved feed efficiency when fed the HELFB diet compared with the LEHF diet (LRFI: 0.46 vs. 0.35, $P < 0.001$; HRFI: 0.40 vs. 0.35, $P < 0.05$).

Discussion

Although diet did not affect line differences in ADG, differences in ADFI were reported. These data resulted in a line by diet interaction effect on G:F. Overall, rearing pigs

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on LEHF diets after being continually selected based on HELF diets results in pigs that do not differ in feed efficiency or feed intake.

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Table 1. Number of pigs on trial.

	HELF		LEHF	
	LRFI	HRFI	LRFI	HRFI
Barrows	24	23	19	23
Gilts	19	18	20	22

Table 2. Performance data results by line*diet interaction.

	HELF		LEHF	
	LRFI	HRFI	LRFI	HRFI
ADFI, kg/d	1.41 ^a	1.62 ^b	1.40 ^a	1.47 ^{a,b}
ADG, g/d	637 ^a	645 ^a	514 ^b	533 ^b
G:F	0.46 ^a	0.40 ^b	0.35 ^c	0.35 ^c

*Values within a row with different superscripts differ by P<0.05.