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# Reproductive Performance of Yorkshire Sows Selected for Residual Feed Intake

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### Summary and Implications

Sow reproductive performance traits were evaluated in Yorkshire sows from the ISU residual feed intake (RFI) selection experiment. Compared to the randomly selected control line, sows from the line selected for reduced RFI had more piglets born and born alive and the piglets weighed more at birth, had greater pre-weaning growth rates, and weighed more at weaning. However, sows from the select line lost more weight and body condition during lactation than did sows from the control line.

### Introduction

Feed efficiency is becoming increasingly important because of the high cost of feed. Residual feed intake (RFI) is a measure of feed efficiency that is defined as the difference between observed feed intake and feed intake predicted from average requirements for growth and maintenance. When developing strategies for genetic improvement of feed efficiency it is important to evaluate correlated responses to selection. Thus, the objective of this experiment was to evaluate sow reproductive performance in the unique selection lines for RFI that have been developed at ISU.

### Materials and Methods

In 2001, purebred Yorkshire pigs were used to start two experimental lines; a selection line for decreased RFI and a control line which was randomly selected for four generations and then selected for increased RFI. In early generations, only pigs from the select line were evaluated for feed intake. During these generations only select sows farrowed two litters to provide additional information for estimation of breeding values. However, starting in the fourth generation, both select and control pigs were evaluated for feed intake, and both select and control sows were kept for a second litter.

Weight and ultrasonic backfat for the sow were recorded when entering the farrowing house and at weaning. Weight and ultrasonic backfat were used to estimate fat and protein mass at the beginning and end of lactation in order to evaluate loss of fat and protein during lactation. Feed intake was recorded on the sows during lactation. All piglets born to a sow were recorded and coded for live, stillborn, or

mummy. Individual birth weights of all live and stillborn piglets were recorded. At weaning, individual weights of all piglets were recorded. Farrowing and weaning dates were also recorded for all pigs.

Data were analyzed using the PROC MIXED procedure of SAS (SAS Institute Inc., Cary, NC). Fixed effects included in the model were line, line\*generation, and generation\*parity, where generation refers to the generation the piglets belonged to. Random effects included were sow for all traits and sire for litter weaning weight and total piglet average daily gain. Covariates depended on the trait being analyzed.

### Results and Discussion

After 6 generations, the select line had two more piglets farrowed per litter ( $P<0.01$ ) yet only one more piglet born alive ( $P<0.1$ ). This was due to the select line having one more stillborn per litter ( $P<0.0001$ ). There was no difference in number of mummies between the two lines ( $P=0.22$ ) although the trend was for the select line to have 0.1 more mummies per litter. There was no difference between the lines in the number of piglets weaned ( $P=0.77$ ), thus the select line lost one more piglet from birth to weaning. The select line had greater litter weights at birth ( $P<0.05$ ), even after adjusting for number born. The select piglets kept this weight advantage through to weaning ( $P<0.05$ ) and also grew faster during the lactation period ( $P<0.05$ ). However, this increased performance in terms of piglets was at a cost to the sow. Although there was no difference in body weight or composition (as estimated using ultrasonic backfat) at the start of lactation, sows from the select line lost more weight during lactation ( $P<0.0001$ ) which was primarily due to a greater fat mass depletion ( $P<0.0001$ ). Feed intake did not differ between lines until the sixth generation. In generation 6, the select line consumed less feed than the control line ( $P<0.0001$ ). Sows used in generation 6 were the first sows to farrow after changing the control line from random selection to selection for increased RFI. In conclusion, selection for RFI has positively affected piglet numbers and pre-weaning growth but has negatively affected sow body condition change during lactation.

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