Performance of Growing Pigs Fed Using Electronic Versus Commercial Feeders

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Summary and Implications

The effect of electronic feeders on performance of growing boars and gilts was evaluated. Yorkshire boars and gilts (n=475) were randomly assigned to pens with single-space FIRE (electronic) feeders and pens with five-space SMIDLEY feeders. Pigs began and ended test at an average body weight of 39 and 116 kg. Over the whole test period, pigs on electronic feeders did not differ significantly in growth rate, backfat thickness, and loin muscle area from pigs on commercial feeders. They did, however, use less feed and converted this more efficiently. Further inspection of growth and feed intake curves revealed that gilts on electronic feeders used less feed and grew slightly slower, in particular during early growth, but no differences were found for boars. Results indicate that electronic feeders may cause a genotype by environment interaction for gilts but not for boars.

Introduction

Feed is the largest variable cost in pork production. Although selection for growth and leanness has resulted in increased feed efficiency, further improvement requires measurement of feed intake on individual pigs. Measurement of individual feed intake on pigs housed in groups can be accomplished by electronic feeders. Electronic feeders are single-space feeders that offer protection from competition, depending on the design of the feeder. In contrast, multispace feeders that offer no protection are used in commercial herds. There are also design differences that may result in differences in feed wastage. Knowledge of performance of pigs fed using electronic versus commercial feeders is needed to detect genotype by environment interactions and to ensure that genetic progress achieved in selection herds is realized at the commercial level. The objective of this study was to compare performance and growth and feed intake curves of Yorkshire boars and gilts fed using electronic versus five-space commercial feeders.

Materials and Methods

Purebred Yorkshire boars and gilts (n=475) were used. Littermates were randomly split into single-sex pens that contained either a single-space FIRE electronic feeder (Osborne Industries Inc., Osborne, KS) or a five-space SMIDLEY stainless steel feeder, for a total of 40 pens. FIRE feeders were equipped with full-length races. The number of pigs per pen averaged 12.8.

Pigs began test at an average age of 92 d (ONAGE). Body weight (BW) was recorded weekly, beginning and ending at average weights of 39 and 116 kg. Backfat thickness and loin muscle area were measured once every 2 weeks by using an ALOKA real-time ultrasound machine. Amount of feed put in each feeder and feed remaining at the end of each 2-week period were measured for both feeder types. Body weight, backfat thickness, and loin muscle area measurements at the start (ONWT) and end (OFFWT, BF, and LMA) of test were used to calculate average daily gain (ADG) and changes in backfat thickness and loin muscle area (DBF and DLMA). The traits ONWT, ONAGE, and OFFWT were averaged for each pen (PONWT, PONAGE, and POFFWT). Amount of feed used by each pen was used to calculate average daily feed intake per pig per pen for each 2-week period (PDFI) and for the whole test period (PADFI). Pen feed conversion ratio (PFCR) over the whole test period was calculated for each pen as kilograms of feed/kilogram gain.

The traits with one observation over the test period (ADG, BF, LMA, DBF, DLMA, PADFI, and PFCR) were analyzed with a model that contained the fixed effects of sex, feeder type, sex by feeder type interaction, group, and appropriate covariates. Random regression models were fit to serial measurements of BW and PDFI to evaluate differences in growth and intake curves. The model included the fixed effects of sex, feeder type, sex by feeder type interaction, group, appropriate covariates, and random regressions on day of test. First derivatives of the BW curves were used to obtain curves for daily gain (DG).

Results and Discussion

Least squares means for traits measured over the whole test period are listed in Table 1. Feeder type did not significantly ($P>0.05$) affect ADG, BF, LMA, DBF, and DLMA. Pigs on electronic feeders used less feed (-0.08 kg/day) and converted that feed more efficiently (-0.09 kg feed/kg gain) than pigs on commercial feeders. Similar results were found by Hyun and Ellis (1) for electronic versus single-space feeders. They compared feed intake recorded by the electronic feeder with feed put into single-space feeders and suggested that differences in feed intake were caused by feed wastage or underestimation of feed intake by the electronic feeder. In this study, feed use was measured as the amount deposited for both feeder types and thus differences in feed intake were probably due to differences in feed wastage.

Sex differences were found for all traits except DBF and PADFI (Table 1). Boars grew faster, had less fat, smaller LMA, a smaller change in LMA, and were more feed efficient. Group was significant (P<0.01) for all traits. Feeder type by sex interaction was not significant for any trait but approached significance (P<0.10) for ADG and PADFI.

Feed intake and growth curves from the random regression analyses are plotted in Fig. 1. Curves for boars fed using electronic and commercial feeders overlapped. Boars on both feeder types used the same amount of feed and grew at the same rate throughout the entire test period. Gilts on electronic feeders used less feed throughout the test period. They also grew slower, except at the end of the test period, which suggests that feed intake limited growth through most of the test period. This result indicates that the differences in feed intake between the different feeder types observed in Table 1 are not solely explained by differences in feed wastage, as suggested earlier. These graphs clearly show the interaction between sex and feeder type.

References

1. Hyun, Y. and M. Ellis. (2001) J. Anim. Sci. **79**:803-810.

Table 1. Least-squares means for the effects of sex and feeder type on traits[A] measured over the whole test period.

Trait	Boars electronic	Boars commercial	Gilts electronic	Gilts commercial
ADG (kg/day)[B]	0.857[a]	0.846[a]	0.793[b]	0.810[b]
BF (mm)	16.4[ab]	16.3[b]	16.9[ab]	17.2[a]
LMA (cm^2)	41.4[b]	41.6[b]	44.7[a]	44.8[a]
DBF (mm)	9.0[a]	8.7[a]	9.5[a]	9.2[a]
DLMA (cm^2)	25.7[b]	25.9[b]	27.5[a]	27.8[a]
PADFI (kg/day)	2.18[b]	2.22[ab]	2.15[b]	2.27[a]
PFCR (feed/gain)	2.62[c]	2.73[b]	2.81[ab]	2.88[a]

[A] ADG, average daily gain; BF, backfat thickness at end of test; LMA, loin muscle area at end of test; DBF and DLMA, difference in backfat thickness and loin muscle area between the start and end of test; PADFI, pen average daily feed intake; PFCR, pen feed conversion ratio.

[B] Means within a row that do not share a common superscript letter differ (P<0.05).

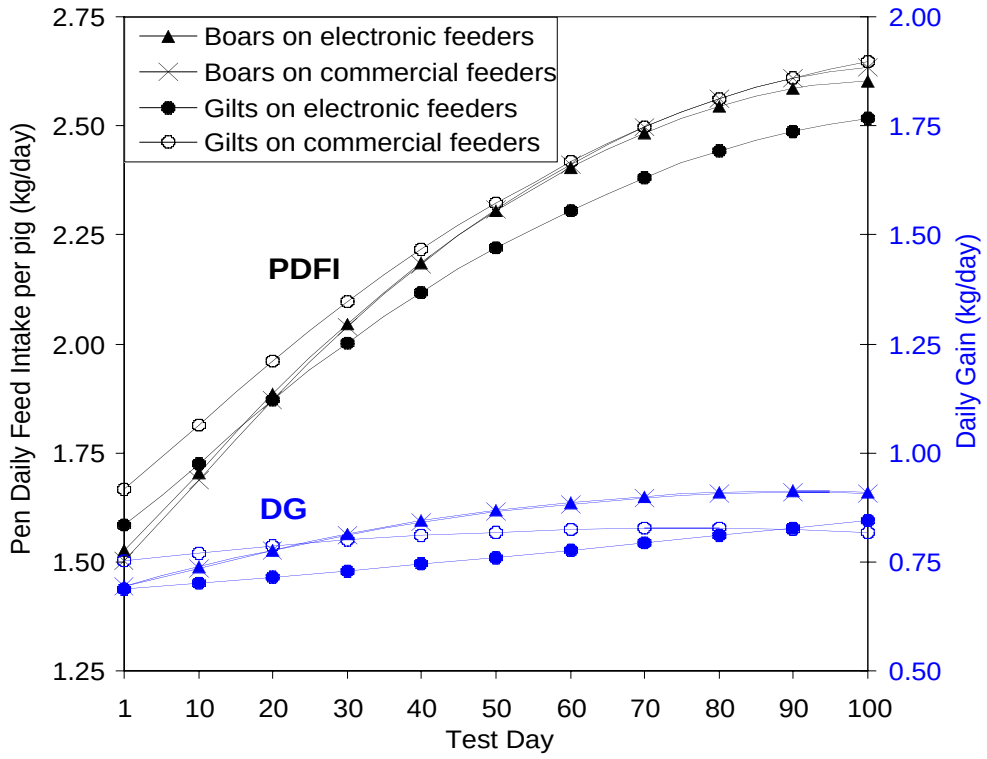

Figure 1. Pen daily feed intake per pig (PDFI) and daily growth (DG) curves for boars and gilts fed using electronic and commercial feeders.