A Comparison of Progeny Sired by High Indexing and Low Indexing Duroc Boars

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Story in Brief

Data was collected on 1032 progeny of high and low indexing Duroc boars. Boars were purchased from test stations in pairs, each pair containing one high and one low indexing boar. The index used to evaluate these boars included average daily gain, feed efficiency and backfat thickness. Offspring were evaluated for post-weaning performance to compare the use of high vs low indexing boars. Pigs sired by high indexing boars consumed more feed (4.88 vs 4.73 lb per day) and grew faster (1.60 vs 1.52 lb per day) than pigs sired by low indexing boars. Progeny of high indexing sires were also leaner and had better feed efficiency when compared to progeny of low indexing boars, however these differences were small and non-significant. In general, this study showed that the use of boars with superior performance should result in improved performance in commercial swine herds.

Introduction

The selection index advocated by the National Swine Improvement Federation has been created so that swine producers would have a more accurate means of selecting boars. The index includes average daily gain, feed efficiency and backfat thickness. These traits have been shown by numerous research programs to respond favorably to selection, but, the animals in these studies were managed under rigorous experimental conditions which may not exist for boars in a test station. This study was initiated to compare offspring of boars that had above average performance at a central test station with offspring of boars that had performed below average.

Materials and Methods

The National Swine Improvement Federation test station index is $I = 100 + 60 (G-\bar{G}) - 75 (F-\bar{F}) - 70 (B-\bar{B})$ where G is the average daily gain, F is the feed efficiency (lb feed/lb gain) and B is the backfat thickness. $\bar{G}$, $\bar{F}$ and $\bar{B}$ are the test group averages for the three traits. The index has been derived so that an average boar will have an index of 100 and that 68 percent of the boars in a test group will have an index between 75 to 125. It is recommended that boars with an index less than 80 be excluded from the sale.

Twelve Duroc boars were purchased for each of two breeding seasons from test stations in Missouri, Nebraska and Oklahoma. These stations test three

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boars per pen all of whom have the same sire. Boars were purchased in pairs with one boar indexing more than 118 and the other less than 90. At several sales more than one pair of boars was purchased. The performance of the Duroc boars used is summarized in Table 1. The high vs low indexing boars were separated by 54 index units in the fall of 1980 and by 46 index units in the spring of 1981.

The twelve boars each season were randomly mated to 100 gilts which were the progeny of high and low indexing Hampshire boars as described by Buchanan et al (1982). Litters were farrowed in a central farrowing barn and transferred to nursery pens 3-7 days after farrowing. Piglets were weaned at 42 days of age and transferred to finishing pens at approximately 56 days of age. Finishing pens contained 12 to 18 pigs with offspring of the same sire grouped together when possible. Pigs were fed a 16 percent crude protein growing ration until average pig weight in a pen was 120 pounds when the ration was switched to a 14 percent crude protein finishing ration. This was fed to the end of the finishing period. Pigs were weighed weekly and were removed from the pen as they reached 220 pounds. At this time an ultrasonic fat measurement was taken at the shoulder, last rib and last lumbar vertebrae and average backfat thickness was calculated. Average daily gain, for each pig, was measured from when pigs were put in finishing pens to when they reached 220 pounds. Feed efficiency (lb feed/lb gain) was determined on a pen basis. There were 1032 barrows and gilts that completed the test period. Data were analyzed so that offspring of high vs low boars could be compared with the effects of season, sex and breeding of the dam removed.

Table 1. Performance of Duroc Boars Purchased from Test Stations

Season	Average Daily Grain	Feed Efficiency lb feed/lb gain	Backfat in	Index units
		High Indexing boars		
Fall 1980	2.27	2.25	.77	137
Spring 1981	2.38	2.52	.74	129
		Low Indexing boars		
Fall 1980	1.91	2.59	.87	83
Spring 1981	1.96	2.68	.85	83

Results and Discussion

The performance of barrows and gilts sired by high and low indexing Duroc boars is presented in Tables 2 and 3. The sire line by season interaction was significant for average daily feed consumption and average daily gain (Table 2). Average daily feed consumption, was significantly greater for offspring of high indexing boars in the fall of 1981 but there was no difference in the previous season. Offspring sired by high indexing boars gained faster ($P < .01$) than those sired by low indexing boars. No significant differences were detected when comparing progeny of high and low indexing boars for feed efficiency and backfat thickness (Table 3).

Table 2. Average Daily Gain and Feed Consumption of Barrows and Gilts Sired by Duroc Boars Purchased from Test Stations

Season	Line of Sire	Number of Offspring	Average Daily Feed Consumption 15 day	Average Daily Gain 15 day
Spring 1981	High	279	4.87[a]	1.60[a]
	Low	281	4.86[a]	1.54[b]
Fall 1981	High	211	4.88[a]	1.59[a]
	Low	261	4.59[b]	1.49[c]

[abc]Means in column that have different superscripts differ significantly.

Table 3. Backfat thickness and Feed Efficiency of Barrows and Gilts Sired by Duroc Boars Purchased from Test Stations

Line of Sire	Number of Offspring	Backfat in	Feed Efficiency lb feed/lb gain
High	490	.822	3.11
Low	542	.889	3.12

The expected heritability of the performance index, based on the heritabilities of .30, .35 and .50 for average daily gain feed efficiency and backfat, is .36. The actual or realized heritability computed from the high vs low comparison was .12. The reason for the difference between the expected heritability and actual heritability can be partly attributed to the different pre-test conditions that the boars were exposed to.

These results show that progeny sired by boars that had superior post-weaning performance grew faster than those sired by boars with inferior post-weaning performance.

It can be recommended that high indexing boars at central test stations are a good source of potential seedstock. This practice, as well as purchasing farm-tested boars with good performance, should lead to a gradual increase in overall herd performance. Increases in performance will accumulate over time and can be more rapid if selection pressure for these traits is applied when selecting breeding females as well. Growth rate and backfat thickness can be accurately measured by seedstock producers so that breeding animals purchased by purebred and commercial producers will more likely increase performance in existing herds which will allow the industry to produce pork more efficiently.