

GENETIC AND ENVIRONMENTAL EFFECTS ON PERFORMANCE TRAITS OF BOARS AT THE KOREA SWINE TESTING STATION

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SUMMARY

Analysis of the data from 7,750 boars of Durocs, Landraces and Yorkshires performance tested at the Korea Swine Testing Station from 1985 to 1993 showed the significant main effects of breed, test diet, year of test and months of test for all three traits studied, average daily gain, feed efficiency and backfat thickness. The effect of the difference in initial weights was significant for average daily gain and feed efficiency. The effects of the interaction of breed with other factors were also estimated. Yearly reduction in backfat thickness over the nine year period was .029, .077 and .079 cm for Durocs, Landraces and Yorkshires. Feed efficiency was also improved significantly during the period in all three breeds.

INTRODUCTION

Central testing of boars has been exerting an important influence on the genetic improvement of swine in Korea by recognition and selection of superior breeding stocks. This study was conducted to evaluate the effects of breed, test diet, year, months and the difference in initial weights and the two-way interactions of breed with other factors on the performance traits and to evaluate the time trend in three breeds of boars entered in the Korea Swine Testing Station from 1985 to 1993.

MATERIALS AND METHODS

The data used in this study were collected from 7,750 boars of Durocs, Landraces and Yorkshires performance tested at the Korea Swine Testing Station in Icheon, Korea from March, 1985 to May, 1993. The boars tested at the Station were consigned by swine breeding farms in Korea. To enter the test, the farms should meet certain requirements on hygienic measures and on registration of the stock. Two littermate boars were housed in a pen and the test period was from 30 to 90 kg. Of the three traits studied, average daily gain during the test period and backfat thickness were measured on an individual basis and feed efficiency was measured on a pen basis. Backfat thickness was measured at the end of the test as described by NSIF(1987).

Least squares method (Harvey, 1979) was used to analyse the data. The linear model used included the fitted mean, the effects of breed, test diet, year of test, months of test, the differences in initial weights between the two littermate boars housed in a

pen, the two-way interactions of breed with other factors and regression on initial weight. The test diet used at the Station was changed from Diet A to Diet B in 1990. Diet A contained 17.6% CP and 3,120 kcal ME/kg and Diet B contained 15.5% CP and 3,200 kcal ME. The test diet was full fed during the test period. The year and months of test were classified by the time when the test was finished. To evaluate the time trend in the performance traits in the three breeds of boars entered in the test, regression of each trait on year of test was estimated with the least squares subclass means by breed and year of test.

RESULTS AND DISCUSSION

The test of significance showed that the main effects of breed, test diet, year of test, months of test and the difference in initial weights were significant for all three traits except the effect of the difference in initial weights for backfat thickness. Breed by diet interaction was insignificant for all traits. Breed by difference interaction was significant only for feed efficiency. Breed by year interaction was significant for all three traits. Breed by months interaction was significant for average daily gain and backfat thickness. Regression on initial weight was significant for average daily gain and backfat thickness.

Table 1. Least squares means of breed, test diet, months of test and difference in initial weights

Classification		Ave. daily gain (g)	Feed efficiency	Backfat thickness (cm)
Breed	Duroc	941 ± 3.8	2.56 ± .008	1.86 ± .009
	Landrace	864 ± 4.4	2.65 ± .009	1.63 ± .011
	Yorkshire	895 ± 3.4	2.53 ± .007	1.63 ± .008
Test diet	Diet A	880 ± 3.4	2.64 ± .007	1.65 ± .009
	Diet B	920 ± 4.7	2.52 ± .009	1.77 ± .012
Months	Jan.-Feb.	883 ± 3.7	2.67 ± .007	1.70 ± .009
	Mar.-Apr.	916 ± 3.8	2.65 ± .008	1.70 ± .010
	May-Jun.	914 ± 3.2	2.55 ± .006	1.71 ± .008
	Jul.-Aug.	900 ± 3.3	2.51 ± .007	1.75 ± .008
	Sep.-Oct.	886 ± 3.4	2.52 ± .007	1.71 ± .008
	Nov.-Dec.	901 ± 3.4	2.57 ± .007	1.69 ± .009
Initial wt.	0 - 2	907 ± 1.6	2.56 ± .003	1.71 ± .004
diff. (kg)	3 - 4	904 ± 3.2	2.57 ± .006	1.71 ± .008
	≤ 5	890 ± 5.2	2.60 ± .010	1.71 ± .013

The least squares means in Table 1 show that Durocs had a higher average daily gain than other breeds. In feed efficiency Yorkshires were most efficient. Landraces and

Yorkshires had less thickness of backfat. Diet B produced a higher average daily gain, more efficient feed conversion and more thickness of backfat. The boars with 5 kg difference or larger in initial weights tended to be less efficient and have lower average daily gain in the Landrace. The boars that finished the test in January-February were less efficient and had lower average daily gain presumably due to the cold weather during the test. The regression of the trait on initial weight was 6.4 ± 0.9 g for average daily gain, 0.003 ± 0.002 for feed efficiency and 0.006 ± 0.002 cm for backfat thickness.

Table 2 shows the regressions of performance trait on year of test which were computed to evaluate the time trend in the performance traits. The regression coefficients estimated show that the thickness of backfat was reduced over the nine year period, with a higher rate of reduction in the two white breeds than in Durocs. Feed efficiency was also improved significantly in all three breeds during the period. The regression of average daily gain on year of test was positive in Landraces and Durocs. But the regression was negative in Yorkshires.

Table 2. Regressions of performance trait on year of test and the standard errors

Breed	Ave. daily gain (g)	Feed efficiency	Backfat thickness (cm)
Duroc	1.8 ± 1.7	$-.046 \pm .006$	$-.029 \pm .007$
Landrace	7.6 ± 2.9	$-.067 \pm .008$	$-.077 \pm .005$
Yorkshire	-4.9 ± 2.8	$-.052 \pm .006$	$-.079 \pm .005$

The results obtained in this study indicate that the thickness of backfat was reduced and feed efficiency was improved significantly in all three breeds tested at the Station during the period from 1985 to 1993 by the efforts of Korean swine breeders to improve these traits.

REFERENCES

- HARVEY, W.R. (1979) Least squares analysis of data with unequal subclass numbers. USDA.
 NISF. (1987) Guidelines for uniform swine improvement programs. NSIF.