except Duroc-Yorkshire and Landrace-Yorkshire crosses. The Duroc-Landrace cross had the largest heterosis advantage (14.3 days) for age at puberty, and all crosses involving Spot breeding had a notable advantage over their respective purebred averages.

All crosses were heavier than their respective purebred averages for weight at puberty except the Duroc-Landrace cross. The difference between the Landrace-Yorkshire cross and their respective purebred average (9.9 lb) was the only significant heterosis effect for weight at puberty.

Gilts raised in confinement (188.6 days) during the finishing phase were significantly younger at puberty than gilts raised on pasture (194.1 days). A significant interaction between management system and season affected weight at puberty. Spring-born gilts raised on pasture were heavier at puberty (207.3 lb) than fall-born (202.2 lb). However, no notable season effect existed in gilts raised in confinement (201.1 lb in the fall vs. 198.7 lb in the spring). Comparisons among management systems should be viewed carefully because gilts in confinement were penned adjacent to boars of similar age and gilts on pasture were penned with barrows.

Table 3. Average performance for gilts born during different year-seasons

Year-season	Age at puberty (days)	Weight at puberty (lb)
1976 - Fall	195.0	206.6
1977 - Spring	188.6	214.8
1977 - Fall	198.8	205.5
1978 - Spring	183.3	199.8

A significant interaction between year and season existed for age and weight at puberty (Table 3). Spring-born gilts were 6.4 days younger in the first year and 15.3 days younger in the second year. Spring-born gilts were 8.2 lb heavier in the first year and 5.7 lb lighter in the second year.

Breed differences for age at puberty are indicated in these data. The information on the breed comparisons should aid in evaluating the efficiency of production systems.

Relationship Between Pubertal and Growth Characteristics in Gilts

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Story in Brief

Data from 737 crossbred and purebred gilts of Duroc, Landrace, Yorkshire and Spot breeding were used to estimate the heritability of age and weight at puberty and their genetic and phenotypic correlations with birth weight, weaning weight, post-weaning daily gain, adjusted age at 200 lb and adjusted backfat thickness at 200 lb.

The paternal half-sib heritability estimate for age at puberty was .19. The genetic and phenotypic correlations between age at puberty and birth weight, weaning weight,

postweaning daily gain, backfat thickness at 200 lb and age at 200 lb were favorable. The favorable correlations indicate continual selection for increased growth rate would result in a correlated decrease in age at puberty.

Introduction

Costs of replacement gilts can be reduced by bringing gilts into production at an earlier age, which can be accomplished by decreasing the age at puberty. Present selection practices stress increased growth rate and decreased backfat thickness. With this current selection emphasis, the magnitude and direction of the correlated response of age at puberty is of interest. Also, the effectiveness of selection for decreased age at puberty is of interest.

Therefore, the purpose of this paper is to present estimates of heritability of age at puberty and genetic and phenotypic correlations of age at puberty with growth traits. Heritability measures the proportion of phenotypic differences due to genetic causes. Phenotypic correlation measures how closely two traits vary together and genetic correlation measures the association among traits due to genetic causes (genetic correlation results from a gene influencing more than one trait). This information may be valuable in evaluating the contribution of selection programs to the efficiency of production.

Experimental Procedure

The data were obtained from 737 crossbred and purebred gilts of Duroc, Spot, Yorkshire and Landrace breeding. Information on the mating structure and management of sows, litters and gilts can be found in the preceeding paper in this report.

Results and Discussion

The paternal half-sib heritability estimate for age at puberty was .19 (Table 1). This estimate is lower than the average (.34) from the literature. The paternal half-sib heritability estimate for weight at puberty was .35. This estimate is close to the average (.31) in the literature. Even though the heritabilities are not high, the estimates indicate change in age and weight at puberty can be achieved through selection.

The genetic correlations of age at puberty with birth weight (−.07), weaning weight (−.25), postweaning daily gain (−.38) and age at 200 lb (.56) increased in size as the age when growth was measured increased (Table 1). The direction of the genetic correlations indicates that continued selection for increased growth rate would tend to decrease age at puberty. The phenotypic correlations of age at puberty with growth

Table 1. Heritabilities and genetic and phenotypic correlations of pubertal and growth traits[a]

	AGEPUB[b]	WTPUB[b]	BW[b]	WW[b]	ADG[b]	AGE[b]	BF[b]
AGEPUB	.19	−.03	−.07	−.25	−.38	.56	.27
WTPUB	.54	.35	.46	.69	.81	−.70	.28
BW	−.09	.24	1.53	.54	.50	−.61	.19
WW	−.19	.29	.51	1.20	.49	−.88	−.01
ADG	−.34	.34	.29	.31	.69	−.73	.16
AGE	.38	−.38	−.42	−.58	−.83	.60	.00
BF	.01	.01	−.03	−.04	.05	.01	.51

[a]Heritabilities on the diagonal, genetic correlations above the diagonal and phenotypic correlations below the diagonal.

[b]AGEPUB = age at puberty, WTPUB = weight at puberty, BW = birth weight, WW = weaning weight, ADG = average daily gain, AGE = adjusted age at 200 lb and BF = adjusted backfat at 200 lb.

traits also generally increased with age at which growth was measured. These correlations indicate that gilts exhibiting a faster growth rate would tend to reach puberty at earlier ages. The genetic and phenotypic correlations between age at puberty and backfat were low and positive indicating little relationship.

The genetic and phenotypic correlations between weight at puberty with growth are favorable. Thus, selection for increased growth rate would tend to increase weight at puberty. Also gilts exhibiting a faster growth rate would tend to be heavier at puberty. The phenotypic and genetic correlations between weight at puberty and backfat are low and positive indicating little relationship.

These data indicate that continual selection for growth rate would result in a correlated decrease in age at puberty.

Performance Trends of Boars Tested at the Oklahoma Swine Evaluation Station

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Story in Brief

Performance data collected from 1731 boars tested at the Oklahoma Swine Evaluation Station have been analyzed. Average changes in performance have been estimated for several breeds from 1971 through 1979. Traits measured were average daily gain, pen feed efficiency, backfat thickness and loin eye area. There was a general increase in average daily gain and a decrease in pounds of feed per pound of gain, backfat thickness and loin eye area. Average changes in such a population should, to some extent, indicate changes in the swine industry. If these data are reflective of the swine industry, they indicate improvement in all traits evaluated except loin eye area.

Introduction

Improvement of production efficiency in the swine industry is dependent upon accurate identification of individuals with superior performance. Swine testing stations have been established to aid in that identification. The Oklahoma Swine Evaluation Station began testing in 1971. Such a station provides opportunities for comparison of individuals from different farms and also gives the individual breeder an opportunity to evaluate the performance of his own stock. Examination of time trends in a swine testing station will indicate the general changes in average performance of pigs at the station. These changes may be due to a variety of factors including genetic changes.

Materials and Methods

The Oklahoma Swine Evaluation Station was built in 1970. The station originally had one barn with 24 open-front pens measuring 5 by 15 ft. A second barn was constructed in 1975 which increased capacity to 48 pens.

Pens of three boars and one barrow or two boars and two barrows were tested until 1974. After that time all pens contained three boars. Pigs within a pen were the progeny