

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

of one sire. One test in the spring and one in the fall were conducted through 1974. After that time there were two tests conducted each season. Pigs were put on test when the pen averaged 70 lb. There has been a change in off-test weight from 220 lb to 230 lb during the life of the station.

Data collected when the pigs reached off-test weight included average daily gain, pen feed efficiency and an ultrasonic scanogram estimate for loin eye area and backfat thickness. The instrument used was an Ithaco Scanogram, Model 721. Feed efficiency for pens containing barrows was adjusted to a boar-equivalent basis. Backfat thickness was the average of measurements taken at the shoulder, the last rib and the last lumbar vertebra. Loin eye area was measured at approximately the tenth rib. For this study all backfat thickness and loin eye area estimates were adjusted to a 230-lb basis with adjustment factors recommended by the National Swine Improvement Federation.

The data for these analyses include 1731 boars from eight breeds that completed the tests from 1971 through 1979. The number of boars from each breed and year is shown in Table 1. The increase in numbers in 1975 was due to the completion of the second building.

Analyses were conducted that allowed estimation of breed x year subclass means that were adjusted for the effects of season, test group (after 1974) and initial weight. These analyses also provided estimates of regression coefficients on year (average change per year) for Chester White, Duroc, Hampshire, Spot and Yorkshire boars. There were insufficient numbers of boars from the other three breeds to provide useful estimates of the regression coefficients.

Results and Discussion

The average daily gain for boars of each breed in each year is shown in Table 2. Average pen feed efficiencies for the boars are presented in Table 3. There appears to have been a general increase in growth rate and improvement of feed efficiency for the boars tested. However, these changes were not consistent from year to year.

Average loin eye area and backfat thickness for the boars of each breed in each year are shown in Tables 4 and 5. There was a general decrease in amount of backfat over the 9 years of testing. There was also a fairly consistent decrease in loin eye area in each of the breeds.

Phenotypic time trends were estimated by regressing performance on year. These regressions (Table 6) estimate the average change per year in each of the traits. Such estimates were available for five of the eight breeds tested. There were no Berkshire, Poland or Landrace boars tested in some years, and that prevented adequate estimation of average change in those breeds.

The estimates of change per year supported what the means indicated. There was a significant increase in average daily gain and improvement of feed efficiency for each of the five breeds except the Spot. There was a significant decrease in backfat thickness and loin eye area in each breed.

These changes may be due to any of a number of factors. It is likely that at least part of the trend was due to real genetic changes in the purebred swine industry. It is also likely that climatic differences from year to year contributed as well as management changes at the station. Some possible additional sources of change, particularly in the later years, are that breeders were learning how to better manage the boars (pre-test) and that they were more conscientious in selecting boars to go to the station. Both of these may have resulted in pigs that performed better.

Table 1. Number of boars of each breed in each year

Breed	Year of test								
	1971	1972	1973	1974	1975	1976	1977	1978	1979
Berkshire	4			6		3	8		9
Chester White	11	8	11	17	38	42	31	30	20
Duroc	31	34	42	45	62	66	71	90	94
Hampshire	28	29	32	17	32	50	28	43	27
Poland	11	4		3			3		9
Spot		9	23	21	37	49	61	28	34
Yorkshire	6	17	20	25	39	60	58	53	75
Landrace					1			14	12

Table 2. Average daily gain^a for boars of each breed in each year

Breed	Year of test									Overall average
	1971	1972	1973	1974	1975	1976	1977	1978	1979	
Berkshire	1.89			2.07		1.65	1.83		1.76	1.85
Chester White	1.59	1.78	1.84	1.84	1.96	1.89	1.90	1.77	1.84	1.86
Duroc	2.00	1.94	1.96	2.09	2.00	2.07	2.03	2.11	1.99	2.03
Hampshire	1.89	1.91	1.87	1.90	2.08	1.99	2.01	2.09	2.09	1.99
Poland	1.75	1.68		1.99			1.99		1.96	1.85
Spot		1.90	1.96	2.00	2.10	2.00	1.95	1.96	2.00	1.99
Yorkshire	1.78	2.01	1.95	2.04	2.04	2.00	2.02	2.13	2.14	2.05
Landrace					2.12			2.01	2.08	2.05
Overall average	1.87	1.92	1.93	2.01	2.03	1.99	1.98	2.04	2.03	

^alb per day.**Table 3. Average pen feed efficiency^a for boars of each breed in each year**

Breed	Year of test									Overall average
	1971	1972	1973	1974	1975	1976	1977	1978	1979	
Berkshire	3.01			2.41		2.78	2.87		2.98	2.82
Chester White	2.97	2.72	2.78	2.55	2.38	2.70	2.75	2.71	2.67	2.68
Duroc	2.82	2.56	2.59	2.46	2.40	2.60	2.52	2.50	2.51	2.58
Hampshire	2.85	2.65	2.67	2.56	2.40	2.49	2.52	2.43	2.47	2.57
Poland	3.12	2.63		2.76			3.14		2.81	2.93
Spot		2.82	2.80	2.53	2.42	2.68	2.82	2.78	2.71	2.69
Yorkshire	2.95	2.56	2.64	2.52	2.42	2.62	2.63	2.54	2.48	2.55
Landrace					2.37			2.70	2.62	2.65
Overall average	2.90	2.62	2.67	2.51	2.40	2.62	2.66	2.56	2.56	

^alb feed per lb gain.

Table 4. Average loin eye area^a for boars of each breed in each year

Breed	Year of test									Overall average
	1971	1972	1973	1974	1975	1976	1977	1978	1979	
Berkshire	5.71			6.05		5.62	5.62		5.16	5.48
Chester White	5.63	5.72	6.09	5.68	5.57	5.56	5.25	5.14	4.97	5.45
Duroc	5.54	5.56	6.03	5.74	5.43	5.46	5.32	5.22	4.96	5.39
Hampshire	6.02	5.91	6.25	6.22	5.82	5.80	5.62	5.51	5.12	5.78
Poland	5.81	5.84		5.66			4.61		4.93	5.75
Spot		5.89	6.12	5.71	5.42	5.44	5.36	5.08	4.94	5.60
Yorkshire	5.47	5.61	5.92	5.45	5.38	5.46	5.12	5.12	4.99	5.48
Landrace					5.32			5.11	4.64	4.91
Overall average	5.73	5.72	6.09	5.75	5.50	5.54	5.29	5.22	4.97	

^ain.².**Table 5. Average backfat thickness^a for boars of each breed in each year**

Breed	Year of test									Overall average
	1971	1972	1973	1974	1975	1976	1977	1978	1979	
Berkshire	1.01			1.05		.94	.86		.75	.89
Chesier White	1.04	.98	1.07	1.02	.86	.97	.92	.77	.84	.91
Duroc	1.03	.97	1.02	1.09	.94	.96	.89	.78	.80	.91
Hampshire	.85	.85	.89	.91	.82	.79	.74	.63	.75	.80
Poland	1.02	.83		.86			.99		.92	.95
Spot		.91	.98	.96	.94	.97	.92	.79	.83	.91
Yorkshire	1.18	.97	1.02	1.01	.91	.93	.84	.79	.81	.88
Landrace					.94			.92	.91	.92
Overall average	.98	.93	.98	1.02	.90	.93	.87	.76	.81	

^ain.

Table 6. Average change in performance per year for boars of five breeds^a

Breed	Trait			
	Avg. daily gain, lb	Lb of feed/lb gain	Loin eye area, in. ²	Backfat thickness, in.
Chester White	.020**	-.013*	-.107**	-.031**
Duroc	.010**	-.022**	-.083**	-.033**
Hampshire	.033**	-.031**	-.107**	-.024**
Spot	.033	.006	-.083**	-.007**
Yorkshire	.032**	-.034**	-.075**	-.040**
Overall average	.019**	-.021**	-.088**	-.029**

^aBerkshire, Poland and Landrace boars not included due to small numbers of boars tested.

*Average change per year is significantly different from zero, $P < .05$.

**Average change per year is significantly different from zero, $P < .01$.

If these phenotypic trends reflect changes that were occurring in the swine industry, they indicate improvement in growth rate, feed efficiency and backfat thickness. There is currently concern about the extent to which loin eye area has been changed. While it is possible that many hogs were too heavily muscled ten years ago, it is also possible that the total reduction has been too severe since then.

The Relationship Between Measures of Performance and Selling Price in Tested Boars

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Story in Brief

Performance records and sale prices of 901 boars that sold from the Oklahoma Swine Evaluation Station from 1971 through 1979 were used to evaluate the effect that performance had on selling price. Measures of performance that were included were age at final weight, average daily gain, feed efficiency, back fat thickness and loin eye area.

None of the traits was highly correlated with selling price. Average changes in price per unit change in each trait indicated that less than half of the variation in selling price was explained by variation in the performance traits. Generally one of the measures of growth rate had the most important impact on selling price.

Introduction

Performance testing of swine has been increasing for several years. One of the methods of performance testing is the central test station. Such a station enables potential buyers to have an evaluation of boars that have been managed under uniform