Performance and Progeny Tests for Evaluating Boars

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The appraisal of a prospective breeding animal is actually an estimation of his breeding value. In making this estimate we can consider (1) the merit of the individual himself, (2) the merit of the ancestors in his pedigree, (3) the merit of collateral relatives such as full and half brothers and sisters of the individual, and (4) the merit of the individual's progeny after he is old enough to have been progeny tested. After considering the information available we then can select or cull an individual according to whether we think his breeding value will permit him to contribute toward the genetic improvement of the herd. The choice of herd sires is the most important decision a breeder makes, because they will contribute half of the inheritance of the next generation in the herd. This decision is also important because of the greater opportunity for selection in males than in females. It is therefore desirable to do everything possible to increase the accuracy of estimating the breeding values of herd sire prospects. Initial decisions must be made on individuality, pedigree, and family information, but these should be checked by adequate and accurate progeny tests as soon as possible.

Testing Procedure

In the Oklahoma project[1] of the Regional Swine Breeding Laboratory boar pigs from the more productive sows are placed on a feeding test at weaning (about 56 days). The feeding period is from 56 days to a final weight around 175 lbs. Rate of gain during the test is measured on each individual and efficiency of gain is measured on 2-4 boar pigs by the same sire. Most of the pens include only litter mate boars, but in some pens boars from two litters of comparable age and by the same sire are fed together. Efficiency of gain, expressed as feed required per lb. of gain, is thus measured on a family group of full or half brothers. In a few instances feed records of this kind are not obtained on boars because of a shortage of pen space for testing. Such boars are fed the same ration but in larger groups and no feed records are taken. Boars are weighed off of the feeding test individually at approximately 175 lbs. At this time backfat thickness is measured on each boar by probing with a Lean Meter. Each boar is also scored with a 1 to 9 scoring system for length, meatiness, and soundness of legs. The backfat probes are adjusted to a 200 lb. barrow equivalent basis to permit a fairer comparison of boars, barrows, and gilts of somewhat different weights at the time of probing. The above performance information is then considered in the selection of boars for the breeding herd.

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[1] This is a cooperative project between the Oklahoma Agricultural Experiment Station and the Regional Swine Breeding Laboratory, Agricultural Research Service, U. S. Department of Agriculture.

Pedigree screening is used to determine which boars will be performance tested. The performance test on individuals and on brothers and sisters is used to determine which boars will be selected for breeding. These boars are then progeny tested as the final test of breeding value.

Selected boars are progeny tested by mating each boar to 6 or 7 gilts of another breed for a crossbred progeny test. The progeny tests include feeding and slaughter tests on samples of pigs by each sire. If enough pigs are available, 2 or 3 pens of 8 to 10 pigs each are fed by each sire. The feeding test is from about 56 days of age to a final weight of approximately 210 lbs. Rate of gain is measured on each individual pig but efficiency of gain is measured on each lot. Each gilt is probed at the final weight and probes are adjusted to a 200 lb. barrow equivalent basis. Gilts are also scored for length, meatiness, and soundness of legs. Barrows are not probed or scored, but a sample of barrows by each sire are slaughtered at the Wilson & Co. plant in Oklahoma City for carcass data. An effort is made to slaughter 6 to 10 barrows by each sire but in some cases the availability of carcass barrows is less than the minimum desired.

Results

The performance and progeny test records on 5 Duroc boars from line Ok 8 are shown in Table 1. This line is being developed specifically for crossbred sow productivity when crossed with the Beltsville No. 1 line Ok 9. Consequently, the primary basis for selection of these boars was the litter production records of their crossbred half-sisters. This selection differential was 0.6 of a pig in the size of litter raised by the crossbred half-sisters of these selected boars and the 5 line 9 boars listed in Table 2 as compared to the average litter size for all crossbred gilts. Because of the selection for crossbred half-sib's productivity, selection on the boar's performance was not as great as it might otherwise have been. Some variation is shown in performance of the 5 selected boars as shown in the upper portion of Table 1. This is particularly true in average daily gain, which ranged from 2.08 lbs. for boar 677 to 1.61 lbs. for boar 634. The 44 boars selected at weaning and performance tested gained 1.67 lbs. per day. This was .17 lbs. per day faster than the average of the entire line. The tested boars also had less backfat and were scored higher than the line average in all items. The tested boars, however, were fed a somewhat different ration than the rest of the herd, although under the same general conditions, so that some caution must be used in comparing the performance of the tested boars with the remainder of the herd. The five selected boars as compared to the 44 that were tested gained considerably faster, were more efficient in feed conversion, had less backfat, and were scored higher for length, soundness of legs and particularly meatiness.

The lower portion of Table 1 gives the progeny test results on the 5 Duroc boars. The progeny performance should not be compared to the individual performance of the sires because of the different

conditions under which the sires and their progeny were tested. The boars and their progeny were tested in different years. The boars were fed a fortified pelleted ration with a corn-milo grain base over a period from 56 days to 175 lbs., whereas their progeny were fed to a heavier weight of 210 lbs. on a non-pelleted wheat base ration which does not produce as rapid or efficient gains as the boar test ration. However, boar performances can be fairly compared with one another and progeny performances can also be compared fairly with one another. It is interesting to note that the slowest gaining boar (634) also had the slowest gaining progeny, but that the fastest gaining progeny were by boar 91 who ranked third in his own rate of gain. Boar 634 sired pigs distinctly superior to those of the other boars in backfat thickness, loin eye area and yield of lean cuts. Boar 677 was scored slightly higher than 634 for meatiness, but this was not supported by the progeny test. This indicates the desirability of obtaining carcass data from a progeny test. Live animal appraisals will generally be related to an individual's progeny test but errors in appraisal will occur and these can be detected by a progeny test.

The performance and progeny test records of the line Ok 9 boars are shown in Table 2. The boars and their progenies were farrowed in the same seasons and were contemporaries of the line 8 boars and their progenies in Table 1. The slowest gaining boar in this group as in the previous group sired the slowest gaining progeny, but the fastest gaining progeny were sired by the second fastest gaining boar. There was no particularly outstanding sire on the carcass progeny test. All boars

Table 1. Performance and Progeny Test Summary on Line Ok 8 Duroc Boars Siring 8x9 Crossbred Pigs, Ft. Reno 1962 Spring

Boar	91	200	465	634	677	Av. of 5 Boars Selected	Av. of 44 Boars Tested
Performance Test							
Av. daily gain, lbs.	1.86	1.93	1.74	1.61	2.08	1.84	1.67
Lbs. feed per lb. gain	2.78	2.60	2.78	2.54	no test	2.67	2.84
Probed backfat, in.	1.47	1.45	1.48	1.51	1.54	1.49	1.55
Length score	7	6	6	7	6	6.4	6.2
Meatiness score	6	7	6	7	8	6.8	5.8
Legs score	4	6	6	5	6	5.4	5.2
Progeny Test on 8x9 Crossbred Pigs							
No. pigs on feeding test	18	16	20	19	20	93	
Av. daily gain, lbs.	1.66	1.40	1.52	1.34	1.52	1.49	
Lbs. feed per lb. gain	3.55	3.56	3.56	3.62	3.69	3.60	
No. barrows slaughtered	6	3	6	5	6	26	
Carcass length, in.	29.8	31.3	29.6	29.7	30.6	30.1	
Carcass backfat, in.	1.50	1.37	1.66	1.45	1.47	1.51	
Loin eye area, sq. in.	3.63	3.76	3.26	4.22	3.89	3.77	
% lean cuts	36.9	35.8	36.0	38.3	35.6	36.1	

Table 2. Performance and Progeny Test Summary on Line Ok 9 Beltsville No. 1 Boars Siring 9x8 Crossbred Pigs Ft. Reno 1962 Spring.

Boar	184	255	602	1090	1214	Av. of 5 Boars Selected	Av. of 28 Boars Tested
Performance Test							
Av. daily gain, lbs.	1.71	1.51	1.88	1.57	1.52	1.63	1.66
Lbs. feed per lb. gain	2.75	2.66	2.69	2.78	no test	2.72	2.76
Probed backfat, in.	1.44	1.62	1.47	1.72	1.60	1.57	1.59
Length score	8	8	8	8	8	8.0	7.7
Meatiness score	8	6	8	6	6	6.8	6.1
Legs score	6	3	4	5	4	4.4	4.5
Progeny Test							
No. pigs on feeding test	20	20	19	20	20	99	
Av. daily gain, lbs.	1.59	1.35	1.51	1.48	1.58	1.50	
Lbs. feed per lb. gain	3.84	3.68	3.61	3.80	3.84	3.76	
No. barrows slaughtered	6	3	6	6	4	25	
Carcass length, in.	30.4	30.4	30.1	30.6	29.8	30.2	
Carcass backfat, in.	1.56	1.45	1.42	1.52	1.60	1.51	
Loin eye area, sq. in.	3.51	3.12	3.43	3.32	3.33	3.57	
% lean cuts	36.5	37.0	37.2	36.4	35.3	36.3	

sired pigs with small loin eye areas. The progeny by boar 255 were the poorest of the group. The somewhat high probed backfat measurements on the five selected boars were an indication of this possibility in the progeny test. The five selected boars were actually little better for most traits than the average of the 28 boars tested. The low selection differentials for these line 9 boars were caused by the substitution of second choice boars for three of the boars originally selected. One of the originally selected boars was injured before the breeding season began and the other two boars failed to breed. The three substitutes for them were 255, 1090, and 1214 who were slower gaining and considerably fatter than the three boars originally selected. It is rather interesting that these three substitute boars were scored lower for meatiness than boars 184 and 602 and their progenies also had smaller loin eyes. The progeny test indicates that the scores for meatiness of all boars were overestimates of their breeding values.

The performance and progeny test records on 7 line Ok 14 Hampshire boars are given in Table 3. These boars were farrowed in the Fall of 1960 and tested at the Stillwater station. Their crossbred progeny were farrowed one year later and tested at the Ft. Reno station. Line 14, unlike lines 8 and 9, is being selected for crossing ability in pig performance, i.e., rate and efficiency of gain and carcass merit. Boars are progeny tested by mating to crossbred 8x9 and 9x8 gilts. At weaning 25 boars were selected for performance tests. At the conclusion of the performance test 8 boars were selected, but one of these failed to breed resulting in progeny test information on only the 7 boars listed. Boar 14

was selected in order to have a very slow gaining sire on the progeny test and boar 74 was chosen in order to extend the range in backfat thickness of the boars to be progeny tested. These selections and the loss of one boar through breeding failure reduced the selection differentials, so that the selected boars were little different in performance from all the tested boars. Possible exceptions were the advantages in backfat thickness and meatiness scores of the selected boars over the average.

As in the case of the other two sets of boars the slowest gaining boar (14) sired the slowest gaining set of progeny. The feed records on all of the progeny were poor because of low quality, weevil damaged wheat in the ration of the progeny. For this reason, perhaps not much significance should be attached to the feed efficiencies of the progenies of these boars. Some rather wide differences are indicated, however, with progeny of boar 90 considerably superior to the others.

In the carcass test the number of carcasses from certain boars were somewhat limited and therefore limit the reliability of progeny comparisons. The longest pigs were sired by 91 and this checks with the length score on 91 himself. Boar 204 sired the shortest pigs and he was scored as one of the shorter boars. Boar 72 sired the pigs with the lowest backfat thickness but since there were only 4 pigs slaughtered by him this appraisal must be considered with caution. However, a later progeny test with purebred pigs by boar 72 supports the evidence of his desirable breeding value for low backfat thickness. Boar 47 sired the fattest

Table 3. Performance and Progeny Test Summary on Line Ok 14 Hampshire Boars Siring 14x18-9 Crossbred Pigs, Ft. Reno 1961 Fall.

Boar	14	47	72	74	90	91	204	Av. of 7 Boars Selected	Av. of 25 Boars Tested
Performance Test									
Av. daily gain, lbs.	1.42	1.48	1.86	1.83	1.52	1.73	1.80	1.66	1.67
Lbs. feed per lb. gain	3.00	2.99	3.06	3.06	2.99	2.99	2.89	3.00	2.96
Probed backfat, in.	1.42	1.49	1.47	1.61	1.52	1.43	1.43	1.48	1.53
Length score	6	7	6	6	6	8	6	6.4	6.4
Meatiness score	6	6	8	6	6	6	7	6.4	6.0
Legs score	6	4	6	6	6	6	6	5.7	5.8
Progeny Test on 14x8-9 Crossbred Pigs									
No. pigs on feeding test	33	21	17	18	16	33	29	167	
Av. daily gain, lbs.	1.49	1.59	1.51	1.57	1.60	1.55	1.52	1.54	
Lbs. feed per lb. gain	3.90	3.65	4.02	4.35	3.23	3.74	3.60	3.78	
No. barrows slaughtered	9	5	4	4	3	9	6	40	
Carcass length, in.	29.8	30.2	29.6	29.8	29.9	30.4	29.5	29.9	
Carcass backfat, in.	1.49	1.55	1.30	1.50	1.41	1.45	1.50	1.47	
Loin eye area, sq. in.	4.31	4.58	4.35	4.24	3.71	4.29	4.18	4.27	
% lean cuts	40.8	39.6	41.3	40.8	41.4	40.2	40.4	40.6	

pigs but he, himself, was only average in probed backfat thickness. Boar 47 sired the progeny with the largest loin eyes which were slightly larger than those from boar 72. A later progeny test with purebred pigs from these same two boars yielded loin eye areas of 5.44 for sire 72 and 4.90 for 47. The boars both bred quite well in respect to loin eye area. Boar 90 with only 3 carcasses showed a low loin eye area of 3.71 sq. in. On a more extensive purebred progeny test later, his progeny averaged 5.16 sq. in. of loin eye area. This emphasizes that progeny test information on a limited number of progeny should be considered only as preliminary information that should be evaluated with caution until more extensive information is available.

It is interesting to note that it was necessary to cull boar 91 at the conclusion of the progeny test in spite of the fact that his tests were fairly extensive and his progeny performed well in all respects. He sired a number of cryptorchid pigs and a higher than normal number of "off belted" pigs. For these reasons he was culled, although his progeny performance in other respects were quite good.

Summary

Performance and progeny test records have been presented on sets of boars from three lines in three different breeds. A study of these records indicates the usefulness of a herd testing program for the evaluation of individual performance and also a progeny testing program for the selected sires to improve the efficiency of overall selection. Individual performance, pedigree and family performance are extremely useful in the initial selections of young herd sires and these are correlated to the breeding values of these individuals for heritable traits, but they are not perfect indicators of breeding value. The progeny test gives new information about breeding value which will make the overall testing and selection program more complete and more reliable. To carry out such a program it is necessary to performance test a much larger number of boars than needed for service in order to permit selection on performance test results. It is also necessary to select more boars to be progeny tested than are actually needed for service to permit more opportunity to select on progeny test results and also increase the chances of locating the really superior sires.