Boar Selection: Guidelines for Commercial Producers

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January 2000
4 pages

Extension Bulletin E-1086 • Revised January 2000

pork industry handbook

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The performance level of the commercial swine herd is determined by two things: genetics and environment. The genetic contribution is determined by the boars and gilts selected and the crossbreeding program used. Health status, housing, feeding, and management will enhance or hinder the genetic expression of performance traits. This publication provides recommendations for selecting replacement boars.

Identification of Responsible Seedstock Suppliers

It is extremely important to identify seedstock suppliers who can provide superior seedstock as a result of their genetic selection and herd health programs. Buying breeding stock from progressive, responsible seedstock suppliers is the only means by which a herd's production efficiency can consistently improve.

Genetic Improvement

The rate of genetic improvement in a commercial pork producer's herd parallels the rate of genetic progress made by the seedstock suppliers (Figure 1). To make significant genetic progress for any economically important trait (growth rate, feed conversion, carcass merit, or litter size), performance records must be used in selecting animals to produce the next generation.

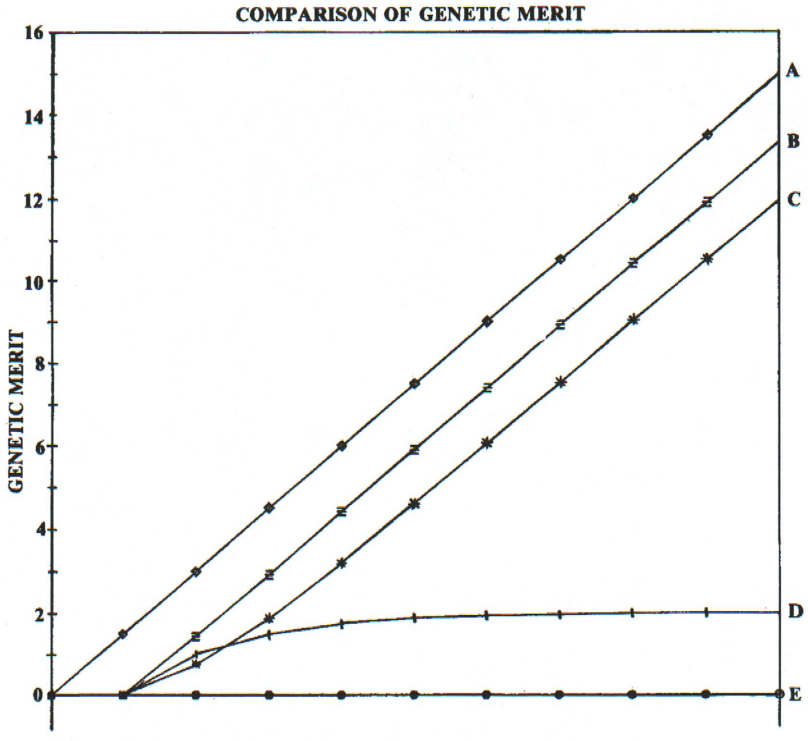
The top three lines (A, B, C) of Figure 1 show the expected improvement in genetic merit when the seedstock herds are making genetic progress. The genetic merit of commercial herds follows the progress made by the seedstock herds. In those seedstock herds making genetic progress, the purchase of the highest-ranking boars available enables the commercial herd to approach the genetic level of the seedstock herd.

Purchase of boars from seedstock herds where genetic improvement programs are not utilized (lines D and E) results in very limited genetic progress. Genetic progress is limited because the genetic merit of the boars purchased is not improving.

Commercial herds that purchase average boars from genetically improved seedstock herds have an advantage over commercial herds which purchase the very top boars from unimproved herds. Average boars from genetically superior herds can be of higher genetic merit than above average boars in genetically average or below average herds. For this reason, identification of seedstock producers is of primary importance. Selection of individual boars from these producers is secondary.

When selecting seedstock suppliers, review their genetic improvement program. A sound genetic improvement program should include four features: (1) accurate, complete performance records including animal identification, consistent measurement of all boars and gilts (not on-again, off-again or limited, partial performance testing), and ranking of animals within defined contemporary groups; (2) assessment of the genetic merit of economically important traits (growth rate, feed efficiency, carcass merit, and reproductive performance) based on the individual's expected progeny difference (EPD); (3) indexes weighting EPD's of traits relative to their economic importance in commercial pork production (the indexes should correctly rank the individuals relative to their intended use in crossbreeding systems); and (4) selection of the highest-ranking boars and gilts based on selection indexes of EPD's. Also using boars of poor or unknown genetic merit, little genetic improvement is possible. By using boars from producers who have not selected superior boars, genetic progress is drastically reduced.

Commercial pork producers cannot expect consistent genetic improvement of economically important traits in their herds unless the seedstock producer uses superior boars.



Key to Figure 1

A. Genetic merit of seedstock herds with sound performance testing and selection programs.

B. Genetic merit of commercial herds buying high ranking boars from seedstock herds with sound selection programs (A).

C. Genetic merit of commercial herds buying average boars from seedstock herds with sound selection programs (A).

D. Genetic merit of commercial herds buying high ranking boars from seedstock herds that are not realizing any genetic progress (E).

E. Genetic merit of commercial herds buying average boars from seedstock he.ds that are not realizing any genetic progress.

Figure 1. Rate of genetic improvement in swine herds.

Therefore, commercial producers should purchase seedstock from suppliers who use their replacement boars and gilts based on EPD indexes.

Seedstock Herd Health

Purchased breeding stock can introduce new diseases and parasites into commercial herds. Therefore, it is important to identify seedstock producers that have implemented comprehensive herd health programs. This includes a veterinarian that makes routine on-farm inspections, conducts blood tests and other diagnostic procedures, examines animals, counsels, and makes recommendations. The seedstock supplier should minimize opportunities for new disease organisms to enter the herd by blood testing, isolation of herd replacements, strict traffic control, and sanitation. The management program also should include adequate nutrition, comfortable housing and ventilation, and vigorous parasite control

Considerations When Choosing Boars

Breed of Boar—The crossbreeding program used will likely dictate the breed or cross of boar. Keep in mind that offspring performance in crossbreeding programs is maximized when "breeds" and "crosses" are used in a systematic manner. For more information on selecting breeds and crossbreeding systems, see PIH-39, "Crossbreeding Systems for Commercial Pork Production".

Age of Boar—Select and purchase boars at six to seven months of age for use after they reach eight months of age. Do not use young boars just because they appear to be large enough. Replacement boars should be purchased at least two months prior to their use. This allows them to be isolated and checked for health status, conditioned to the farm, and test-mated or evaluated for reproductive performance.

EPD Indexes—Boars should be ranked on indexes which weight the EPDs relative to the boars intended use in crossbreeding systems. Bioeconomic indexes take into account the multiplication of a boar's genetic merit and the economic impact of each trait on their offspring. STAGES (Swine Testing and Genetic Evaluation System) is a series of genetic evaluation programs implemented by U.S. purebred associations. The STAGES program calculates bioeconomic indexes that have a direct dollar value interpretation. The maternal index includes both reproductive and postweaning traits and has a value of one dollar per index point per daughter litters. The increased value of a superior maternal boar over a lower indexing boar can be estimated as the difference in the index value times the number of litters farrowed by the daughters selected. The STAGES terminal sire index has a value of ten cents per index point per progeny. The increased value of a superior sire over a lower indexing sire can be estimated as one-tenth difference in the terminal sire indexes of the two boars times the number of offspring produced.

If bioeconomic EPD indexes are not available, the seedstock supplier should explain how the boars were ranked including the traits used in developing the index values. The seedstock supplier also should describe the criteria used to establish price categories. Pricing of boars based on bioeconomic EPD index values is superior to pricing based on percentile rank. Bioeconomic EPD indexes have a more straightforward interpretation and application.

Pricing based on percentile rank is less desirable as its interpretation and application is not as consistent for a number of reasons. First, both the actual value and variation of the EPDs are variable from one contemporary group to the next. Second, the percentile rank of the boars tested and the percentile rank of the boars at weaning are both greatly impacted by the percentage of boars weaned that are actually tested. Third, the minimum

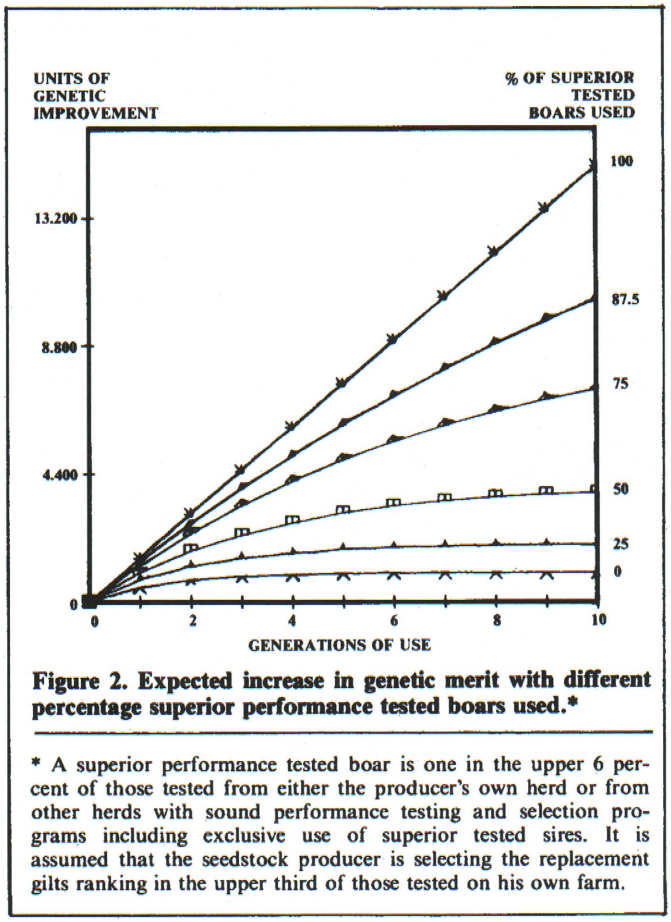


Figure 2. Expected increase in genetic merit with different percentage superior performance tested boars used.*

* A superior performance tested boar is one in the upper 6 percent of those tested from either the producer's own herd or from other herds with sound performance testing and selection programs including exclusive use of superior tested sires. It is assumed that the seedstock producer is selecting the replacement gilts ranking in the upper third of those tested on his own farm.

percentage rank value (i.e., a boar in the upper ten percent) has different meaning in different pricing systems. For example, assume a seedstock supplier that sells the upper five percent of the boars as Elite AI sires. A boar in the upper ten percent includes boars between the fifth and tenth percentile. For another supplier, boars from the upper ten percent include all boars in the upper ten percent including those in the upper five percent. For these reasons, it is best that the seedstock supplier make the EPDs and index values on the individual boars, the value of the mean EPDs and index values of the contemporary group and the percent of boars available at weaning that are tested.

Performance Pedigrees—Performance pedigrees are a listing of the animal's ancestors with their genetic evaluations. Performance pedigrees can document consistent performance testing and selection. For seedstock suppliers realizing genetic improvement, the EPDs and index values will show consistent improvement each generation.

Economic Implications

Commercial pork producers should be willing to pay a premium for genetically superior, healthy seedstock because of the resulting improvement in pork production efficiency, and to offset the seedstock producer's performance testing and health program costs. Support of seedstock producers who have comprehensive genetic improvement and herd health programs will allow for their survival, continued genetic progress, and improved performance. This will enhance your survival in a competitive marketplace and lead to a more efficient pork industry.

Selection Facts to Remember

- For long-term genetic improvement for any economic trait, performance data must be collected and superior animals selected within seedstock herds.
- Improvement of seedstock herd performance by nongenetic means, such as new facilities, improved rations or more space per pig will not result in improvement of the seedstock's genetic merit or commercial progeny performance.
- Performance records from different herds do not allow an accurate assessment of genetic differences. Differences between performance levels of different herds are primarily due to management differences. Across-herd genetic evaluation can help in comparing the genetic merit of pigs from different herds.
- Comparisons are more accurate when individuals are compared to other animals in the same contemporary group. Within a contemporary group, all animals should be treated as uniformly as possible, for example, the same pen space and diet.
- Performance testing and calculation of EPDs and EPD indexes do not result in genetic improvement. Genetic improvement occurs when seedstock herds select the highest-ranking boars and gilts as replacements based on the EPDs. Seedstock suppliers should be able to describe and document their genetic selection program.
- Evaluate potential seedstock suppliers based upon their performance testing and selection practices.
- When purchasing F1 boars, it is important to identify seedstock suppliers who have implemented genetic improvement programs in the purebred lines. Performance testing and selection within the purebred lines is the only means by which the genetic merit and progeny performance of the crossbred boars can consistently improve.
- Not all traits are expressed in boars, e.g., litter size, litter weight, but are expressed in their female ancestors, sibs, and offspring. Thus, EPDs for genetic improvement in reproductive traits are needed.
- Performance traits can be genetically correlated. For example, selection of the faster-gaining, leaner boars and gilts based on EPDs will result in a correlated response for improved feed efficiency.
- Genetic evaluation programs (STAGES and other EPD programs utilizing best linear unbiased prediction (BLUP)) potentially allow more rapid genetic progress by incorporating each individual's performance records with available records of sibs, ancestors, and progeny. The accuracy of these evaluation programs declines as the percentage of animals tested declines. Testing a limited sample of the herd yields inaccurate, biased genetic evaluations.
- Breed associations and breeding stock companies can calculate across-herd EPDs that allow the comparison of individuals performance tested on different farms. The accuracy of across-herd genetic evaluations is dependent on the strength of genetic ties between the herds. Pigs tested in different herds can not be accurately compared unless either common or genetically related sires are used each generation.

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