Pointers in Breeding for Production

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Swine producers are involved with many varied decisions in their swine enterprise. Almost daily decisions are necessary regarding management details, which change with the season. Decisions regarding the kind and content of rations must be made regularly. In terms of time required, decisions on feeding and management seem to be almost full time. They change as new products and new information become available and are shown to be profitable additions.

Decisions affecting which animals are a part of the breeding herd must be made two to four times a year. Although not as time consuming, these decisions can have an important bearing on management decisions. For example, improvements in the breeding herd can result in animals which are:

1. more efficient in feed use—thereby reducing feed requirements for a given number of hogs.
2. faster gaining—meaning less time to market and therefore less labor cost.
3. more desirable in terms of marketable product—less fat, higher proportion of meatiness in animals and therefore a more profitable market hog.

Improvements in breeding depend on keeping as replacements, sows and boars which are genetically superior for type and performance traits. Unfortunately, such evaluations cannot be made accurately by appearance alone. An animal's own performance, the performance of litter mates and other pigs by the same sire, weight for age, backfat probes, carcass data, feed records. All are necessary for more nearly accurate evaluations of animals in the herd.

For every trait in every herd, there will be observed greater or lesser amounts of variation caused by such things as:

- variable management
- spread in age
- sire differences
- litter differences
- individual differences among pigs

Recognizing these major causes of variation makes it possible to allow for them in choosing among potential breeding animals. That is, for example, choose among pigs of similar ages or within a sire group thus minimizing the known differences among them. Recognizing, making allowances for and taking advantage of the variation which occurs is the purpose of a selection program. This means sorting out the animals with superior breeding ability.
Performance traits expressed by swine are the result of a combination of an animal's genetic capability for the traits and the kind of management under which the animal is raised. That part of the variation we observe in the expression of traits caused by differences in genetic capability among animals is called heritability. Heritability estimates are available from research studies on performance traits of swine. Some of the important ones are shown in the following table.

### HERITABILITY ESTIMATES OF SEVERAL SWINE PERFORMANCE TRAITS

<table>
<thead>
<tr>
<th>Trait</th>
<th>Heritability Per Cent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Highly Heritable Traits</strong></td>
<td></td>
</tr>
<tr>
<td>Body Length</td>
<td>61</td>
</tr>
<tr>
<td>Per cent Fat Cuts*</td>
<td>60</td>
</tr>
<tr>
<td>Per cent Ham*</td>
<td>58</td>
</tr>
<tr>
<td>Loin Eye Area</td>
<td>48</td>
</tr>
<tr>
<td>Backfat Thickness</td>
<td>40</td>
</tr>
<tr>
<td><strong>Medium Heritability Traits</strong></td>
<td></td>
</tr>
<tr>
<td>Carcass Score</td>
<td>42</td>
</tr>
<tr>
<td>Feed Efficiency</td>
<td>38</td>
</tr>
<tr>
<td>Per cent Lean Cuts*</td>
<td>34</td>
</tr>
<tr>
<td>Growth Rate (weaning to 200 lbs.)</td>
<td>30</td>
</tr>
<tr>
<td>Conformation Score</td>
<td>26</td>
</tr>
<tr>
<td>Pig Weight at 5 Months</td>
<td>21</td>
</tr>
<tr>
<td><strong>Low Heritability Traits</strong></td>
<td></td>
</tr>
<tr>
<td>Number Pigs Weaned</td>
<td>19</td>
</tr>
<tr>
<td>Litter Weight at Weaning</td>
<td>17</td>
</tr>
<tr>
<td>Number Pigs Farrowed</td>
<td>10**</td>
</tr>
</tbody>
</table>

* Based on carcass weight  ** Estimate probably high

The higher the heritability estimate for a trait, the more opportunities for genetic change by selection. For example, body length has a heritability estimate of 61 per cent. Sixty-one percent of the variation in body length is due to genetic differences among animals. This means it is fairly easy to change body length by direct selection. For characters with low heritability estimates, the opportunities to make improvement by direct selection are limited.

There is no simple 1-2-3 method for making improvements by breeding. It involves a combination of good management, and using all available information about the animals in your herd. A general outline of suggested procedures follows:

A. **General Program and Goal**

1. Provide the management and environment most practical for you in terms of a production program and the quality of pigs you will market for pork.

2. A breeding program is only as good as the way it is carried out.
   a. If you like a breed, find the best breeding animals you can for your herd.
b. If you crossbreed, choose 2 to 4 breeds in order to take advantage of the strong characters of each; raise replacement gilts, but buy purebred boars to use in a definite regular order.

3. Besides being "good-doers" on your farm, your market pigs must also be the kind in demand by the market.

B. For any breeding program:
1. To use the best animals, you must know which they are, so you need a marking system.

2. Select for as few traits as possible.

3. Save as few animals for replacement as possible - the greater per cent that must be saved the less part of the available variation you can take advantage of.

4. Place major selection emphasis on those traits for which heritability estimates indicate there is genetic variability to capitalize on—those with high heritability estimates.

5. Use all available information to aid in selection.

6. There are several swine selection programs worked out which you can use as guides. They are:

   a. The Extension Service On-The-Farm selection program

   b. Breed association sponsored programs such as
      Production Registry
      Advanced Registry
      Star Litter
      Certification

   c. Use the one that fits your needs - it will help minimize the mistakes in saving animals for the breeding herd.

(The South Dakota State Swine Breeding Project is conducted in cooperation with the Regional Swine Breeding Laboratory, AHRD, ARS, USDA.)