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Selection and Management of the Sow Herd

K.J. Drewry and W.L. Singleton, Animal Sciences Department

The two most important factors affecting economic returns from a swine breeding herd are: (1) number of pigs weaned per sow exposed to the boar, and (2) ability of these pigs to convert nutrients into quality pork economically. And both factors are directly influenced by breeding stock selection and herd management.

The genetic profit potential of a swine herd is established when the operator selects his replacement gilts and boars, and when he decides on the mating system to use. Once these decisions are made, then his management and husbandry practices determine the absolute profit or loss potential of the herd.

This publication deals with how to maximize economic potential of pork production through proper selection of replacement gilts and management of the breeding herd.

Selection of Replacement Gilts

Factors to consider when selecting replacement gilts include: their source, health, litter size, dams' productivity, structural soundness, conformation, teat number and placement, femininity, growth rate, backfat, age and number, and the breeds and mating system to be used. Following is a discussion of each of these factors.

SOURCE AND HEALTH

Most producers prefer replacement gilts that are "home-raised." This permits selection from the top end of the group of potential replacements, which probably would not be possible if gilts were purchased. In addition, the animals are already acclimated to the health condition of the farm.

If gilts are purchased, you should pay particular attention to the health of the herd from which the gilts come. Those selected should either be blood tested and found negative for brucellosis or be from a validated brucellosis-free herd. Purchased gilts should be from the top half of the herd.

All replacement gilts, regardless of source, should be vaccinated for erysipelas at 6 to 8 weeks of age if it is a problem in your area. Also treat for internal and external parasites at this time or at weaning.

LITTER SIZE, UNDERLINE AND SOW PRODUCTIVITY

In selecting replacement gilts, whether purchased or from your own herd, give special attention to litter size, the gilts' underline and their dams' productivity.

At weaning, identify those gilts that (a) are from litters of 8 or more pigs farrowed, (b) have 12 or more evenly-spaced, functional teats (at least six per side), and (c) are from sows possessing the following productivity traits:

1. No problems at farrowing.
2. Largest number of live, uniform-sized pigs at farrowing.
3. Weaning the highest percentage of live pigs farrowed.
4. Litters with the heaviest weights at weaning.
5. Least amount of skeletal structure-related problems during farrowing and nursing.
6. Desirable temperament and disposition.
7. From "sow-lines" exhibiting good longevity.

The job of selecting the best gilts can be simplified by some way identifying potential replacements at farrowing (i.e., those from litters of 8 or more pigs). For commercial producers, the 1-3-9-27-81 ear notching or tag system is suggested. Then
at weaning, make additional identification using the following or similar gilt-sow scoring system:

1. Gilts with 14 evenly-spaced, functional teats from the top-producing sows have a small hole punched in both ears.
2. Gilts with 12 or more evenly-spaced, functional teats from slightly less desirable sows have a hole punched in the right ear.
3. Gilts with 12 evenly-spaced teats from sows of average production have a hole punched in the left ear.

These identified potential replacement gilts should be fed together in the same pen or section of the house from weaning on, to reduce the possible effects of management and/or housing differences which might otherwise occur.

STRUCTURAL SOUNDNESS

Replacement gilts should be structurally correct, with sound feet and legs. This is becoming increasingly important due to total confinement swine production. Lack of structural soundness results in lowered fertility when the production program requires breeding in confinement.

Replacement gilts should be fed and managed in confinement on concrete or slats until they are about 5 months of age. This will allow any structural soundness problems to be exhibited. Those proving to be structurally sound following 5 months in confinement should perform satisfactorily in either confinement- or pasture-production programs.

CONFORMATION

In selecting replacement gilts, there has been a tendency to place too much emphasis on extreme muscling and meatiness, at the expense of other production factors. The emphasis on percentage of ham and loin in carcass shows has often resulted in the selection of gilts that are too muscular.

Recent research data and field observations indicate that extremely meaty gilts exhibit poorer reproductive performance and "mothering ability" traits. Therefore, give more attention to the other conformation factors, such as length, size and body capacity, underline and structural soundness, and less to extremes in meatiness.

FEMININITY

Remember, the purpose of the gilt is to produce pigs that produce meat. So, a replacement gilt should look like a producing sow, not like a market barrow or boar. That is, she should exhibit the physical characteristics of the female by being somewhat smoother and less muscular, and by having a well-developed underline and external organs.

Do not select a gilt with an extremely small vulva, since that often indicates an infantile reproductive system. Gilts with small vulvas may never come into estrus (heat), or they may cycle at a much older age than gilts with well-developed vulvas. The small vulva condition is more common among certain lines of extremely meaty gilts or among gilts raised under strict confinement conditions.

PERFORMANCE RECORDS

Performance records are valuable evaluation tools in gilt selection. These include growth rate, backfat, loineye and feed efficiency. When basing selection on such records, consider, if possible, only those animals from the top half of the herd or group that have acceptable underline, were from litters of 8 or more pigs farrowed, and were raised in confinement on concrete. A gilt’s growth rate, backfat and visual structural soundness should receive the most emphasis. However, if performance records are not available, then select gilts with the heaviest weight for age that are acceptable for litter size, underline, type, soundness and backfat.

Both purebred and commercial producers should consider using the recently-developed On-Farm Gilt Testing Program, offered by the Purdue University Animal Sciences Extension Section for evaluating their home-raised replacement gilts. Guidelines for this program are presented in Purdue Extension Publication AS-413 (see “Related Publications,” page 6).

AGE AND NUMBER

Age of gilts at selection and number to select depend somewhat on whether the gilts are home-raised or purchased. For home-raised gilts identified at birth or weaning, make initial selection at 5 months. Choose 50 percent more than required as replacements, separate them from the market animals and feed a growing-conditioning ration. At 7 months of age, cull and market the least desirable 30 percent. This leaves 20 percent more than are expected to farrow to compensate for the 80 percent conception rate expected with first-time breeders.

For purchased gilts, again look for those around 5 months of age and select 20 to 25 percent more than are expected to farrow. Place purchased gilts in isolation for 30-45 days and feed a growing-conditioning ration. Cull the least desirable 5 percent at 7 months.

BREEDS AND MATING SYSTEMS

The factors discussed above are important to both the purebred and commercial producer. However, when it comes to breeds and mating
systems, the purebred producer must select and mate only pedigreed animals within his breed, whereas the commercial producer may select either purebred or crossbred animals.

**Purebred vs. Crossbred**

Crossbred dams generally offer the following advantages over purebreds: (1) higher conception rate, (2) larger litters, (3) better milking ability, (4) greater longevity and (5) more vigorous pigs. However, *outcross* or *outbred* dams (from mating unrelated purebred animals of the same breed) will give the same response as observed with crossbreds but at a lower level. Thus, type of mating system followed is important to both the purebred and commercial producer.

**Crossbreeding Programs**

Several crossbreeding programs are used by commercial swine producers. The most popular at this time is “rotational crossbreeding.” This program utilizes only two or three breeds, and replacement gilts are selected from the herd. Gilts are selected on the basis of growth rate, feed efficiency and maternal traits, and are mated to boars high in production traits and carcass merit. It is easy to follow and systematic, since the breed of the purbred boars is rotated with each generation of gilts.

Another crossing program gaining in popularity is “terminal crossbreeding.” Here, two-breed cross gilts are produced by mating breeds that rate high in maternal traits. These crossbred gilts are then bred to boars (either purebred or crossbred) that rate high in carcass merit and production traits. All pigs produced are marketed. This systematic program is used both by larger commercial operators in producing their own replacement gilts and by many of the feed companies and commercial swine breeding organizations that sell replacement gilts.

**Breed Ranking and Use**

Table 1 compares the various breeds of swine relative to nine production and carcass traits. This rating is based on research results from 13,000 litters across the U.S.; on performance data on 15,000 pigs in Indiana, Ohio, Minnesota and North Carolina swine evaluation station programs, and on field observations by the Purdue Animal Sciences extension and research staff. It gives the purebred producer an indication of his breed’s good points and where emphasis should be placed in his selection program. It also gives the purebred and commercial producer an idea of which breeds should be used in the various rotational or terminal crossbreeding programs, and when.

Remember, these rankings will change over time due to selection within the purebred herds. Also remember that breeds which rank low for a particular trait will still have individuals or lines superior to the lower-producing individuals or lines of a breed ranking higher for that particular trait.

The commercial producer’s gilts and sows should be a crossbred from breeds ranking high in maternal traits, such as litter size, mothering ability and milking ability. These dams should then be bred to boars of breeds ranking high in carcass and production traits.

The kind of gilts and sows produced by the purebred breeder will determine the way his breed will be used by the commercial producer. If rotational crossbreeding continues to be popular, the purebred breeder should strive to produce gilts that rate “average” in all the production and carcass traits.

However, if terminal crossbreeding becomes the most popular, then he will have to decide whether his breed should be used on the “sow-side” or “boar-side” of the cross. If on the “sow-side,” he should emphasize the maternal and production traits; if on the “boar-side,” he should emphasize the production and carcass traits, with slight selection pressure on maternal traits.

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Breeding Herd Management

MANAGING THE REPLACEMENT GILTS

Proper management of selected gilts returns big dividends to the swine producer. A good management-development program for the replacement herd before and after breeding will eliminate many potential problems that affect conception rates, litter size and pig performance. Following are the essentials of such a program.

Developing the Gilts

Replacement gilts should not become too fat. Ideally, they should be reared in confinement or on concrete under a full-feeding program until initial selection at 5 months of age. Then separate and feed 4½ to 5½ pounds of a 15% developer ration per day from 5 to 9 months of age. Feeding levels of that ration will vary with the climate conditions and the particular group of gilts.

After final selection at about 7 months of age, allow the replacement gilts to have “fence-line contact” with the present breeding herd so they can build-up immunities to any diseases which might be present. Also allow them fence-line contact with the boars to hasten sexual maturity and activity.

As stated earlier, potential replacement gilts should be reared up to 5 months old in confinement on slats or concrete to “prove” structural soundness. After that, ideally they should be developed in drylot or on pasture until bred at around 9 months. However, if they must continue in confinement, provide 16-24 square feet per gilt.

About 2 weeks before breeding, vaccinate for erysipelas (if a problem) and leptospirosis, and treat for external and internal parasites.

Age to Breed

Gilts should be at least 8½ to 9 months old and weigh approximately 250 pounds at breeding. As with boars, too many producers begin breeding when the gilts are still too young and thus not sexually mature. Even if large enough at an earlier age, do not breed gilts until they are at least 8½ to 9 months of age.

Whether or not you practice flushing (i.e., increasing feed level prior to breeding) depends on your feeding program the 2 months before breeding. Research shows that flushing has little effect on actual litter size; however, the gilts should be in a weight-gaining condition when breeding begins. If you do flush, cut back feed intake immediately after breeding.

The Heat Cycle

Gilts will begin to exhibit estrous cycles between 6 and 8 months. These cycles are 21 days in length (ranging from 17 to 22 days). During each cycle, there is a period of 24 to 48 hours in which the gilt will be in estrus (heat) and will accept the boar. Signs of estrus include: swollen vulva, nervousness and the “standing reflex” when pressure is applied to the rump area. Ovulation occurs sometime between the middle to end of the 24- to 48-hour estrus period, with up to 18 to 20 eggs being shed from the ovaries.

For optimum conception rate and litter size, the gilt should be bred at the beginning of standing estrus and again 12 to 24 hours later.

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Replacement gilts are usually either hand-bred or pen-bred. Hand-breeding means taking the boar to the gilt or vice versa and separating them after mating is completed. Advantages include: controlled use of available boars and accurate breeding records; however, it requires more labor.

Pen-breeding means turning boars in with a group of gilts for a given number of days. Less labor is involved, but more boar power is required, and accurate breeding dates are not known.

Generally, during a 4-week breeding period, a young boar (8½ to 12 months old) can pen-breed 10 to 12 gilts, whereas an older boar can breed up to 15 or 20 gilts during the same period. With hand-breeding, maximum services for the young boar should be two daily and 10 weekly, and for the older boar three daily and 15 weekly.

Breeding can take place in confinement, in drylot or on pasture. If in confinement, hand breeding is highly recommended. The bred gilt then can remain in confinement for gestation, if desired.

The first three weeks after breeding is a critical period with regard to the life of the embryo. Research data show that, on average, 25 percent of the eggs fertilized at breeding will be lost by the 25th day of gestation. Therefore, anything you can do to minimize excitement or other forms of stress that would raise the gilt’s temperature can significantly reduce the chances of early embryonic death.

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Breeding can take place in confinement, in drylot or on pasture. If in confinement, hand breeding is highly recommended. The bred gilt then can remain in confinement for gestation, if desired.

The first three weeks after breeding is a critical period with regard to the life of the embryo. Research data show that, on an average, 25 percent of the eggs fertilized at breeding will be lost by the 25th day of gestation. Therefore, anything you can do to minimize excitement or other forms of stress that would raise the gilt's temperature can significantly reduce the chances of early embryonic death.

MANAGING THE SOWS

Normally, sows will not return to estrus (heat) when nursing their litters. However, one occasionally will, if she has been lactating for over 6 weeks or if nursing a small litter.
Nursing sows are usually full-fed up to weaning. Many producers then withhold feed and water the first 24 to 48 hours following weaning to help dry up the milk flow. (This practice is probably more important when weaning at 3 to 4 weeks than when weaning at 7 to 8 weeks).

After the sows dry up, limit-feed 6 to 8 pounds of a well-balanced, high-energy ration. If the sows are “extremely thin,” they may need to be full-fed. As with gilts, sows should also be in a weight-gaining condition at breeding for optimum conception rate and litter size.

**BREEDING THE SOWS**

A sow will normally have her first estrus period within 3 to 7 days after weaning. Whether or not you breed her at this time will depend on your farm’s farrowing schedule. But keep this in mind: conception rate and litter size are likely to be lower with breeding on first estrus if pigs are weaned younger than 3 weeks.

If the sow is not bred immediately following weaning, she will re-establish her 21-day estrous cycle. Conception rate and litter size are not greatly increased by skipping the first estrus, when weaning is at 3 weeks or later.

Sows can be either hand-bred or pen-bred. The hand method is recommended if breeding is done in confinement. (Bred sows can be kept in confinement during gestation, if desired.) If pen-breeding is used, the sows should be moved to a dirt lot.

Since nearly all of your sow herd will come into heat within a 3- to 7-day period, make sure you have adequate boar power. For optimum fertility, maximum number of services recommended for a mature boar is three daily and 15 weekly. Proper management of the boar during breeding is outlined in AS-409 (see “Related Publications,” page 6).

**PREGNANCY CHECKS**

Maintaining a gilt or sow that you thought was pregnant but, in fact, was not, is very expensive in terms of feed, labor, facilities and inefficient scheduling. Using 1974 prices, a gestating sow or gilt costs 45 cents a day to feed and maintain. That adds up to more than $30 per animal from day 30 to day 100 of gestation, whether she’s pregnant or not. And for sows, very little, if any, of the feed cost is recovered since they are usually fed just to maintain their body weight. Gilts, however, should gain 75 to 100 pounds during gestation.

It’s very important, therefore, to detect “open” sows and gilts as early in the gestation period as possible. One method is to observe the herd closely each day for signs of estrus. Any animal showing estrus can then be culled or put back in the breeding pen. Most producers, however, do not have or will not take the time to observe the herd each day.

Another method, recently developed to diagnose pregnancy between 30 to 80 days of gestation, utilizes an ultrasound device called a “prenoticator.” It is easy to use, fast, accurate and does not require that the animal be restrained.

**Summary**

Proper selection and management of the swine breeding herd will return big dividends to the swine producer. Careful selection of replacement gilts will eliminate many potential reproductive problems. In addition, use of proper breeds, mating system and breeding method for your particular situation, together with good breeding herd management and nutrition will mean maximum breeding herd performance.

A realistic reproductive efficiency goal for any swine producer is: (1) a 90 percent conception rate for the 28-day breeding period, and (2) 9.5 pigs weaned per litter at 4 weeks. Following the practices outlined in this publication should help you realize that goal. In review, these practices are:

- Identify all animals, especially gilts.
- Select gilts at 5 months.
- Use production records to select top gilts.
- Pay special attention to the underline, structural soundness and litter size.
- Design and follow a selection-mating system which optimizes the genetic potential of the various breeds.
- Do not allow gilts and sows to become too fat prior to breeding.
- Allow fence-line contact of replacement gilts with sow herd and boars for at least 60 days prior to breeding.
- Provide adequate boar power during the breeding period.
- Hand-mate when breeding in confinement.
- Feed gilts to gain about 75-100 pounds and sows to gain about 50 to 60 pounds during gestation.
- Keep pregnant gilts and sows as comfortable as possible.
- Keep accurate breeding and farrowing records.
- Cull open and low-producing sows.
RELATED PUBLICATIONS

Single copies of the following Purdue Extension publications related to swine breeding herd selection and management programs are available free of charge to Indiana residents from their local county Extension office or from the CES Mailing Room, AGAD Building, Purdue University, West Lafayette, Indiana 47907.

"Balanced Rations for Swine" (AS-350)
"Confinement Sow Management" (ID-80)

"Feeding Systems and Rations for Gestating Sows" (AS-408)
"Indiana On-Farm Boar Testing Program — Rules and Regulations" (AS-380)
"Indiana On-Farm Gilt Testing Program — Rules and Regulations" (AS-413)
"Indiana Station Boar Testing Program" (AS-299)
"Selection and Management of Herd Boars" (AS-409)