Guidelines for Choosing Replacement Females
Michigan State University
Cooperative Extension Service

Authors:
William T. Ahlschwede, University of Nebraska
Daryl Kuhlers, Auburn University
Reviewers:
Maynard Hogberg, Michigan State University
James F. Schneider, Holmen, Wisconsin

November 1992
4 pages

pork industry handbook

MICHIGAN STATE UNIVERSITY COOPERATIVE EXTENSION SERVICE • EAST LANSING, MICHIGAN

Guidelines for Choosing Replacement Females

Authors:
William T. Ahlschwede, University of Nebraska
Daryl Kuhlers, Auburn University

Reviewers:
Maynard Hogberg, Michigan State University
James F. Schneider, Holmen, Wisconsin

The productivity of the sow herd is the foundation of commercial pork production. The sow herd also contributes half of the genetic makeup of growing-finishing pigs. These factors together indicate the importance of careful selection of replacement gilts and wise decisions on their retention in the breeding herd.

The choice of crossbreeding system plays an important role in the development of a gilt selection and sow-culling strategy. With rotational crosses, all gilts are candidates for selection. It is reasonable to be quite selective. With the specialized terminal crosses, the matings producing replacement gilts are less productive than those producing market hogs. Hence, the number of matings to produce replacement gilts and the opportunities to select gilts are minimized.

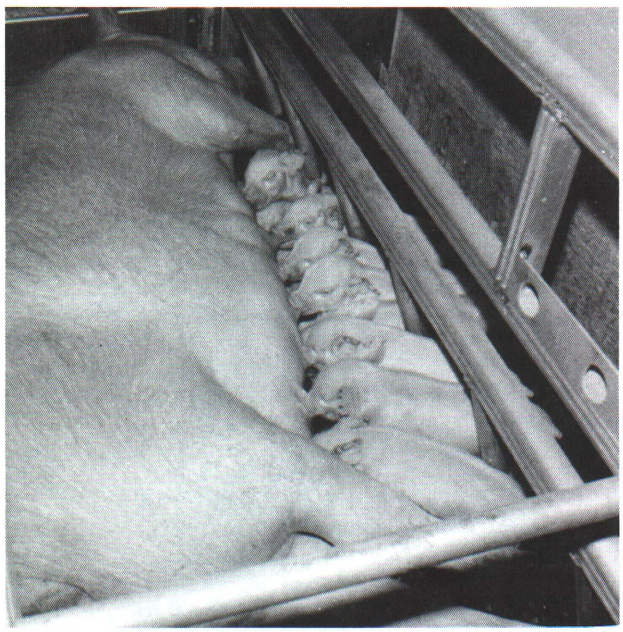
From among those gilts available for selection, select the fastest growing, leanest gilts that are sound and from large litters; and among sows which have farrowed and will rebreed, cull only those with physical problems, bad dispositions, extremely small litters (more than 3 pigs below herd average) and poor mothering records.

Pork producers with small sow herds will find it difficult to maintain the breeding groups required to produce their own gilts for terminal crosses. For these producers to profit from the increased productivity of terminal crosses, purchasing replacement gilts may be desirable. It is recommended that producers purchasing replacement gilts establish a continuing relationship with a reputable supplier of healthy maternal crossbred gilts.

The Sow's Job

The success of a commercial pork operation depends upon the sow herd weaning large litters of pigs regularly. This means that a large percentage of the sows and gilts show estrus and breed, farrow large litters of vigorous pigs, keep a high percentage of the pigs alive and get their pigs off to a good start. All of these functions are affected by environmental situations and management practices. All are affected by genetics. However, the large genetic influences are due to breed differences and heterosis. Differences among gilts and sows in a breed group are much less important. Direct selection from among gilts cannot be made for these sow productivity characteristics.

The size of litter in which a gilt is born and the weaning weight of the litter genetically are traits of the gilt's mother. Selecting gilts for these traits would be selection on the dam's record, which dilutes the selection effort. Our understanding of the genetic basis for these traits indicates that economically important genetic changes can be made by selection. The large



nongenetic variation in these traits, particularly litter size, makes it difficult to detect the change. The place for selection on sow productivity is at the seedstock production level in breeds destined for use as sow lines. Seedstock producers are positioned to use Estimated Breeding Value (EBV) procedures to accelerate genetic improvement. Purchase boars for siring replacement gilts from sources whose selection criteria includes sow productivity. Choose boars with high EBV's for sow productivity traits.

Keeping the baby pigs alive and getting them off to a good start generally are classified as maternal effects. Successful management schemes assign the job of keeping pigs alive to the manager as well as to the sow. If management intervenes on the pigs' behalf by fostering pigs to equalize litter size, by hand feeding weak pigs, and by administering timely treatment of baby pig health problems, the sow should not be held wholly responsible for differences in survival. In the matter of getting pigs off to a good start, there are important differences among sows which show up in weight gain of suckling pigs. For culling purposes, evaluation of pig weights for indication of sow milking performance should be made before the pigs are 4 weeks old, preferably at 3 weeks of age.

Evaluating maternal performance early is supported by two types of rationale. First, before 3 weeks of age, the pig relies almost entirely on the sow as a source of nutrients. Under usual production practices there is no alternative. After the third week the litter's need for nutrients often surpasses the sow's ability to produce milk. At that time, the pigs can turn to dry feed to meet part or all of their needs.

Second, there is evidence which suggests that heavy pig weights up through 4 weeks indicate high levels of milk production, but heavy suckling pig weights after about 4 weeks of age indicate lower levels of milk production. This is because pigs on poor milking sows start creep feed earlier and eat more dry feed. Hence, evaluation of sow milking performance should be made at about 3 weeks of age.

Since fairly low rates of sow culling are suggested and equalizing the size of litters is expected, evaluation of sow performance should identify those sows that obviously are milking poorly. Sows that are slow to come to their milk, that have light pigs at 3 weeks or have pigs that die because of too little milk should be marked for culling.

In addition to farrowing and starting pigs, the sow supplies half the genetic composition of the offspring. Rate of gain, fat thickness, and feed efficiency are commercially important traits which respond to selection. Increased gain and reduced fat thickness can be selected for directly in replacements. Feed efficiency is favored indirectly by selecting the fast-growing, low-backfat gilts.

A balance between sow culling and gilt selection needs to be established. Replacement gilts are needed in sufficient numbers to replace sows as they are culled. Gilts replacing sows represent the major opportunities for genetic change in the sow herd. This change is primarily due to the genetic superiority of the boar selected to sire replacement gilts. Replacing sows with gilts also represents an opportunity to change the breed composition and heterosis level of the sow herd.

Since sows generally produce larger litters of heavier pigs, replacing sows with gilts may reduce production levels. This production differential and the low relationship between the performance of successive litters argue for low rates of culling based on sow performance in order to maintain high levels of production. This must be balanced against the genetic change made possible by bringing gilts into production. A total gilt replacement level of 15-20% is suggested for each farrowing.

The gilt selection and sow culling scheme suggested assumes that there are no major genetic antagonisms between litter size and maternal performance on one hand and rate of gain and low backfat thickness on the other hand. There is some evidence that the so-called "very meaty gilt" does not make a good sow. However, there is no documented evidence that selecting fast-growing, low-backfat gilts will adversely affect sow performance.

Soundness. Soundness means being free from flaws or defects. In selecting replacement females, being sound means being free of flaws or defects which would interfere with normal reproductive and maternal function. Three areas are of particular concern: (1) reproductive; (2) mammary; and (3) skeletal. For selection as replacement stock, sows and gilts should meet minimal levels in each of these categories.

Reproductive soundness. Replacement gilts should exhibit normal reproductive development, both anatomically and behaviorally. The external genitalia should be normally developed (Fig. 1).

Most anatomical defects of the reproductive system are internal and not visible. Gilts with small vulvas (Fig. 1) indicative of infantile reproductive tracts should not be kept. Replacement gilts should begin to show signs of puberty at least a month prior to anticipated breeding. Sows which have difficulty farrowing, are extremely slow farrowing, or have damaged reproductive tracts (uterine prolapse or severe uterine infection) should be culled.

Mammary soundness. Replacement gilts should possess a sufficient number of functional teats to nurse a large litter of pigs. Current industry standards stipulate at least 6 well spaced functional teats on each side. Gilts with inverted or scarred nipples should not be saved. New concrete, rough floors and corrosive chemical compounds on the floors of farrowing houses can cause abrasions to gilts' underlines which result in nonfunctional teats (Fig. 2). As the gilt approaches puberty, her underline should become more prominent, indicating normal development.

Skeletal soundness. Gilts with feet and leg problems which will interfere with normal breeding, farrowing, and nursing functions should not be saved. Sows that are unable to get up and down in farrowing crates should be culled.

Which Gilts and Sows to Select

The fastest growing, leanest gilts which are sound and from large litters should be saved for replacement females. Sows which fail to rebreed should be culled. Sows which had small litters, failed to milk, or had problems farrowing should be culled. Small litter means more than 3 pigs below the group average.

This selection and culling program requires identification of potential replacement gilts at birth. The gilts should be evaluated for growth and leanness as they approach market weight. The purpose of evaluating the growth and leanness is to eliminate slow growing and fat gilts. This is best done when the gilts weigh between 180 and 200 lb. This is considered the final selection. At this time, the gilts are appraised for indications of normal reproductive development, functional appearance of the underline and skeletal soundness.

Ear-notching gilts at birth with litter and individual notches, along with a written record of birth date, litter size and breed composition will meet the needs of the gilt selection program. Less complex identification systems can be used if they provide a method of identifying gilts from large litters and allow age determination at the time gilts are evaluated and added to the breeding herd. Some producers have notched only gilts from large litters, using birth date as the number so the age can be determined. Ear tags are helpful in identifying sows in the breeding herd (Fig. 3). Sufficient sow identification and farrowing house records need to be kept in order to cull the right sows.

Purchasing Replacement Gilts

The adoption of specialized terminal crosses creates a dilemma for producers with sow herds too small to maintain a separate breeding group for the production of replacement gilts. Yet the added productivity of the maternal cross sows is needed to provide competitive profit levels. For producers with few

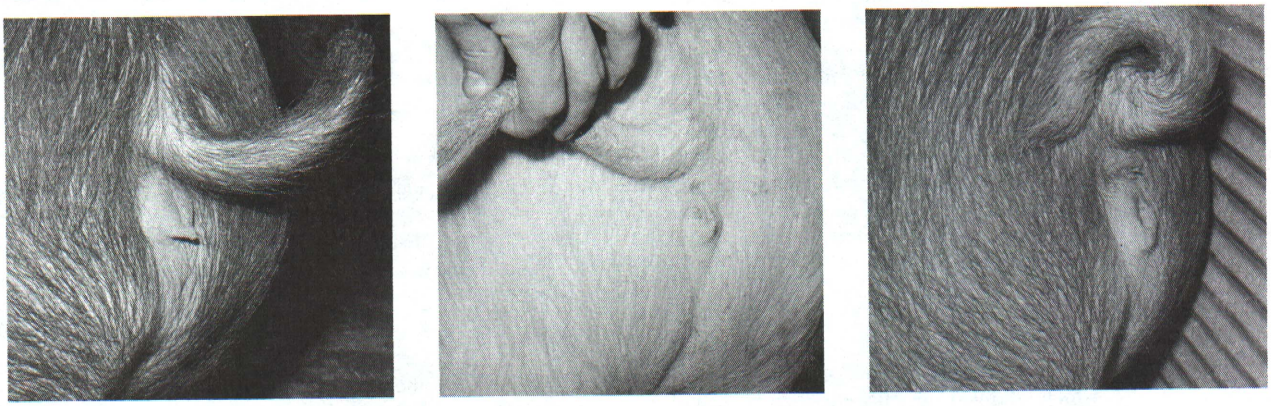


Figure 1.–Select gilts with normally developed external genitalia (left). Gilts with small infantile (center) or abnormal (right) vulvas should not be kept.

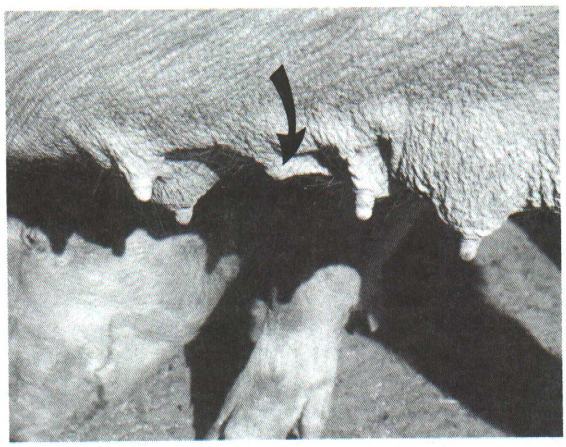
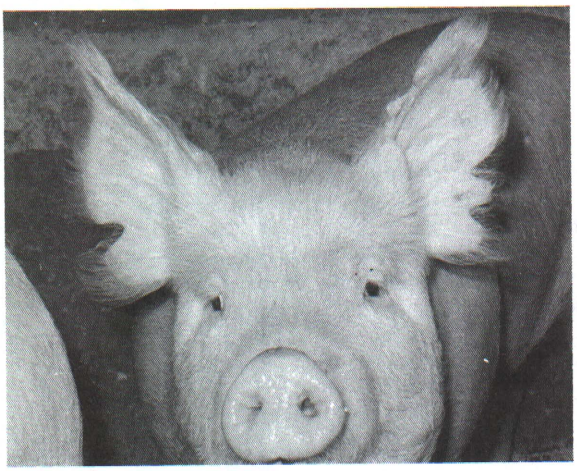


Figure 2.–Nonfunctional teat caused by concrete burn during first week of life.



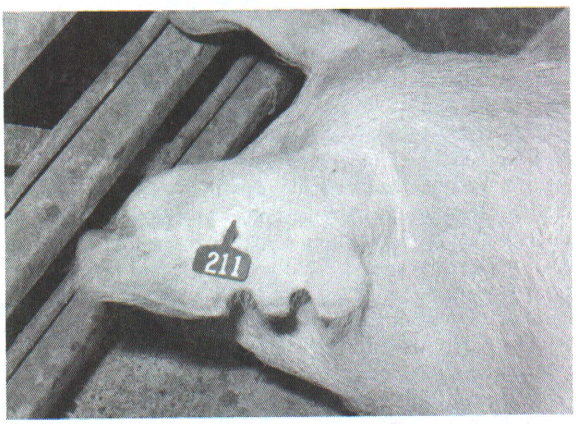


Figure 3.–Permanent identification with ear notches (top). Ear notches can be supplemented with an ear tag for sow identification (bottom).

sows, purchasing replacement gilts may be desirable. The productivity of specialized maternal crossbred sows usually more than repays the purchase price. The health status of the purchased gilts is a major consideration.

When purchasing replacement gilts, the source of the gilts is the primary concern. The source controls the health status and the breed and cross of the gilts. The source determines the genetic worth of the gilts by the selection practices employed in the production of the gilts. The source is the agent of quality control and provides service if needed. Hence, the choice of supplier is the most critical decision when buying gilts.

Health. By restricting gilt purchases to a single source, commercial producers can establish the herd health level experienced by the supplier. Hence, it is important to choose a herd with an excellent health status. Sources with defined herd health programs and monitoring procedures are preferred. Consult with the veterinarian of the herd and with other customers to verify the herd status. Inspection of the herd is in order.

Breed and cross. The purpose of buying replacement gilts is to get breed combinations and crosses that cannot be produced effectively at home. It is an opportunity to buy the best cross for your farm. Compromises in the breed and heterosis level of the gilt must be accompanied by substantial savings in purchase price. One buys the lifetime performance of the sow when gilts are purchased. To assure complete or 100% heterosis, the sire of the gilt must be of a breed not represented in the sow producing the gilt.

Genetic worth. Within every breed or cross, a wide range of genetic merit or worth exists. Among groups within the breed or cross, the major factor in genetic merit is the selection practiced among the parents of the group. While it is not possible to determine exactly the genetic merit of the herd, it is possible to make a meaningful assessment of potential sources. Two indirect methods are suggested. The first is to evaluate the selection practices of the source herd. A replacement gilt supplier who bases selection decisions on performance tests for rate of gain, leanness and sow productivity is preferred to one which does not. The other source of information about the genetic merit of a replacement gilt supplier is other customers. Often the supplier will provide testimonials from satisfied customers. It is preferred to check customer results independently.

The availability of microcomputers and the development of new software has made more accurate evaluation of breeding stock feasible. If breeders test all litters for several generations, they can estimate the real genetic value of individuals. These estimates are calculated as Estimated Breeding Values (EBV) or as Expected Progeny Differences (EPD). Since parents pass half of their genetic compliment to their offspring, EPD is equal to one-half of the EBV. Computationally, performance records of individuals are considered along with the records of all relatives, weighted by the heritability and strength of family relationships, to arrive at the best estimate of an individual's genetic worth. Breeders who use EBV's or EPD's to make selections in their own herds can make more rapid genetic progress than those who do not.

Quality control and services. One would prefer a source of replacement gilts which shipped to customers only sound healthy gilts of the age and size agreed upon. This is part of the reputation of the source. Even with the best of sources, the buyer is encouraged to inspect the candidate gilts and reject those which are unsound. Willingness to stand behind the gilts and help solve any problems which may develop is the service included with the gilts. While the amount of service supplied will vary with the source, it is important that the nature and amount of service provided be established prior to purchase.

These factors suggest the importance of establishing a continuing relationship with a supplier of replacement gilts. This helps maintain a herd health program and in the timing of shipments of gilts. As the relationship continues, the supplier is better able to provide service. Both parties know what to expect.

Timing Purchases. It is recommended that replacement gilts be purchased at least 30 days before their anticipated breeding. During this period they should be isolated from the main breeding herd, but should be exposed to the organisms of the breeding herd via cull sows and fecal material.

Management for Development

While little direct selection can be practiced for litter and maternal performance, several management practices can be used to help insure optimal performance from gilts. The way the gilt is managed at birth and as she approaches puberty can affect her subsequent reproductive performance. Moving pigs among litters at birth to equalize litter size is a common practice. Equalizing litter size after the gilt pigs from large litters have been identified may also give gilts the best chance to develop normally. Research suggests that gilts reared in large litters are less productive than gilts reared in small litters. Transfer male pigs from litters containing potential replacement gilts to other sows, so that replacement gilts are reared in average sized litters.

Following weaning, gilts should be fed and managed in a way that will accelerate their growth and development until they near puberty.

Replacement gilt candidates should be self-fed a balanced, well-fortified diet during the growing period. When gilts reach 180-200 lb they should be evaluated and selected and placed on a restricted diet fortified for limit feeding. Added accuracy in evaluating growth and leanness by extending the feeding period does not justify the cost of the added feed. The added weight gained on full feed is mostly fat which is not needed and may interfere with subsequent reproduction. In addition, the stimulation from sorting and moving the gilts and reducing their level of feed at 180-200 lb may trigger puberty (first heat) in the gilts. These changes, coupled with fenceline boar contact, should help induce earlier puberty and insure a higher pregnancy rate and larger litters from the gilts.

Gilt Selection Calendar

When	*What*
Birth	• Identify gilts born in large litters. Hernias, cryptorchids and other abnormalities should disqualify all gilts in a litter for replacements. • Record birth dates, litter size, breed composition and identification. • Equalize litter size by moving male pigs from large litters to sows with small litters. Pigs should nurse before moving. • Keep notes on sow behavior at time of farrowing and check on: (a) disposition, (b) length of farrow, (c) any drugs such as oxytocin administered, (d) condition of udder, and (e) extended fever.
3-5 weeks	• Wean litters. Feed balanced, well-fortified diets for maximum growth and development. • Screen gilts identified at birth by examining underlines, and reject those with fewer than 12 well-spaced teats. If possible, at this time select and identify as replacement gilt candidates about 2-3 times the number needed for replacement.
180-200 lb	• Evaluate gilts for growth, leanness, and soundness. • Select for replacements the fastest growing, leanest gilts that are sound and from large litters. Save 25-30% more than needed for breeding. • Remove selected gilts from market hogs. Place on restricted feed. Increase mineral fortification levels. • Give fenceline contact with boar. • Observe gilts for sexual maturity. If puberty records are kept, give advantage to those gilts that have cycled most frequently when final culling is made.
Breeding time	• Make final cull when the breeding season begins and keep sufficient extra gilts to offset the percentage of nonconception. • Make sure all sows and gilts are ear-tagged or identified.

Related Publications

Additional information can be found in the following PIH fact sheets:

PIH-23	Swine Diets
PIH-39	Crossbreeding Programs for Commercial Pork Production
PIH-52	Minerals for Swine
PIH-59	Infectious Swine Reproductive Diseases
PIH-101	Selection for Feet and Leg Soundness

MAJOR REV (destroy old)-11/92-2M-ES-SP-35c