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Michigan State University
Cooperative Extension Service

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April 1994

6 pages

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pork industry handbook

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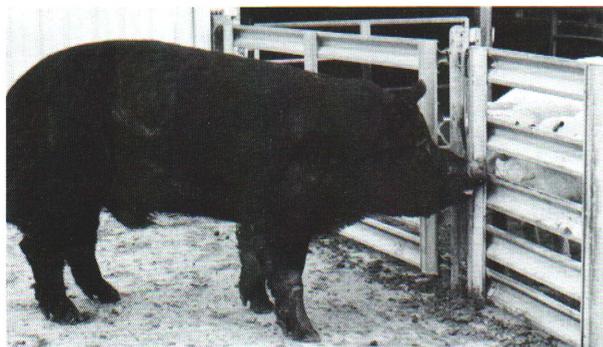
Herd boars influence the swine breeding program in two important ways. One, they provide a source of genetic improvement and two, they have an effect on farrowing rate and litter size. In addition, replacement boars can be a potential source for the introduction of disease into a herd. The following guidelines provide information to help make decisions when purchasing new boars, acclimating them to their new environment and managing them for productive service as mature boars.

When to Buy Herd Boars

Purchase boars at least 45 to 60 days before they are needed for breeding. This allows ample time to locate superior animals and, once they are selected, to check their health, acclimate them to new environmental conditions, and test-mate or evaluate them for reproductive soundness. Boars should be ready for use when they are about 8 months of age.

Adjustment Policy

The code of fair practices adopted by the National Association of Swine Records is a good guideline to follow and is available from purebred associations. The consignor or seller



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is responsible for settlement of all claims. Make all requests for adjustments within a reasonable time after date of delivery to buyer. According to these guidelines, should any boar prove to be a nonbreeder, the seller should either replace the boar with one satisfactory to the buyer, or refund the purchase price.

Many individual seedstock suppliers have their own adjustment policy. Regardless of where herd boars are purchased, it is recommended that both parties understand the sale policy and responsibilities before the transaction. Most seedstock suppliers will enter into a written agreement with the buyer concerning fair adjustment if problems develop with the boar. Seedstock suppliers usually are willing to serve as consultants to the buyer in the selection of boars. They also are an excellent source of practical boar management information, and their suggestions should be carefully considered. If a problem is detected, contact your supplier who may be able to help. Both suppliers and buyers benefit if no adjustment is required.

Pre-Purchase Health and Disease Considerations

Without adequate precautions, the addition of new boars also may mean the addition of disease. There are two critical control points for keeping disease out: 1) limit the number of sources of boars, and 2) match the donor (supplier) and recipient (buyer) herds health status to minimize new disease introduction.

To minimize problems with incoming boars, ask your veterinarian to develop a disease history of the recipient farm through:

- Serum surveys (blood test).
- Slaughter checks.
- Routine farm visits with a veterinarian.
- Postmortems (necropsies) of pigs that die.

Require farms from which animals are purchased (i.e., donor herds) to supply the purchaser with a health history of their farm. Include information on:

- Brucellosis Validation Status
- Pseudorabies Qualification Status
- Serologic survey results. Profile information may vary, but they may reveal information on herd status for Parvovirus, TGE, Leptospirosis, *Actinobacillus (Hemophilus) pleuropneumoniae*, Influenza, PRRS virus, and *Mycoplasma hyopneumoniae*.
- Herd history concerning incidence of *E. coli* diarrhea, Salmonellosis, Swine Dysentery, Porcine Proliferative Enteritis, Atrophic Rhinitis, Sarcoptic Mange, Erysipelas, Streptococcus, *Actinobacillus (Hemophilus) pleuropneumoniae* and Mycoplasmosis or any other diseases.
- Herd history concerning vaccination, deworming and feed additive programs.

Once this information is compiled, compare the history of the donor and the recipient herds and decide whether or not the disease risks, if present, warrant the purchase. References from other customers may also be helpful. Be sure to follow current state laws which regulate inter- and intrastate transport of swine.

Transporting Newly Purchased Boars

Many seedstock suppliers offer a delivery service to their customers. Regardless of who transports the boars, proper care insures maximum animal performance by minimizing stresses, injuries and diseases. Any stress or disease that causes extremes in body temperatures can lower fertility or even produce temporary sterility which might last 6 to 8 weeks. Therefore, carefully follow these suggestions when transporting newly purchased boars:

- Avoid shipping boars that have been fed within an hour or two before loading.
- Provide a safe, well-built loading and unloading facility.
- Clean and sanitize the truck/trailer before transporting the boars.
- Provide a covered truck/trailer with suitable bedding (sand in summer, straw in winter) and protection against weather.
- Use a divider when hauling unfamiliar boars in the same truck/trailer.
- Avoid harsh handling of animals while loading and unloading.

Quarantine

Isolate newly purchased boars at least 30 days (preferably 60 days) in quarters that have been cleaned and sanitized 2 weeks before they arrive. The isolation facility should (1) be located several hundred feet from the rest of the herd, with precautions taken to avoid disease transmission by pets, rodents, equipment and human vectors; (2) provide protection from extreme weather conditions; (3) allow about 20 square feet of dry, draft-free, well-ventilated sleeping area per animal; and (4) be adjacent to an exercise area.

Maintain biosecurity (isolation) between new additions and the rest of the herd. Feed and check on the isolated animals at the end of each day. Do not return to the herd after taking care of the new boars. Provide separate boots and coveralls to wear while caring for the new additions.

During the quarantine period, avoid medicated feed that may mask disease symptoms. Observe boars each day for signs of coughing, diarrhea, lameness and unthriftiness. If signs of disease develop, contact a veterinarian to investigate the problem and serve as a third party advisor to both the buyer and seller.

During the first week, deworm and vaccinate for parvovirus, leptospirosis, and other diseases as recommended by your veterinarian. Eradicate lice and mange from the new breeding stock.

After 30 days of isolation, blood test the new additions for brucellosis, pseudorabies, transmissible gastroenteritis (TGE), and other diseases as indicated. Continue the isolation period until all health tests are received and evaluated. Begin exposure to breeding barn manure, cull sows or a small number of finishing-age gilts that will not be returned to the herd. This allows adequate time for new boars to acquire immunity to your herd's diseases.

Feeding

During the initial isolation period, feed a diet similar to that fed by the seller. This reduces stress associated with relocation. Change the diet gradually to match the buyers.

Young boars are still growing and should be fed at a level which allows for moderate weight gain. Depending upon the diet, boar age, boar condition and housing conditions, feed the boar 5 to 6.5 pounds of a balanced 14% crude protein diet per day—5 to 5.5 pounds for younger boars; 5 to 6 pounds for mature boars. Some boars with exceptionally high sex drive and those used in pen mating systems in outside facilities during cold weather have higher maintenance requirements and the daily feed levels should be adjusted accordingly. A suggested guideline is to provide an additional 3.5 to 7 ounces of feed per day for each degree below 68°F. Overfeeding boars can lead to reproductive problems and decrease the length of service in a herd.

A well-balanced sow gestation diet of approximately 65 grams of crude protein, 3.0 grams lysine and 2.0 grams methionine and cystine per pound should be adequate for breeding boars. When limit-feeding any diet to reduce the energy intake, be certain that adequate levels of protein (amino acids), vitamins, and minerals are present to meet the boar's requirements for these nutrients.

Test-Mating and Semen Evaluation

Records indicate that about 1 in 10 young untried boars have a fertility problem that renders them either sterile or subfertile. The simple practice of test-mating to identify a problem boar before the breeding period starts, can save dollars by avoiding lost time and interrupted pig flow. Boars are not normally sexually mature until at least 7 months of age and should not be used before this. Test-mate at between 7 to 8 months of age. The procedure is as follows:

1. Take a gilt in estrus (heat) to the boar, and observe the boar for aggressiveness and desire to mate. If the boar is test-mated while he is still in isolation, select market gilts and do not return them to the herd.
2. Give the boar assistance during the first two to four matings, if necessary. If the boar mounts the front end or side of a female, gently move him around to the proper position. He should soon learn to mount correctly.
3. Observe the boar's ability to enter the gilt and complete the mating which should take from 3 to 10 minutes. Check for a limp, injured, infantile or tied penis. If a female is mated, check her for estrus with a boar 18 to 22 days later to determine if she became pregnant. At least three gilts should be bred for best accuracy.
4. If possible, collect and evaluate a semen sample. Semen collection by the hand pressure technique is preferred. Evaluate the sample for semen quality, i.e., sperm motility, concentration, morphology and semen volume. With a minimum amount of training, most producers can learn to perform this evaluation themselves. (See PIH-64, Artificial Insemination in Swine).

There is no absolute laboratory test for fertility; but through test-mating and semen evaluation, it is often possible to detect a sterile boar or one of questionable breeding soundness. Early detection of these problem boars allows for prompt adjustment or replacement.

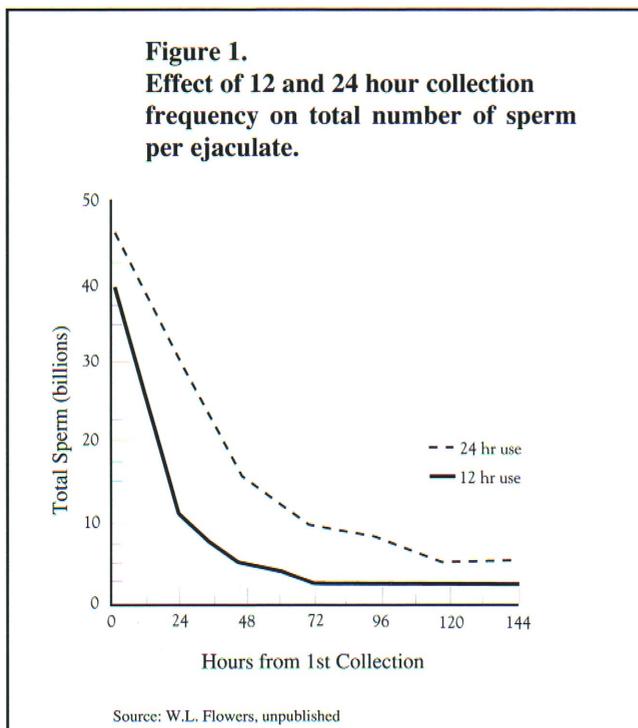


Table 1. Recommended maximum number of services per boar, by age.

Boar	Individual Mating System Maximum Matings		Pen Mating System ^a Boar to Sow Ratio
	Daily	Weekly	7 to 10 day breeding period
Young (8 to 12 mo.)	1	5	1:2 to 4
Mature (> 12 mo.)	2	7	1:3 to 5

^aAssumes that all sows are weaned on the same day.

The reproductive processes associated with semen production and libido still may be developing in boars that are purchased at young ages (5 to 6 months of age). Libido or the desire to breed may develop before spermatogenesis or the production of sperm cells. Just because a young boar mounts and breeds a female does not mean that he is sexually mature. For this reason evaluation of semen quality is an important part of test-mating young boars.

Determining Boar Power Requirements

Boar power (boar:sow ratio) requirements vary from farm to farm. Factors such as farrowing schedule, use of artificial insemination, type of mating system and age of boars influence the number of boars required. Table 1 provides a guideline for boar use and boar to sow ratios.

In general, boars used in individual-mating systems need time to adjust to a regular pattern of usage. It is advisable to gradually introduce them into the breeding rotation. Mating frequencies should be low during the first week boars are used for breeding and gradually increased to the desired level during the first month.

Avoid over-using boars. Figure 1 shows the effect of frequency of semen collection (mating, frequency) on the number of sperm per ejaculate. When boars are mated at 12-hour intervals after a period of sexual rest, the number of sperm cells in the ejaculate declines rapidly over a 72-hour period to a level approaching the critical number of 2.5 to 3.0 billion which is thought to be required for normal farrowing rates and litter sizes.

Pen Mating vs. Individual Mating

Benefits and limitations of these two mating systems are summarized in PIH-69, Individual Mating Facilities for Swine. Pen mating requires less labor and lower cost facilities but the resulting farrowing rate may be lower than for sows which are individually mated.

Individual mating systems provide an opportunity to control the use of boars and the opportunity to observe and record matings but more labor and higher cost facilities may be required. Individual mating systems are essential for proper management of a weekly farrowing schedule or for all-in/all-out production. The following equation can be used to estimate minimum boar inventories for individual mating systems.

$$\text{MBI} = \frac{\text{NF}}{\text{MB} \times \% \text{A}} \times \text{MF} \times \text{FR}$$

where:

- MBI = Minimum boar inventory
- NF = Number females desired to farrow per unit of time
- FR = Farrowing rate (expressed as decimal)
- MF = Desired matings per service per female
- MB = Ideal matings per boar per unit of time
- %A = Percentage of boar inventory active per unit of time (expressed as decimal)

(Source: G. Dial, University of Minnesota.)

Calculated minimum boar inventories for four farms are shown in Table 2. These calculations are based upon previous records and performance levels of the given farms. Make some allowances for normal expected fluctuations which may occur.

	Farm			
	A	B	C	D
NF	20	20	20	20
FR	.85	.85	.80	.80
MF	2.5	2.5	2.5	2.5
MB	4	4	4	4
%A	95	85	85	80
MBI	15.5	17.3	18.3	19.5

When a pen mating system is used, consider dividing weaned sows into two or more groups and rotating boars on a 12 to 24 hour interval. If three groups of boars are maintained, one boar group will be sexually rested for 12 to 24 hours before it is exposed to a sow. Boar rotation not only provides for a period of sexual rest, but it also increases the opportunity for the observation and recording of matings. In addition, boars can be fed separate from sows, thus feed intake can be controlled, which may contribute to longevity.

Boar Culling and Replacement Rate

Boar culling and replacement programs are important considerations for breeding herd managers. Farrowing rate and litter size generally improve as a boar ages from about 9 to 20 months of age. As long as boars remain structurally sound and are aggressive breeders, fertility is generally maintained until they are three years of age or more. Mature boars are more proficient in stimulating estrus in females and may be more experienced breeders than young boars. However, younger boars are needed for gilt matings to maximize genetic improve-

ment, and for replacing mature boars.

Most boars are culled for reasons such as lameness, lack of aggressiveness, and size rather than for poor semen quality or for low farrowing rates. The strategy should be to maintain as many mature boars as possible and yet develop a program which will provide replacements as needed. Most well-managed herds require a 25% to 50% boar replacement rate annually.

Breeding Area

Provide an adequate breeding area. Remove any wire, boards, or objects which may cause injury. Good footing is a must to avoid injury and reluctance to mate. Avoid wet, slippery floors. Slats that have a "pencil-rounded" edge are generally acceptable in the breeding area for individual mating, whereas slats with sharp edges are not. Woven wire, rubber mats, and sand surfaces have been successfully used in individual mating operations. Cement that is "struck off" with a 2 x 4 or wood float results in an acceptable surface if it is maintained in a clean and dry condition. A sprinkle of lime on the floor may be helpful in providing a "slip free" breeding surface.

Boar Housing

When using the individual mating system, pen boars separately in crates which are 28 in. wide x 7 ft long or pens 6 ft x 8 ft. Individual housing of boars eliminates fighting, riding, and competition for feed which improves longevity (See PIH-69). Groups of boars used in a pen mating system should be penned together when they are removed from a sow group.

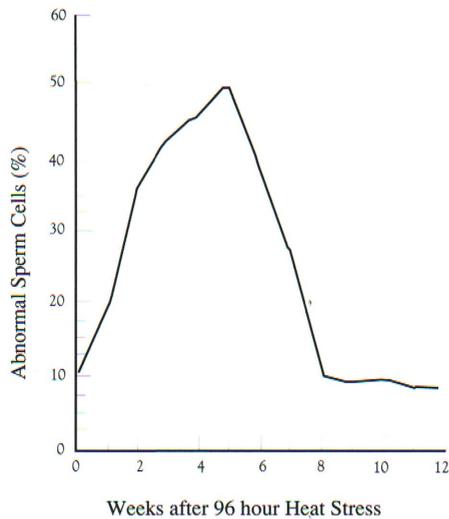
Keep Boars Cool During Summer

Boars subjected to temperatures over 85°F may have reduced semen quality, resulting in reduced fertility up to 4 to 6 weeks after the stress period. Even a short-term heat stress (3-4 days) can reduce semen quality (Figure 2). Females bred to boars that have been subjected to heat stress may have a lowered farrowing rate and smaller litter sizes (Figure 3).

An easy and effective way to determine if boars are in a heat-stressed situation is to monitor their respiration rate. The normal respiration rate for a boar is 25 to 35 breaths per minute. During heat stress, it is not uncommon for respiration rates to increase to 75 to 100 breaths per minute. Respiration rate can be determined easily by watching the movement of the rib cage. The expansion and contraction of the rib cage is equivalent to a single breath. It is a good idea to observe the respiration rate of boars anytime the ambient temperature increases above 80°F. If respiration rates increase above 40 to 50 breaths per minute, then procedures to cool the boars should be initiated immediately.

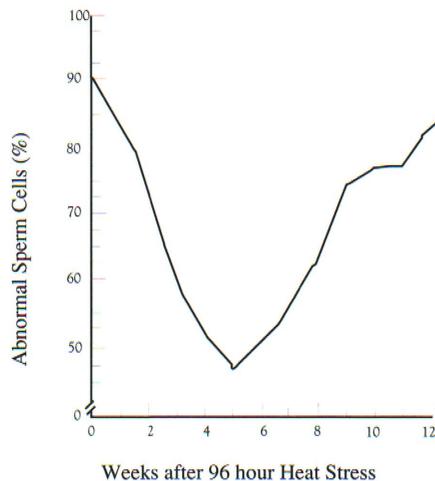
Keep boars cool and comfortable during warm months to insure high farrowing rates and large litters. Use a sprinkler system installed under a shade built over a sand or concrete floor for boars used in a pen mating system. Consider thermostatically controlled drippers, evaporative cooling or geothermal systems for boars housed in environmentally regulated buildings. See PIH-87, Cooling Swine.

Figure 2.
Effect of 96 hour heat stress on percent abnormal sperm in the ejaculate of young boars (< 1 year old).



Source: W.L. Flowers, unpublished

Figure 3.
Percent fertilized eggs recovered after insemination of gilts with semen from heat stressed boars.



Source: W.L. Flowers, unpublished

Routine Management Procedures

Routine management procedures will help keep boars healthy and working in the breeding rotation. They also can lead to the early identification and treatment of potential problems.

Observe boars daily for signs of abnormal behavior such as lack of appetite, listlessness or lameness. It is also good to have a high-low thermometer in the breeding area and the boar housing facility. Record high and low temperatures daily on the breeding records, especially during the summer months. Vaccination of boars for reproductive diseases such as leptospirosis, erysipelas and parvovirus, and treatment for mange and lice every 6 months are good precautionary practices. Every 6 to 8 months tusks on the boars should be trimmed or cut and preputial hairs around the sheath should be removed.

Summary

1. Purchase boars early.
2. Use proven selection criteria (see PIH-9, Boar Selection Guidelines for Commercial Pork Producers).
3. Be aware of the potential of introducing new diseases into your herd. Select boars from herds which can provide good health records.
4. Isolate the boars for at least 30 days prior to use.
5. Test-mate with gilts and get a semen evaluation if possible.
6. Maximize fertility by providing adequate boar power, rotating boars or individual-mating, providing an adequate breeding area, keeping them cool during the summer months and using other sound management practices.
7. Keep and use breeding records.

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