



Online AI Manual

Table of Contents

- [Introduction](#)
- [Why Use Artificial Insemination](#)
- [U.S. National Genetics Evaluation](#)
- [Cost of Natural vs. AI Service](#)
- [The Economic Value of Superior Sires](#)
- [Breeding Programs To Facilitate AI](#)
- [Boar Selection Criteria](#)
- [Health Advancements Through AI](#)
- [Boar Health and Management](#)
- [Semen Availability](#)
- [Boar Viewing](#)
- [Ordering Procedures](#)
- [Artificial Insemination Clinics](#)
- [Boar Training and Semen Collection](#)
- [Processing Fresh Semen](#)
- [The Key Steps to a Successful Breeding Program with AI](#)
- [Methods of Estrus Synchronization For Facilitating Swine Artificial Insemination](#)

[HOME](#) | [OBJECTIVES](#) | [BOARS](#) | [CATALOGS](#) | [BOAR PRODUCTS](#) | [CONTACT US](#)

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[\[back to the table of contents\]](#)

Introduction

Swine Genetics International, Ltd. has the following objectives:

- To supply superior genetics at an economical price.
- To provide an efficient method of genetic transfer with a reduced risk of disease transmission.
- To preserve the genetics of proven superior sires so that their semen will be available to a wider segment of the swine industry, for a longer period of time.
- To develop improved methods of liquid and frozen semen preservation, in order to further increase the efficiency of artificial insemination (AI.) of swine.
- To continually explore new methods, such as estrus synchronization, which have the potential of increasing the availability of superior genetics to the swine industry.
- To supply the latest in technology, AI. equipment and supplies at a competitive price.

The staff at Swine Genetics International is dedicated to meeting the genetic needs of the swine industry. Complete customer service is our goal.

President/CEO

Jim Krug

Boar & Facility Management

Bryan Hill

Morgan Hill

Tye Lettow

Sales & Marketing Development

Bob Naylor

Tye Lettow

Export Director & Coordinator

Harold Hodson
Marty Snyder

Semen Processing & Freezing

Heidi Timmer
Tim Ragen

Office Management & Secretarial

Marty Snyder
Connie Baker

Accounts Recievable/Payable

Pam Anderson
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Online AI Manual

[\[back to the table of contents\]](#)

Why Use Artificial Insemination?

- With AI, the cost of using superior sires can be spread over more sows. With SGI semen, the cost is shared with hog producers throughout the world. For these reasons superior semen is available at a cost below what a producer may be presently encountering with natural service. (For the full value of superior semen see page 5.)
- More rapid improvement in the traits that result in greater profits is possible because of the wider boar selection available. By using EPDS, indexes, and breeding value scores on production, carcass, reproduction and visual traits, a boar can be selected that is strong in the areas needed to make the most rapid improvement with a particular group of sows.
- AI will allow introduction of new genetic material, with a reduced risk of disease transmission and without the introduction of internal and external parasites. (See page 8 for a complete description of the health advancements possible through AI).
- AI is the most economical method of servicing a large or small group of females, by reducing the boar power needed. A more uniform pig crop will result through intensive use of fewer and superior boars.
- Natural heat synchronization can be achieved by weaning a group of females at the same time. (See page 26 for methods that can be utilized to synchronize sows or gilts.) The use of AI will result in the full benefits of this important management tool, without the added cost of maintaining the extra boar power needed for an extensive periodic breeding schedule.
- Use of AI will eliminate many of the problems encountered in maintaining and utilizing boars such as: isolation and testing of boars

prior to introduction into the herd; special care and facilities to prevent heat stress or injury; size differences between the boar and sow or gilt; lack of libido or infertility of boars at critical times, resulting in the disruption of breeding and farrowing schedules; injuries to boars, sows, and gilts during breeding and danger to workers in handling boars.

- AI can be used extensively in the development of sound and functional rotational or terminal crossbreeding programs. (See page 6) Swine Genetics' personnel will assist in the development of a breeding program through semen selection that will blend performance, reproduction and carcass traits into the most profitable total production program.

[HOME](#) | [OBJECTIVES](#) | [BOARS](#) | [CATALOGS](#) | [BOAR PRODUCTS](#) | [CONTACT US](#) | [LINKS](#) | [ADMIN](#)

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Online AI Manual

[\[back to the table of contents\]](#)

U.S. National Genetics Evaluation

The American Duroc, Hampshire, Landrace and Yorkshire breeds have been utilizing a national genetic evaluation system for several years now. Over 500,000 individual records are in the data bank for growth, backfat and reproductive traits. The data are analyzed using BLUP (Best Linier Unbiased Predictive) genetic evaluation procedures. This animal model technology is the most accurate technology available for the evaluation of genetic merit. The individual's own record, records on ancestors in the individual's pedigrees, any collateral relatives with performance records (littermates, half sibs, etc) as well as records on any progeny of the individual are utilized. This multiple trait procedure is used for genetic evaluation of reproductive traits (Number Born Live and 21-Day Litter Weight) and growth traits (Days to 230 and Backfat). The sources of variation accounted for in the analysis models include the major sources that influence animal performance (contemporary group, sire, dam, permanent environment, maternal effects and service sire). This allows for the direct comparison of all sires evaluated.

TERMINOLOGY USED IN THIS MANUAL

STAGES

Data listed under the heading STAGES is based on the individual's own record and that of relatives. In this case the sire does not have progeny with performance records. In most cases these sires are not old enough to have sufficient accumulated progeny records.

ACROSS-HERD SIRE SUMMARY

Data is listed under this heading only if the sire has progeny that have been tested under the National Evaluation System and this performance included in the sire evaluation.

EPDs

The Expected Progeny Difference (EPD) is a prediction of the progeny performance of an animal compared to the progeny of an average animal in the population (Duroc, Hampshire, Landrace or Yorkshire breeds) based on all information currently available. As indicated above, the major sources of variation are accounted for including contemporary group and herd differences in the BLUP analysis. This allows for direct comparison of all sires. These EPDs are expressed as a plus or minus for Number Born Live, 21-Day Litter Weight, Days to 230 lb. (105 kg) and Backfat. Negative EPDs are desirable for Days and Backfat while positive EPDs are desirable for Number Born Live and 21-Day Litter Weight.

Example:	<u>EPD DAYS</u>	<u>EPD LITTER WT</u>
Sire A	-3.0	-2.0
Sire B	2.0	6.0

Sire A's progeny will require 5.0 less days to 230 lbs. than Sire B. However, daughters of Sire B would produce litters 8 lb. heavier at 21 days than Sire A.

INDEXES

Selection indexes are calculated from the EPDs according to the economic value associated with cost of production and value of market pigs in a typical Midwestern farrow to finish pork production facility. Three indexes are calculated:

Terminal Sire Index (TSI) - It ranks animals on Days to 230 and Backfat EPDs only. It does not include

maternal data.

Sow Productivity Index (SPI) - It ranks individuals by Number Born Alive and 21-Day Litter Weight EPDs only. It does not include growth or backfat data.

Maternal Line Index (MLI) - It utilizes the EPDs for both growth (Days and Backfat) and maternal (Born Alive & Litter Weight).

All indexes are scaled so that the average parent has a value of 100 while superior parents have a value greater than 100. Which index to utilize will depend on a herd's individual needs and whether the sire is to be used for terminal or maternal line production.

In most commercial pork production systems, sires to be utilized to produce replacement females should be selected on MLI while sires utilized to produce market animals should be selected on TSI.

[HOME](#) | [OBJECTIVES](#) | [BOARS](#) | [CATALOGS](#) | [BOAR PRODUCTS](#) | [CONTACT US](#) | [LINKS](#) | [ADMIN](#)

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Online AI Manual

[\[back to the table of contents\]](#)

Cost Of Natural vs AI Service

YEARLY BOAR COST

Feed (approximate 1 ton).....	\$150.00
Housing, Labor, Vet, etc. (\$1/day).....	\$365.00
Depreciation (\$750 cost over 1 1/2 years).....	\$500.00
Interest on Investment (1 0%).....	\$100.00
TOTAL YEARLY COST.....	\$1,115.00

ASSUME 1 BOAR PER 15 SOWS

2.2 litters/sow/year would equal 33 litters per year per boar

ASSUME 2.35 SERVICES PER LITTER

(85% Farrow rate with 2 services per each sow breeding)
33 litters x 2.35 services = 77.5 services per boar

COST PER SERVICE NATURAL MATING

\$1,115.00 -, 77.5 equals.....\$14.38

AI SGI LEAN GENES SEMEN AS LOW AS.....\$6.50

SAVINGS PER SERVICE.....\$7.88

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Online AI Manual

[\[back to the table of contents\]](#)

Economic Value Of Superior Sires

MATERNAL LINE

**SAVE \$25.00 PER LITTER OR \$27,500.00
PER YEAR ON A 500 SOW HERD**

Economic studies indicate that each one point in Maternal Line Index (MLI) above 100 will result in one U.S. dollar more profit per litter by the daughters of that particular sire compared to daughters of an average sire (MLI of 100) in the breed. Thus, if a commercial producer can utilize truly superior sires through AI with an average MLI of 125, their daughters will return 25 U.S. dollars more profit per litter farrowed.

On a herd basis, if a producer has 500 sows with 2.2 litters per sow per year he would produce a total of 1100 litters per year. This producer could generate 27,500 U.S. dollars (1100 x 25 U.S. dollars) greater profit per year from using superior AI maternal sires (MI 125) compared to using average maternal sires to produce his replacement females.

TERMINAL LINE

**SAVE \$5.00 PER PIG OR OVER \$46,750.00
PER YEAR ON A 500 SOW HERD**

Again U.S.A. economic studies indicate that each one index point above 100 for terminal sire index (TSI) is worth 0.15 to 0.20 U.S. dollar per pig marketed. Boars from the top 1% of the breed average approximately 130 for TSI. Thus, if truly superior sires with a 130 TSI are used AI by a commercial producer, he

would realize five U.S. dollars extra profit (30 index points x 0.167 per point) per pig marketed in comparison to an average boar from the same line.

On a herd basis if a commercial producer has 500 sows with 2.2 litters per sow per year and 8.5 pigs marketed per litter, he would market 9350 pigs per year. With five U.S. dollars extra profit per pig, the producer could generate 46,750 U.S. dollars (5 x 9350) extra profit by using AI sires with a TSI of 130 compared to an average terminal sire.

Over \$70,000.00 extra profit can be realized by using truly superior AI sires, both for the production of the maternal lines (\$27,500.00) and the terminal market pigs (\$46,750.00).

[HOME](#) | [OBJECTIVES](#) | [BOARS](#) | [CATALOGS](#) | [BOAR PRODUCTS](#) | [CONTACT US](#) | [LINKS](#) | [ADMIN](#)

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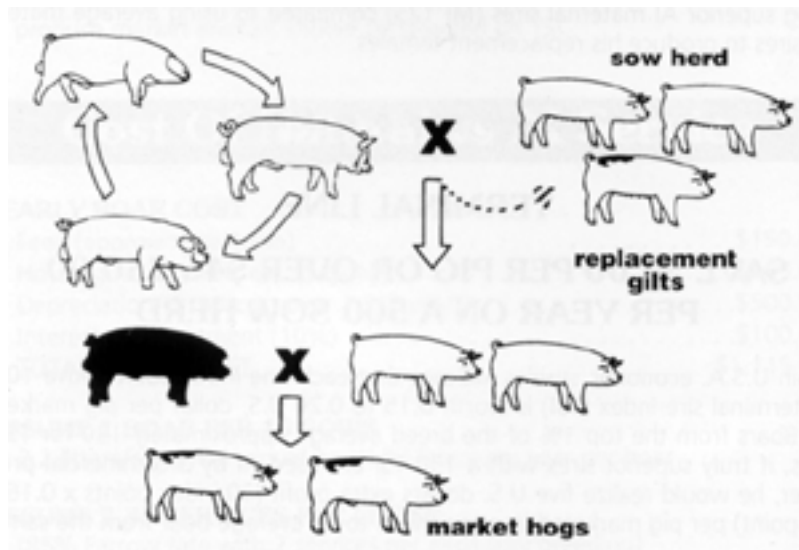
Online AI Manual

[\[back to the table of contents\]](#)

Breeding Programs To Facilitate AI

With the development of larger and more specialized production units there has also been the development of breeding programs better suited to the use of AI than the traditional two or three breed rotational crosses. Although a program utilizing FI sows and terminal boars can be readily adapted to AI, a program utilizing a rotational sow line and a terminal boar line is probably best suited for AI in small to medium sized herds. Either a two or three breed rotation could be used for the sow line. A three breed rotation will result in a higher level of hybrid vigor. The top producing sows from the total herd can be selected to be bred AI (to the next breed of boar in the rotation) for production of replacement females. The remainder of the sows would be bred to terminal boars for commercial production. This permits a high degree of selection pressure on reproductive performance for the females selected to produce replacements. The terminal boar can be a pure line, an FI, or a two breed rotation. The following diagram illustrates a rotaterminal crossing system:

DIAGRAM OF A ROTATERMINAL BREEDING SYSTEM



Recent research indicates that the greatest improvement in sow productivity in a commercial herd results from the selection pressure placed on reproductive traits for the boars utilized to produce the replacement females. Thus, there is a large demand for semen from boars with superior EPDs and indexes for maternal traits. SGI sires have consistently proven to be the industry leaders as documented by the Yorkshire and Landrace Across-Herd Sire Summaries. As a result, the use of maternal line semen by commercial producers has been the largest growth area in the SGI AI Center during the past several years.

[HOME](#) | [OBJECTIVES](#) | [BOARS](#) | [CATALOGS](#) | [BOAR PRODUCTS](#) | [CONTACT US](#) | [LINKS](#) | [ADMIN](#)

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[\[back to the table of contents\]](#)

Boar Selection Criteria

In order to provide the most outstanding genetics available to our customers, Swine Genetics utilizes the following methods to acquire boars:

- 1) Leasing of proven sires
- 2) Purchasing of young boars
- 3) Importation of superior lines from foreign countries

Boars leased by Swine Genetics have demonstrated the ability to consistently sire superior offspring based on their superior EPDs and indexes. Our goal in sire leasing is to offer superior genetics that normally have only limited distribution so that they may be shared industry wide. Importations allow our customers to sample superior genetics from other countries at a minimal cost. Proven sires and young boars are selected based on their record of excellence in specific areas, such as rate of gain and feed efficiency, reproductive performance, carcass merit, soundness and longevity. All available information including EPDs and indexes, relating to performance, carcass, reproductive capacity and structural conformation on the individual boar, his ancestors and offspring are utilized in developing a breeding value score for the following traits:

Performance and Carcass

Average daily gain or days to 230 lb.
 Backfat or leanness
 Loin muscling or LEA
 Rump & ham muscling

Reproduction

Number of pigs born
 % of pigs weaned
 21 day litter weight
 Regularity of: recycling after weaning, conception & farrowing
 Durability or longevity in herd
 Male aggressiveness and ease of collection
 Sperm production per collection
 Liquid semen quality (storage length, conception & litter size)
 Frozen semen quality

Structural Traits

Front leg & shoulder structure
 Rear leg structure
 Total soundness
 Heaviness of skeleton & bone
 Boldness of shoulder & rib shape
 Length of leg and height
 Length of body
 Overall skeletal size
 Depth of body
 Width of body
 Width of chest floor
 Total body volume
 Levelness of top
 Rump structure & tail setting
 Pliability or looseness of body & muscle structure
 Underline quality (teat spacing, prominence, size & texture)

Scored on a scale of 1 (lowest) to 10 (highest).

It is unlikely that a boar will be truly superior in all areas. Boars selected will have a definite superior breeding value in specific areas and at least average to good values in other areas. Total reproductive performance (including regularity of breeding and farrowing, longevity in the herd, the number farrowed, weaned, and weaning weight) is extremely important in boars utilized to produce replacement females. Boars have therefore been specifically selected in each breed because of the superior reproductive performance of their dams, granddams, and/or daughters. Other boars have been selected for their superior feedlot performance and/or carcass merit. Also by maintaining boars in a 7 x 14 foot concrete pen, selection pressure is applied for traits that result in functionality and longevity under strict confinement conditions. Utilization of the breeding value scores, along with EPDs and indexes, can help you select boars that allow you to make rapid progress in specific areas without sacrificing a loss in other areas. The Swine Genetics staff will be happy to assist you in selecting boars to meet your specific needs.

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Online AI Manual

[\[back to the table of contents\]](#)

Health Advancements Through AI

AI allows the introduction of new genetic material with a reduced risk of disease. There is the potential that pathogenic organisms can be transported in semen. However, the probability of new pathogens moving into a herd with the addition of new genetic material in the form of a live boar from almost any source appears much higher than from semen collected from boars quarantined, isolated and tested periodically for a wide variety of organisms. Although the potential for transfer in semen is not clear cut with many pathogens, the following classifications can be made based on the current research and basic knowledge available.

A. Cannot be spread through semen

- Internal parasites
- External parasites

B. Disease from which the U.S. is free; thus, will not be present in semen collected in the U.S.

- Foot and mouth disease Swine vesicular disease -African swine fever
- Vesicular exanthema
- Japanese B encephalitis virus
- Hog cholera

C. Disease organisms that should not be present in semen if collection is performed under sanitary conditions.

- Bordetella (AR)
- Hemophilus

- Pasteurelia
- Erysipelas
- Treponema hyodysenteriae (dysentery)
- Eperythrozoon suis
- TGE
- Swine influenza

These diseases are normally spread via oral or fecal transmission.

D. Reproductive diseases that can be potentially transmitted through semen but can be prevented by periodic testing of the boars.

- Leptospirosis
- Brucellosis
- Tuberculosis
- Pseudorabies or Aujeszky disease PRRS

SGI boars are negative for above five diseases.

With boars isolated, periodically tested for these diseases and used only for semen collection (i.e. no natural services) there should be little risk. In addition, the broad spectrum antibiotics normally added to semen are effective against the bacteria which causes the first three diseases. The potential to transmit pseudorabies or PRRS via semen is debatable at the present since the limited research results are not conclusive and there are several known cases where semen from positive boars has been used without spreading the disease.

E. Diseases that several years of field experience indicate are not transmitted via semen, the common mode of transmission is by the oral route.

- Parvovirus
- Enterovirus
- Mycoplasma

The addition of a combination of spectinomycin and lincomycin will also reduce the risk of mycoplasma organisms being transmitted through the semen.

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Online AI Manual

[\[back to the table of contents\]](#)

Boar Health and Management

Swine Genetics' boars go through a strict isolation and testing program before entering our center. The boars are maintained in an enclosed environmentally controlled building, accessible only to the workers who have changed clothing, disinfected boots and taken other proper sanitary precautions. Observation of boars by visitors is possible through an observation window. Periodic testing of all boars in the center is conducted to verify that they are free of leptospirosis, brucellosis, pseudorabies (PRV), tuberculosis, PRRS and several other diseases. In addition, appropriate antibiotics are added to both liquid and frozen semen to further safeguard against possible spread of disease. SGI herd health is under the supervision of Dr. J. Kunesh of the Iowa State University Veterinary College.

[HOME](#) | [OBJECTIVES](#) | [BOARS](#) | [CATALOGS](#) | [BOAR PRODUCTS](#) | [CONTACT US](#) | [LINKS](#) | [ADMIN](#)

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Online AI Manual

[\[back to the table of contents\]](#)

Semen Availability

Liquid and frozen semen are available. Swine Genetics semen is frozen by a new technique in sealed straws rather than in pellet form. This technique allows for better sanitary control during shipping and thawing and an easier, more precise thawing technique. Results in Europe using swine semen frozen in straws have been very favorable. SGI has modified the European method by pioneering the use of a special Cryo-Med freezing chamber that has resulted in even more precise control and higher quality frozen semen. Both domestic and foreign customers have consistently reported excellent results with SGI frozen semen.

Liquid semen will be shipped in sealed tubes to insure sanitation and quality control. The extender used for liquid semen will allow semen viability for 5-7 days when properly handled. Thus, liquid semen can be used for 4-6 days following the one day delivery. Semen from superior boars of the following breeds is available.

Berkshire

Large White

Duroc

Hampshire

Chester White

Landrace

Yorkshire

Terminal

A separate boar catalog is periodically printed with more detailed information on the boars (including EPDS, indexes and breeding value scores for specific performance, -carcass, reproductive, and structural conformation traits). Updated information, in the form of individual boar sheets are also mailed periodically along with the current prices for liquid and frozen semen. The following semen options will be available:

1. Liquid Semen - Boar Designated. You designate the particular boar(s) and number of doses (inseminations desired). Semen will be shipped by 24 hour service anywhere in the U.S. in sealed tubes ready for use. If properly stored, semen should maintain good fertility for 4-6 days after delivery.

2. Liquid Semen - Breed Designated. Same procedure as No. 1 except only the breed(s) rather than particular boar(s) is designated. By designating only the breed(s) and leaving the selection of the individual boar(s) up to the Swine Genetics staff, you will receive a discount. All semen will be from boars offered on a regular basis and identified as such.

3. Liquid Semen - Lean Genes - Terminal Semen. Semen specifically for production of slaughter animals. Can be ordered only as terminal semen; however, breed(s) preference can be designated. It is the most economical way to purchase semen.

4. Frozen Semen - Boar Designated. You designate the particular boar(s) and number of doses (inseminations) desired. Frozen semen will be shipped in either a returnable liquid nitrogen tank or a tank that may be purchased for farm storage.

5. Frozen Semen - Breed Designated. Same procedure as No. 3 except only the breed(s) rather than the particular boar(s) designated. Again, by leaving the individual boar(s) selection up to the Swine Genetics staff, you will receive a discount. All semen will be from boars that have been offered on a regular basis and identified as such.

6. Contract Semen. If you are interested in breeding a group of sows or gilts with SGI semen on a regular weekly or monthly basis, contact us about our special contract program. This program can result in substantial savings in the per dose cost of the semen.

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Online AI Manual

[\[back to the table of contents\]](#)

Boar Viewing

We welcome you to stop by to view our boars. For health reasons all boars will be viewed through an observation window. They may be viewed on Tuesday, Wednesday and Friday between the hours of 9:00 a.m. and 4:00 p.m. by advance appointment. Due to the busy schedule of collecting boars on Monday and Thursday, only limited viewing is possible. Video tapes of the boars at SGI are also available for viewing in your home.

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Online AI Manual

[\[back to the table of contents\]](#)

Ordering Procedure

Liquid or frozen semen may be ordered by calling our toll free number during normal office hours from 8:00 a.m. to 4:30 p.m. Central time, Monday through Friday. SGI offers a very flexible liquid semen program. We will ship a limited number of doses up to a total collection from the particular boar or breed you desire. Liquid semen is normally shipped on Monday and Thursday while total collections are available Monday through Friday by special arrangement. A limited amount of liquid semen may also be available on Tuesday, Wednesday and Friday. We would be happy to discuss your needs with you and work out a program tailored to your operation.

Orders for liquid semen should be placed as far in advance as possible, especially when requesting a specific boar. The most efficient method of semen shipment, at the lowest possible price, will be investigated for your area, at the time you place your order. Liquid semen will be shipped by 24 hour services only. The cost of shipping will be added to your invoice and mailed within a few days of when your semen is shipped. Payment for your order will be due within 20 days after your order is received. Overdue accounts will be subject to a monthly interest charge. Shipping arrangements and other instructions will be provided to you upon receiving your order. We welcome producers to pick up either fresh or frozen semen at the Swine Genetics headquarters in Cambridge. This will save you shipment charges and insure your liquid semen maintains the optimum storage temperature during its travel to your farm.

FOREIGN

Foreign orders may be placed by mail, telephone (515)383-4386 or Fax (515) 383-2257. Foreign shipments will be made by air and insured. Because of the extended viability of liquid semen with the long life extender used by Swine Genetics, it is possible to make shipments of liquid semen to foreign countries in addition to the traditional frozen shipments.

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Online AI Manual

[\[back to the table of contents\]](#)

Artificial Insemination Clinics

Research has shown that conception rate and litter size are usually not reduced when liquid boar semen is used correctly in an AI program. Use of frozen semen usually results in a slight reduction in conception rate and litter size, as compared to liquid semen or natural service. However, like any other management tool, a few simple techniques and a basic understanding of the methods and procedures involved in handling, storing and inseminating semen, are necessary to insure optimum results. For this reason, Swine Genetics conducts AI clinics periodically. During these clinics, you will receive valuable information on general breeding herd management, the proper methods for estrus (heat) detection, a general understanding of female and male reproductive physiology and the proper methods for ordering, handling, storing and inseminating semen. A brief discussion of these topics is given on the following pages. This discussion is not intended to replace the AI clinic, but to serve as a brief review and a statement of our recommendations for those who already have experience with AI. If you are interested in attending an AI clinic, contact SGI for more details and specific dates. If we cannot organize enough people to have an AI clinic, we will be happy to work one-to-one with you to cover the topics of interest to you and design an AI program suited specifically to your operation.

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Online AI Manual

[\[back to the table of contents\]](#)

Boar Training and Semen Collection

Boar: Age, Condition, Overall Attitude

Boars that are 7-8 months of age and have been exposed to some sexual activity by running in groups with other males are ideal for training to collect off a dummy (age of sexual maturity may differ with breed and genetics.)

Older boars, especially those used in pasture breeding situations, and young boars that have been isolated, usually will take more time to train.

The boars should be in good physical and nutritional condition - not over or under fed.

Take note of the boar's personality. Any problems or quirks that have been exhibited in the past might need to be remembered while training.

Collection Dummy: Wood, Portable, Stationary, Wall Mount

Construction: Any article or material that would somewhat resemble a sow can be used to construct a dummy.

- Wood or steel are most often used for construction. A very economical dummy can be constructed using 2 x 4s or 2 x 6s.
- Another alternative is one-half of a hot water tank for the body of the dummy.

- In an emergency, a bale of straw or similar article can be used as a dummy.
- Approximate dimensions of the body should be 3 1/2 to 5 foot long and 10 to 14 inches wide. Height needs to range from 1 1/2 to 2 1/2 feet.
- The height of the dummy should be adjustable to accommodate different boars. it would be beneficial to have an adjustment that can be easily accomplished by one person. This is especially important when training younger boars and collecting mature boars from the same dummy.
- The top portion of the dummy should be padded with burlap bags, foam rubber or other material and then covered with a canvas, carpet, leather or rubber.
- SGI has plans for the design of the dummy and would be glad to work with you to design a dummy that best fits your needs.
- In some cases a portable dummy would be advantageous so that it can be carried from pen to pen. This is helpful when training young boars or for collecting boars in isolation.
- In a permanent collection pen to prevent the dummy from moving, we suggest two options; either mounting the dummy to the floor or the wall.

Purchase: SGI has either portable or wall mounted steel dummies for sale.

Area For Training:

Temperature: Comfortable for both you and the boar since it might take some time.

Lighting: Make sure there is enough light, especially on the side of the dummy you will be collecting from.

Floor: The floor should provide excellent footing. If slick, not only could the boar slip and cause injury to himself and you, but if his feet slide, he'll not be able to concentrate on the job at hand. Rubber mats with holes or woven wire mats can be used to provide good footing.

Area I - Bring Dummy to his Pen

Advantages: The dummy and yourself will be the only new items to investigate and therefore, will possibly take less time. It is also the usual way to train boars in isolation.

Disadvantages: If his pen is large, you'll need to block off a small area (preferably in dry shavings or straw).

His attitude towards you will have to be somewhat amiable for you to work close to him and not get hurt.

If his pen is in an area where there is activity, he will be more easily distracted.

Area II - Collection Area

Advantages: Regardless of the conditions and activities going on around the area, the collection room offers a permanent place that the trained boars will associate with breeding. It will take less time when you're collecting many boars, be safer and less frustrating. This room should be large enough to collect mature boars, but not so large that it is difficult to keep the boar's attention toward the dummy. It should be a room that offers the seclusion needed to help in keeping out any visual and audible distractions. If possible, an area should be made accessible for untrained boars to observe trained boars being collected.

Disadvantages: Extra expense, time and space to set up a room.

Patience:

Never attempt to work with a boar when you are short of time or not in the proper mood.

Never use negative behavior toward the animal when training - voice, hitting, etc. Patience is probably the key factor to training and collecting boars.

Exposing Boar to Dummy or Collection Room:

Height Setting of Dummy: Prior to exposing boar to dummy - make sure the dummy height is set so the boar can easily rest his head on it. There seems to be a very strong correlation between a boar resting his head on an object and the action triggering the desire to mount the object. The dummy will need to be reset to a higher, more comfortable collection level after he is trained.

Odors: It helps to have a trained boar mount and be collected off the dummy before exposing it to a new, untrained boar. The sheath fluid from a strange boar can also be poured over the dummy. Boars are also intrigued by the gel produced while ejaculating. This gel may be placed on top of the dummy and/or used to tease a boar's head over the top of the dummy.

Position: Dummy should be placed perpendicular against the back center of the wall. Ideally, if it is in a collection room, it will be secure, unable for a boar to move. When collecting in a boar's pen, place the dummy at an angle so that the back of the dummy is in a corner of the pen and where he will mount the

front that points towards the middle of the pen. Both ways, the boar can be worked with and mount from either side or the front, but will not be allowed to circle the dummy - which can be frustrating and time consuming.

Collecting:

Sheath Area: If possible, prior to exposing the boar to the dummy, trim the hair around the opening of his sheath. This will prevent any hair from getting caught in your hand while gripping the penis thus preventing you from extending the penis. If it is not possible to trim sheath hair prior to dummy exposure, then carefully attempt to do this once he has mounted. You may have to wait until he is trained.

Approach: Once the boar has mounted, approach him with ease. If you are right handed, ease down on his right side. If you are left handed, ease down on his left side. This approach enables you to use your strong hand to collect with and frees the other hand to help tail the boar if necessary, free the sheath if it catches on the dummy, or hold your collection container. Try not to get anxious; relax and don't worry about getting out the collection container until the boar is extended and ready to ejaculate.

If the boar has mounted but has not started to thrust, gently massage sheath area back and forth (head to tail) until he starts. This is especially important for young boars who have had no exposure to breeding and are not quite sure what happens next.

Once the boar has mounted and has started thrusting, squeeze out all of the excess sheath fluid. This is extremely important! This fluid contains bacteria, dirt, and potential disease problems. You don't want any of these in your collection. Any excess that is not expelled can leak out and run down penis into the thermos or if a boar moves closer to the dummy while you're collecting, the

excess fluid can be forced out. If any does get into the collection, you should dispose of the collection and not use it.

To maximize the strength in your arm and hand, use a palmsdown and closed-fist approach. Using a clean, bare hand is easier in grasping penis; but once you've gained confidence in collecting, you should use rubber gloves to provide a sterile collection and to prevent any spreading of disease from boar to boar. When you approach the boar's penis, remember to use your hand grip in attempting to simulate a sow's vagina and cervix - start with back pressure and a gentle grip. The key is to grasp the curls at the end of the penis in such a way (across the curls - like nuts and bolts) to stop them rotating as if he was locking into cervix. When this is accomplished, he will simultaneously thrust out to extend and you will gently pull to accommodate him in this process. Never allow your grip to relax enough to allow him to rotate his curl once he is extended. This means to him that he is not locked into cervix and the whole process will have to start over again. If while attempting to firmly grip the boar's penis he begins to back off dummy, let go. He should respond by moving back up on the dummy. If he does dismount, he may not want to remount. He will tire more quickly if he continually mounts and dismounts.

Once you have his penis extended and he has started to ejaculate clear, gel-like fluids; reach for your collection container. Do not collect any of this first clear or watery fraction of ejaculation. A creamy, white or sperm-rich fraction will follow. Collect this portion since it contains the most concentrated amount of sperm. Depending on how many doses you need from the boar, you can decide what portions of the alternating phases of sperm-rich and clear fluid of the ejaculate you want to collect. Collect all fractions subsequent to the discarded first clear fraction if you need to make as many doses as possible. Collect just the sperm-rich fractions when you need only a few doses. Remember that there are

usually breed differences in ejaculate volume and concentration. Yorkshires generally ejaculate a larger volume in lower concentration, Durocs ejaculate smaller volumes and higher concentration, while Hampshire and other breeds are usually somewhere in between.

The boar will generally go through two to three cycles during ejaculation, taking five to fifteen minutes to complete the process. As you train the boar, it is very important to attempt to have him go through several cycles if you want the maximum semen produced during each collection. His penis will usually relax when he is finished. Attempt to help him develop good habits during the collection process - bad habits are hard to break.

Again, as emphasized earlier, use a positive approach when handling your boar. Treat him with respect and have patience and you will both benefit from a successful AI program.

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Online AI Manual

[\[back to the table of contents\]](#)

Processing Fresh Semen

After collection of semen, it is necessary to evaluate the ejaculate to determine how many doses can be made. First, the volume and sperm concentration need to be determined. The number of doses is influenced by the number of doses actually needed and the number of sperm cells contained in the ejaculate. Other factors to be considered include conception data on the boar and physical appearance (morphology) of the sperm cells. We recommend a minimum of 5 to 6 billion sperm per dose for best results with high quality collections. It is also recommended to have 80-100 ml total volume per insemination dose to obtain maximum conception rate and litter size.

Volume

One way to attain volume is to simply place the bag of semen into a graduated beaker and make as close an estimation as possible. An electronic balance may give more precise estimations of volume (1 gram equals 1 ml).

Concentration

There are several ways to determine the concentration. Visual appraisal is simple and inexpensive, but is also the most inaccurate. The following table can be used to determine dilution rate following visual appraisal for concentration.

USAGE GUIDELINES FOR SEMEN EXTENSION

Semen Appearance or Concentration	Usual Range of Semen Volume	Dilution Ratio for 80-85 ml per Insemination
		Semen: Extender

Creamy	50-150 mls	1:7 to 1:12
Milky	150-250 mls	1:4 to 1:7
As Skim Milk	250 mls or more	1:2 to 1:4

This table is intended as a general guideline and must be adapted to suit your breeding program and needs. There are many variables including age of boar, frequency of collection, genetic fertility of the boar as well as disease and other fertility problems that affect the number and quality of sperm produced. With the visual method 10-15 doses can usually be safely made per collection if the boar produces a volume within the usual ranges for the creamy, milk or skim milk classifications (i.e. dilute the semen to a total volume of 800-1200 mls). If the boar is less than 10 months of age or collected more than once or twice a week, he may produce a lower volume than listed as the usual range. In this case the number of doses may need to be reduced to 6 to 10 (480-800 mls total extended volume).

The use of a hemacytometer may also be employed. The hemacytometer is a special slide with a grid engraved on it. It also requires a 400 power microscope and a unopette. A unopette enables you to get a precise mixture of semen and diluent that can be placed on the hemacytometer and hand counted. Four fields of five squares each are counted to obtain an average count of the diluted sample. A dilution formula can then be used to determine an accurate concentration per ml of the original semen collection.

The most precise way to measure concentration is through use of the spectrophotometer. A measured sample of semen is placed in 3 ml of saline solution (in a cuvette) and run through the spectrophotometer. Due to the fact that the spectrophotometer is specially calibrated, it is highly accurate, but also the most expensive of the three options.

Using the volume and concentration obtained by one of the previously mentioned methods, the following formula calculates total billion sperm in the ejaculate:

$$\text{Volume (ml)} \times \text{concentration per ml} = \text{Total Sperm}$$

Total sperm is usually expressed in terms of billions or 10⁹. Collection will range anywhere from 10 to 200 billion sperm. Normal range for rested boars is 40-100 billion. Before adding extender, its temperature should be matched to

the temperature of the semen ($\pm 1^\circ\text{C}$). It is best to warm the extender to approximately 35°C before collecting the boar. After collection, raise or lower the temperature of the extender to match the semen. Do not adjust the semen temperature. Extender should be added in two parts, at intervals of 10 minutes, to avoid dilution shock.

Always check sperm motility and morphology on a pre-warmed slide after dilution to ensure that the sperm have not been damaged during extending. For semen stored 24 hours or longer, check motility before use by warming a small amount (1-2 ml) to 34°C (93°F) prior to evaluation. Be careful not to overheat the semen sample when a drop is placed on the pre-warmed slide. In addition to forward motility one should check for the presence of bent tails or other abnormalities in the appearance of the sperm. With motility of less than 80-85% or more than 5-10% abnormalities, conception rate will be lower unless sperm concentration is adjusted above the 5-6 billion recommended per dose.

After semen has been extended, checked for quality and poured into bottles, it is ready to use or store. If you wish to store the semen it should be slowly cooled to 18°C and stored at that temperature. Semen should be gently mixed twice daily to avoid precipitation. Depending on the quality of the particular boar's semen and the type of extender used, it should remain viable for 1 to 7 days. Using SGI modena, viability and conception rate usually remain stable for 5 to 9 days after collection.

The following table lists recommended equipment and supplies needed for extending and processing liquid semen. SGJ personnel will be happy to work with you to determine your specific needs.

RECOMMENDED EQUIPMENT

- 1) Water Bath Heater/Circulator
- 2) Mechanical Balance (Scale)
- 3) Hemacytometer and Accessories
- 4) Unopettes (100 per bottle) to be used with #3
- 5) Liquid Semen Storage Unit
- 6) Collection Dummy - Portable or Non-portable
- 7) Light Microscope (400x)

OPTIONAL EQUIPMENT

- 1) Electronic Balance (O HAUS GT 4800) replaces #2 Mechanical Balance
- 2) Semen Incubator (Precision Model 81 5) replaces Liquid Semen Storage Unit
- 3) Spectrophotometer and Accessories (including: Pipette, Repipette Dilutor, Pipette Tips, Cuvettes, 1 Case Test Tubes and 1 Test Tube Rack)
- 4) Binocular Microscope w/Phase Contrast, Heated Stage & Slide Warmer

LAB SUPPLIES

- 1) Modena Semen Extender

1 Liter Pkgs. (1 Pkg. makes 1 Liter)
3 Liter Pkgs. (1 Pkg. makes 3 Liters)
5 kg Bulk - Makes 103 Liters total

- 2) 100 ml Plastic Bottles w/Cap (500 per box)
- 3) Contrad Cleaning Solution
- 4) Styrofoam Collection Container
- 5) Plastic Collection Bags
- 6) Gauze Squares
- 7) Glass Thermometers
- 8) Metal Dial Thermometers
- 9) 1 Gallon Plastic Bottles
- 10) Powder Funnels
- 11) 1,000 ml Beakers
- 12) Microscope Slides (1/2 gross/box)
- 13) Cover glass for slides (1 oz/box)
- 14) 600 ml Beakers
- 15) Disposable Collection Gloves (1 00/box)

***Contact SGI for our detailed catalog and prices
on AI Equipment and Supplies.***

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Online AI Manual

[\[back to the table of contents\]](#)

The Key Steps to a Successful Breeding Program with Artificial Insemination

1 Maintain only those females which are healthy and in sound breeding condition. This includes strict culling of gilts with infantile or deformed genital systems and delayed puberty (greater than 8 months) and sows which do not return to heat within 10 days after weaning. Gilts or sows which return to heat after breeding twice should be considered for culling.

2. Accurately detect and record the time females come into estrus. Twice a day estrus checks are an important part of any successful breeding program and probably the most important factor in a successful AI program (especially when using frozen semen). Ideally, these estrus checks should be at 12 hour intervals. This will enable you to predict more accurately the proper time to breed, as compared to the more commonly employed 7-8 and 16-17 hour interval. Estrus checks should always be performed at the same time each day. If a once a day limit feeding program is used, do not check for estrus immediately preceding this time or until all feed is consumed. Afternoon feeding may be desirable so morning estrus checks can be performed earlier, which will increase the day time estrus check interval. Females in estrus respond to the sight, sound, smell, and touch of a boar. All of these senses need to be utilized if all females in estrus are to be detected. A vasectomized boar is ideal for pen estrus checks since accidental mating will not result in undesirable crosses and periodic mating (1-2 times per week) can be allowed, which will keep the boar's estrus checking interest alive. Females in crates or tethered should be checked for estrus by running the boar in the alleyway in front of the females. Careful observation of the sow or gilt for signs of estrus is especially critical under these circumstances. A few days prior to standing

estrus gilts or sows may a) exhibit a swollen red vulva, b) discharge a mucus type secretion from the vulva,

c) show interest in the boar, but play aggressively with him, rather than permitting him to mount, d) pursue other females attempting to mount them (but will not yet stand to be mounted) and roughly nuzzle their flank area. After a female comes into estrus, she will often emit a peculiar growling sound, will assume a rigid stance and elevate her ears when mounted (by a boar, gilt or sow) or when back pressure is applied by the herdsman. The optimum estrus check system therefore involves running the boar in with the pen of gilts or sows or in an adjoining pen and applying back pressure to each female.

Gilts should reach puberty between 6-8 months of age and should be bred during their second heat period. Transporting gilts at 6 months of age and/or exposing them daily to a boar is often beneficial in triggering and synchronizing estrous cycles. Sows should be bred at the first estrus following weaning.

The length of the estrous cycle in swine varies from 18-24 days, with 20-21 days being the most common. Gilts normally remain in estrus for 1 1/2 - 2 days while sows usually remain in estrus 2 1/2 - 3 days.

3. Inseminate at the optimum time. As shown in Fig. 1, gilts and sows both ovulate near the end of standing estrus. To achieve optimum fertility, insemination must occur early enough in estrus so that the sperm are in the vicinity and ready to fertilize the eggs upon ovulation. However, since sperm only survive for a limited period of time in the female reproductive tract, insemination must also not take place too early. The optimum time to inseminate liquid semen is 10-12 hours prior to ovulation. Frozen sperm (from some boars) decreases in viability after 6 hours in the reproductive tract and therefore needs to be inseminated closer to ovulation. Even though we know the approximate time of ovulation with respect to when the animal came into standing estrus, we may not know the exact time standing estrus began. For this reason inseminating at two different times during estrus is recommended to insure that one insemination will provide viable sperm near the time of ovulation. These two inseminations should be performed during the period of maximum fertility shown in Fig. 1 (gray shaded area). Table 1 lists the optimal breeding time for

gilts and sows with liquid or frozen semen and double or single insemination. Since these hours often occur during the night, it is obvious that some deviation from this schedule will be necessary. With liquid semen, many producers breed their gilts at 12 and 24 hours, and their sows 24 and 36 hours after first standing estrus. Very good fertility can be achieved when using liquid semen in this manner. Studies have shown that fertility equal to that of fresh semen may be obtained with frozen semen when the semen is deposited within 6 hours of ovulation. Therefore, in order to assure optimum results with frozen semen (single or double insemination) please follow the recommendations given in Table 1 as closely as possible. Since single (vs. double) insemination with liquid semen will also decrease the length of time that viable sperm are available for fertilization, the optimum breeding time listed, again is more critical when using single insemination with liquid semen.

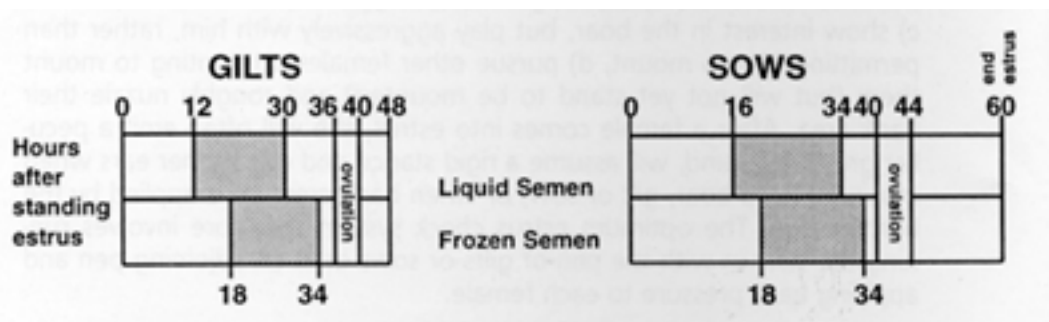


Figure 1 - Period of maximum fertility for gilts and sows using liquid or frozen semen.

Table 1 - optimum time (hours) to breed gilts and sows after first standing estrus.

	LIQUID SEMEN		FROZEN SEMEN	
	<u>Single Insemination</u>	<u>Double Insemination</u>	<u>Single Insemination</u>	<u>Double Insemination</u>
GILTS	24-30	1st 12-24	29-32	1st 24-28
		2nd 24-36		2nd 30-34

sows	28-36	1st 24	33-36	1st 28-32
		2nd 36		2nd 36-40

*** Recent research has indicated 24 and 36 hours is the proper time to inseminate sows that exhibited estrus 46 days after weaning. For sows exhibiting estrus 2 to 3 days after weaning delaying breeding to 36 to 48 hours after first standing estrus will likely give better results. Also, for sows first exhibiting estrus at 7 or more days after weaning, breeding at 12 to 18 and 24 to 30 hours after first standing estrus may prove to be beneficial.**

4. Order semen sufficiently ahead of time to guarantee arrival when you need it. One of the best times to take advantage of the economic savings Swine Genetics' sires can offer you is after weaning a group of sows. Place your order with Swine Genetics several days before you wean your sows. This will enable us to reserve specific boars for you and make shipping arrangements. Sows that are in good physical condition and have nursed a litter of pigs for 20-35 days should come into heat 3-7 days after weaning. Make plans for your semen to be delivered on the 4th day after weaning. Semen shipped in this manner should remain viable throughout the major part of the post-weaning breeding period. Frozen semen can be shipped at any time and stored on the farm for a readily available source of semen whenever needed.

5. Handle and store semen properly.

Liquid Semen - Liquid boar semen should be maintained at 64°F (18°C) to insure maximum fertility. Semen stored in this manner should maintain good fertility for a 5-7 day period. For best results, a refrigerated unit can be purchased from Swine Genetics. When an order is picked up at the Cambridge headquarters, the semen should be transported in an insulated box and immediately placed into your unit. If semen is shipped, place the liquid semen in the refrigerated unit as soon as it arrives if the temperature of the semen is 50'-80°F. If the semen is warmer than 80°F, it should be cooled slowly before placing in the unit. This will assure maximum fertility. It will also be beneficial to mix the semen once or twice daily since the sperm portion

may settle to the bottom of the tube. Mixing should be done by gently rocking the refrigerated unit or by slowly inverting the tube(s) several times. Do not shake vigorously. If the temperature of the semen is outside of the 50'-80'F range or the semen is stored longer than five days, it is advisable to check the semen under a microscope before use to insure that it has not been damaged during shipment or deteriorated during storage.

Frozen Semen - Frozen semen will usually be shipped in light weight liquid nitrogen tanks or dry shippers which have a short holding time.

The number of days the semen can be stored safely in these units will be affixed to each container with a yellow caution sticker. The dry shipper cannot be used as a storage unit. The semen must be transferred from the dry shipper to a liquid nitrogen unit immediately after arrival. We recommend that you purchase a liquid nitrogen storage tank so that you can transfer the semen to your tank for use whenever needed. Large liquid nitrogen tanks with longer holding times can also be used for shipping, particularly with foreign orders. Never allow the level of liquid nitrogen to get below four inches in either the liquid shipping unit (when it contains semen) or your on-the-farm storage tank. The extender for the frozen semen will be shipped in either a powder or ready to use form. All forms of the extender should be stored in the freezer or refrigerator until use. In all cases, proper directions for preparation, storage and use will accompany the extender. Extender should not be stored longer than six months for optimum performance.

6. Use proper techniques in thawing. Liquid semen arrives ready for insemination. Frozen semen needs to be thawed immediately prior to use. The procedure for thawing the frozen straws is very simple, but must be adhered to exactly to maintain fertility. The procedure is as follows:

a. Remove a bottle of frozen extender from the

freezer and warm to exactly 20°C (68°F).

b. Run some water into a sink, similar basin or SGI Thaw Bath and bring to 50°C (122°F). Remove one straw (one breeding dose) from the storage container. Lift the canister out of the liquid nitrogen only far enough to allow you to grasp the straw. The canister should not be out of the liquid nitrogen for more than five seconds.

c. Place the straw in the 50°C water for 45 seconds. Do not try to hold onto the straw during this thaw period.

d. Remove the straw from the 50°C water and wipe thoroughly dry with a paper towel. Holding vertically, snip the upper tip (with the ball) off with a pair of scissors. Place the end over the opening of the bottle of extender and snip the other end to allow the semen to drain into the bottle. Rinse the straw by aspirating extender up into the straw.

Using this simple procedure, several breeding doses can be prepared in just a short period of time. It is recommended that you place no more straws in the 50°C water than there are people on hand to handle the straws, as the 45 second thaw time is highly critical. A straw thaw bath can be purchased which omits the need to heat and maintain the 50°C water temperature. The semen should be inseminated as soon as possible. During transfer of the semen to the breeding area, place the semen (liquid or frozen-thawed) in a styrofoam container in a vehicle or similar warm area (60-80°F). This is important even when the temperature outside is between 60 and 80°F, since light adversely affects semen.

7. Use proper AI procedures. The technique of artificial insemination is

simple compared to that for the bovine and with a little practice can be mastered easily. We recommend all interested individuals to attend one of our swine AI clinics, discussed earlier, to get a more detailed explanation of the procedures than is possible here.

Proper placement of the insemination catheter is essential in AI. The proper placement of the catheter for cervical semen deposition, along with a lateral (side) view of the swine female reproductive organs, is illustrated in Figure 2.

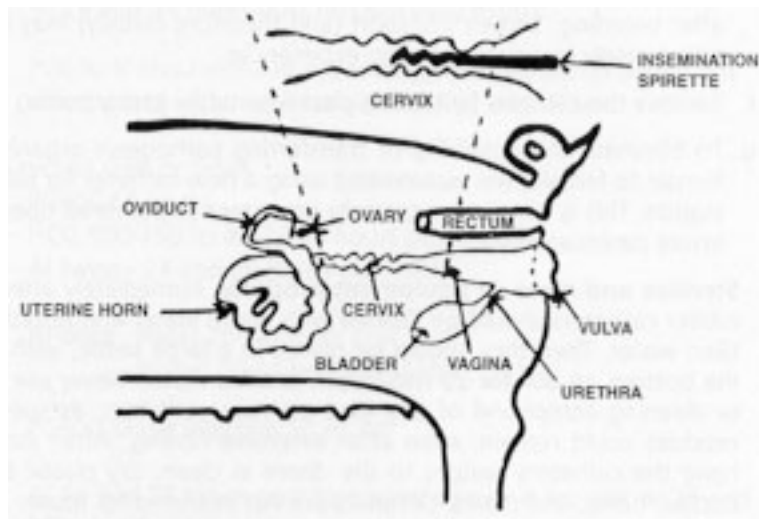


Figure 2 -Proper Placement of Catheter for Cervical Insemination of Semen

The following steps should be followed during the AI process:

- a. Bring the female to be inseminated to an area where she can smell, see, and/or hear a boar. Apply back pressure to bring about an immobile stance.
- b. Clean the vulva with a clean paper towel, dampened as necessary.
- c. Lubrication of the catheter with nonspermicidal jelly (available through SGI) is necessary when using the rubber catheters, and optional when using the disposable plastic catheters. Slowly insert the catheter into the vagina, keeping the tip pointed upward (to prevent entrance into the bladder). The catheter should slide easily through the vagina until it reaches the cervix.

d. When the spiral catheter cannot be pushed forward any further, begin to turn the catheter counterclockwise until it will not turn any further (3-4 revolutions). Pull the catheter back gently towards you to ensure it is properly locked in place. With the foam tip catheter, gently push forward with a slight right to left upwards rotating movement until penetration of the first villousities (fold) of the cervix.

e. After snipping off the plastic end piece to the bottle (frozen) or tube (liquid), insert into the end of the catheter. Holding the bottle or tube in an upright position, squeeze the tube gently. At least three minutes should be taken to empty the container completely. Do not force any of the air in the container through the catheter when the container is emptied. A small amount of semen run back often occurs initially. If large amounts continue to run back, recheck the catheter placement. It is important to always handle gilts and sows gently before, during and after breeding. Semen transport (and therefore fertility) may be affected adversely by any frightening experiences.

f. Remove the catheter by turning clockwise while gently pulling outward.

g. To eliminate the possibility of transferring pathogenic organisms from female to female, we recommend using a new catheter for each insemination. This is of course especially important in purebred operations to insure parentage.

8. Sterilize and store AI equipment properly. Immediately after use, the rubber catheters should be flushed with warm water and rinsed with distilled water. Then they should be placed in a large kettle, with a rack in the bottom, to boil for 20 minutes in distilled water. Never use any soap or cleaning compound of any kind on your catheters, as sperm killing residues could remain, even after extensive rinsing. After sterilization, hang the catheters upright to dry. Store in clean, dry plastic bags. The bottles, tubes, and plastic catheters are not intended for reuse.

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Online AI Manual

[\[back to the table of contents\]](#)

Methods of Estrus Synchronization For Facilitating Swine Artificial Insemination

The following summarizes the current methods available for effectively synchronizing swine.

I. The following abbreviations are used:

- AI - artificial insemination
- PMS - pregnant mare serum gonadotrophin
- HCG - human chorionic gonadotrophin
- PG600 - 400 IU PMS 200 IU HCG
- SC - subcutaneous injection
- IM - intramuscular injection
- IU - international unit

II. Cycling sow and gilts

Feed Matrix(altrenogest) from Intervet

Matrix is designed for synchronization of estrus in sexually mature gilts that have had at least one estrus cycle. It can also be used on actively cycling sows. The treatment period is for 14 to 18 days and estrus (standing heat) will occur within 4 to 6 days after removal although a few may go out to 9 days.

Each animal must receive 6.8 milliliter (15 mg altrenogest) each day for 14 to 18 day consecutive days. Individual feeding is recommended. If feeding in groups, the Matrix must be evenly mixed in the feed or top dressed so each animal gets their share of the Matrix.

Underfeeding of Matrix may lead to the occurrence of cystic follicles or return to estrus during the 14 to 18 day period.

You can also use PG600 24 hours after removing Matrix from the feed to ensure most animals cycle within 4 to 6 days after removing Matrix. When animals cycle breed according to your normal schedule for gilts and sows post first standing estrus.

Matrix and PG600 are available from Swine Genetics International.

Many show pig breeders have been using Matrix very successfully to fit their breedings and farrowings to the intended show schedules.

III. Weaned Sows

- A) PG600 single injection within 12 hours post weaning. AI 24 and 36 hours post first standing estrus.
- B) PG600 SC or IM within 12 hours post weaning. Then HCG 500-1000 IU IM 72-96 hours post PG600. AI twice - 24 and 36 hours post HCG OR AI once - liquid 28-32 hours post HCG frozen 30-34 hours post HCG
- C) PG600 is also helpful in preventing breeding slump during hot months and with first litter gilts nursing large litters.

IV. Non-cycling Gilts or Sows

- A) PG600 single injection SC or IM. AI 12 and 24 hours post first standing estrus for gilts or 24 and 36 hours for sows.
- B) PG600 SC or IM. Then HCG 500-750 IU IM 72-96 hours post PG600 AI twice - 24 and 36 hours post HCG OR AI once - liquid 28-32 hours post HCG -frozen 30-34 hours post HCG

V. Breed Cycling Gilts or Sows at Natural Estrus

- A) Abort at 15-40 days pregnancy with 10-15 mg Lutalyse OR 175-250 mcg Estrumate IM. Another 5-10 mg Lutalyse OR 75-175 mcg Estrumate IM 12 hours post first Lutalyse or Estrumate injection.
- B) Most animals will cycle in 4 to 8 days after abortion.
Breed according to your regular breeding schedule post first standing estrus
- C) PG600 24 hours post abortion and AI 24 and 36 hours post first standing estrus
- D) PG600 SC or IM 24 hours post abortion. Then 500-1000 IU HCG IM 72-84 hours post PG600. AI twice - 24 and 36 hours post HCG OR AI once - liquid 28-32 hours post HCG - frozen 30-34 hours post HCG

It should be emphasized that PG 600 does not work in cycling animals. Also, lutalyse is not very effective in synchronizing cycling swine even though it is very effective and often used in cattle. In swine there are numerous corporalutea that must be removed rather than only one as in the case of cattle. Two or three injections of lutalyse at 12 hour intervals may work in some cases but still will not be a reliable method to synchronize cycling swine.

VI. Work conducted with lactating sows at Southern Illinois University by Harold Hodson and co-workers utilized a treatment scheme of 1500 IU of pregnant mare serum (PMS) followed by 1000 IU of human chorionic gonadotrophin (HCG) 72 - 96 hours later. The sows were inseminated 24 hours post HCG and again at 36 to 40 hours without estrus detection. The results illustrated in Table 1 indicated that it is possible to successfully synchronize estrus and AI lactating sows on a timed basis while still in the farrowing crate.

**TABLE 1: INDUCED OVULATION, ARTIFICIAL INSEMINATION
AND CONCEPTION IN LACTATING SOWS**

	Treatment A	Treatment B	Control
No. Treated	15	15	31
Days Postpartum	25.0	25.3	34.1
No. Farrowed	12	11	27
Gestation Length	116.4	116.4	116.2
Live Pigs/Litter	10.5	11.6	10.0

Treatment A - PMS, HCG

Treatment B - Prostaglandin F2 24 hours prior to PMS

Control - Bred by natural service following weaning

PMS has not been cleared for use in sows even though PG600, which contains PMS, has been cleared. PG600 could be used in place of the PMS. However, a double or triple dose (1 200 to 1800 IU) would probably be needed. Again, this level has not been cleared by the FDA.

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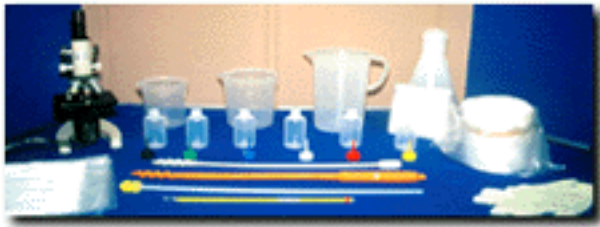
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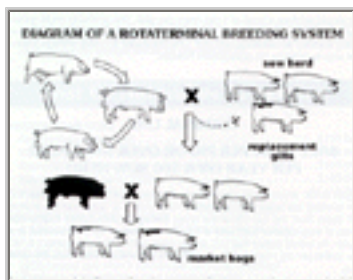
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June 2005

COLLECTION

CODE	DESCRIPTION	UNIT	PRICE	QUANTITY	PRICE	QUANTITY	PRICE
CDP	Collection dummy, portable, adjustable height	Each	300.00				
CK	Collection Kit	Each	70.00				
	Collection cup, 20 collection bags, 20 gauze strips, 20 surgical gloves, 2000 ml flask, 1000 ml beaker 600 ml beaker, 30 bottles & caps, thermometer, 5 pkgs of 4 spirettes and 1 small styrofoam box						
CCW	Collection cups with handle	Each	5.50				
CMBW	Collection bag with gauze and perforations	Each	0.50	100	0.40	1,000	0.35
CBL	Plastic bags, large, 12x18	Each	0.15	25	0.13	100	0.11
CBS	Plastic bags, small 8x10	Each	0.10	100	0.08		
CGS9	Gauze squares 9x9	Each	0.36	25	0.33	100	0.30
CGSC	Gauze squares, precut 275 squares per box	Box	82.00				
CGU	Gauze-uncut, 70 yd. Bolt	Each	72.00				
CBSF	Boar Semen Filter, Round, Pkg of 200	Pkg	20.00				
CGXL	Collection gloves, X-large non-latex, 100/box	Box	18.00				
CGL	Collection gloves, large, non-latex, 100/box	Box	18.00				
CGM	Collection gloves, medium, non-latex, 100/box	Box	18.00				
CGS	Collection gloves, small, non-latex, 100/box	Box	18.00				
CRM	Rubber mat for collection with holes 48x72x3/4	Each	120.00				

EXTENSION

EJB	Joong Ang Bottles, includes caps	Each	0.25	250	0.20		
EJBCA	Joong Ang Bottles, 500/case includes caps	Case	80.00				
EJBCAP	Joong Ang Bottle Caps, blue, white, red, yellow	Each	0.10	500	0.08		
EBMT	Minitube Bottle, without caps, 100 ml	Each	0.25	100	0.20	500	0.16
EMC	Minitube Bottle caps, clear,blue,black,green,red,yellow	Each	0.10			500	0.09
EBM	Big Mouth Bottle, 100 ml, with wide mouth without spout or collar - graduated	Each	0.21	250	0.14		
EBMC	Big Mouth Collar	Each	0.06	250	0.05		
EBMS	Big Mouth Spout, blue, clear, green, red, yellow	Each	0.07	250	0.06		
EDB	Dispensing bag	Each	1.10				
EDS	Dispensing spout	Each	0.30				
EST	Semen Tubes, 95 ml, 2000/case (Continental)	Case	260.00				
EST2	Ultraflex Thin Semen Tubes, 2100/case (Minitube)	Case	315.00				
ESTQT	Quicktip Semen Tubes, 2000/ case (Minitube)	Case	220.00				
ESTHVV	Heavy Quicktip Semen Tubes, 2000/case (Minitube)	Case	237.00				
EAND1	Extender, Androhep Lite, 1 liter	Each	6.00	100	5.50	200	5.30
EAND5	Extender, Androhep Lite, 5kg (makes 100 liters)	Each	435.00				
EAND+	Extender, Androhep Plus, 5kg (makes 100 liters)	Each	461.00				
EEN1	Extender, EnduraGuard, 1 liter	Each	8.95	10	8.10	200	7.70
EEN4.7	Extender, EnduraGuard, 4.7kg (makes 100 liters)	Each	660.00				
EBTS1	Extender, BTS, 1 liter, 250 mg Gentamicin/liter	Each	2.25	10	2.00	100	1.75
EBTS5A	Extender, BTS, 5kg (makes 100 liters), with antibiotic	Each	90.00				
EMK1	Extender, Merck III, 1 liter, contains 1g Neomycin/liter	Each	6.00	100	5.50	200	5.15
EMK5	Extender, Merck III, 5kg (makes 83 liters)	Each	235.00				
EEV1	Extender, Everhold, 1 liter, contains antibiotics	Each	4.50	20	4.25	100	4.00
EEV10	Extender, Everhold, 10 liters, contains antibiotics	Each	42.50	5	40.00	10	37.50
EEV4.8	Extender, Everhold, 4.85kg (makes 100 liters) w/antibiotics	Each	375.00	10	350.00		
EM1	Extender, Modena, 1 liter, contains Gentamicin, Lincomycin and Spectinomycin	Each	5.35	20	5.00	100	4.75
EM3	Extender, Modena, 3 liters, contains antibiotics	Each	15.00	20	14.50	100	13.75
EM10	Extender, Modena, 10 liters, contains antibiotics	Each	50.00	2	48.00	5	46.00
EM4.8	Extender, Modena, 4.8kg, contains antibiotics	Each	450.00	10	425.00		

LABWARE

CODE	DESCRIPTION	UNIT	PRICE	QUANTITY	PRICE	QUANTITY	PRICE
GLASS							
LGB600	Beaker, 600 ml, graduated	Each	6.00				
LGB1	Beaker, 1000 ml, graduated	Each	8.50				
LGB2	Beaker, 2000 ml, graduated	Each	16.50				
LGF1	Flask, 1000 ml, graduated	Each	6.00				
LGF2	Flask, 2000 ml, graduated	Each	16.00				
LGBT1	Bottle, 1000 ml, graduated with cap	Each	10.00				
PLASTIC							
LPB6	Beaker, 600 ml, graduated	Each	7.00				
LPB1	Beaker, 1000 ml, graduated	Each	10.00				
LPP2	Pitcher, 2000 ml, graduated, with handle	Each	8.00				
LPF1	Flask, 1000 ml, graduated	Each	15.50				
LPF2	Flask, 2000 ml, graduated	Each	20.00				
LPRBT5	Rectangular bottle, 500 ml, polyethylene	Each	3.00				
LPBT	Round bottle, wide mouth, 1000 ml	Each	8.00				
LPJ4	Jug, 4 liter w/cap, polyethylene	Each	18.00				
LPJ8	Jug, 8 liter w/cap, polyethylene	Each	29.00				
LPWBT	Wash bottle, with spray nozzle, 500 ml	Each	3.00				
LFunnl	Funnel	Each	2.00				

INSEMINATION

IS4	Disposable spirettes, 4/pkg	Each	2.25	5	1.75	125	1.28
ISCS	Disposable spirettes, 500/case (125 pkgs of 4/pkg)	Case	160.00				
ISCS1M	Disposable spirettes, 500/case (5 pkgs of 100/pkg)	Case	140.00				
IAG	Absolute gilt insemination rod-purple foam tip	Each	1.35	25	1.25		
IAS	Absolute sow insemination rod-pink foam tip	Each	1.35	25	1.25		
IBT10	Blue Tip catheter, disposable 10/pkg	Pkg	2.75				
IBT25	Blue Tip catheter, disposable 25/pkg	Pkg	5.75				
IBTCS	Blue Tip catheter, disposable 500/case	Case	100.00				
IGP10	Golden Pig, disposable, sponge tip, 10/pkg	Pkg	2.75	10	2.50		
IGP25	Golden Pig, disposable, sponge tip, 25/pkg	Pkg	5.75	4	5.50	20	5.00
IGPCS	Golden Pig, disposable, sponge tip, 500/pkg	Case	100.00				
IKOBI	Kobi catheter, 25/pkg	Pkg	8.50				
IKOCS	Kobi catheter, case of 500	Case	165.00				
IMS	Melrose, Spanish, nondisposable rubber catheter	Each	11.50				
IMM	Melrose, Minitube, nondisposable rubber catheter	Each	17.00	20	15.00	100	14.50
IMJ	Melrose, Joong Ang, nondisposable rubber catheter	Each	11.00				
IE	Easi mate, disposable, spiral sponge tip (10/pkg)	Pkg	4.50				
IRP	Red insemination pipettes, 25/pkg	Pkg	3.00				
IBMATE	Boar Mate spray	Each	12.00				
IBMCS	Boar Mate spray, case of 12	Case	135.00				
ILUBE	Lube, non-spermicidal, 5 oz tube	Each	2.50	12	2.25		
ILUBMI	Minilube individual pack	Each	0.10				

MICROSCOPE AND ACCESSORIES

CODE	DESCRIPTION	UNIT	PRICE	QUANTITY	PRICE	QUANTITY	PRICE
M400	Microscope, 400 power, without slides or covers	Each	175.00				
MSL	Slides, plain 1/2 gross (72)	Box	4.50				
MCSL	Caffeine slides, 1/2 gross (72)	Box	15.00				
MC	Cover glass, 1 oz. Box (approx. 225)	Box	10.00				
MB	Microscope replacement bulbs (need model No.)	Each	Call for quote				

ACCESSORIES AND LAB EQUIPMENT

AEB6	Electronic Balance, 4000g Scout Pro	Each	Call for quote				
ACUV	Cuvettes, square, 100/tray (use w/S-T spec)	Tray	10.00				
ASPP	Spermacue Photometer	Each	Call for quote				
AMC	Microcuvettes, use with Spermacue 100/pkg	Pkg	87.00				
AP1	Pipette, 100-1000 ul, adjustable volume	Each	245.00				
APT1	Pipette tips 100-1000 ul, blue, 500/pkg	Pkg	22.50				
APT2	Pipette tips, 1-200 ul, yellow, 480/pkg	Pkg	13.50				
ATTP	Test tubes, plastic with caps, 1000/pkg	Pkg	90.00				
ATTG	Test tubes, glass, disposable, 250/pkg	Pkg	9.50				
ATTR	Test tube rack	Each	17.50				
ASC	Sodium Chloride to make 500 ml of saline	Each	2.00				
AWBH	Water Bath Heater Circulator	Each	Call for quote				
AMS2	Melrose sterilizer, 20 Melrose, stainless steel	Each	256.00				
AB2	Boiler unit for 20-sterilizer	Each	37.00				
AMP	Mixing & dispensing pitcher	Each	148.00				
AAS	Auto-sealer for boar semen tubes, 3-tube, Model 3000	Each	Call for quote				
AAS6	Auto-sealer for boar semen tubes, 6-tube, Model 7000	Each	Call for quote				
ADC	Distiller, countertop, distillate cap 3 gal/day	Each	Call for quote				
AOVEN	Oven, Equatherm Economy, 3.1 cu ft	Each	Call for quote				
ASW	Slide Warmer	Each	Call for quote				

ULTRASONIC EQUIPMENT

CODE	DESCRIPTION	UNIT	PRICE	QUANTITY	PRICE	QUANTITY	PRICE
RPTC	Renco Preg-Tone, cable transducer Measures pig & sheep pregnancy	Each	400.00				
RPTII+	Renco Preg-Tone II Plus, built-in transducer Measures pig & sheep pregnancy	Each	195.00				
RPTIIW	Renco Preg-Tone II Plus with earphone, built-in transducer Measures pig & sheep pregnancy	Each	210.00				
RLM	Renco Lean-Meater, cable transducer, digital fat thickness measurement in pigs	Each	490.00				
RPA	Renco Preg-Alert, measures pig, sheep, cattle and horse pregnancy, backfat & loin muscle thickness	Each	Call for quote				

FROZEN SEMEN EQUIPMENT AND SUPPLIES

FRMM	Ready-made Modena in 100cc	Each	1.50				
FSB	Sealing Balls, glass, red, black, blue, yellow, green, clear, orange, purple, brown, 100/pkg	Pkg	19.50				
FSBM	Sealing Balls, metal, 100/pkg	Pkg	10.00				
FS5	Straws, 5 ml, 100/pkg	Pkg	24.00				
FSWB	Straw Thawing Water Bath	Each	Call for quote				
FNT	Nitrogen Tank, SC20/20, MVE	Each	827.00				
FNT33	Nitrogen Tank, XC33/22, MVE	Each	950.00				
FNT34	Nitrogen Tank, XC34/18, MVE	Each	976.00				
FNT47	Nitrogen Tank, XC47/11-10, MVE	Each	1294.00				

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GENERAL

CODE	DESCRIPTION	UNIT	PRICE	QUANTITY	PRICE	QUANTITY	PRICE
GTUBE	Tubing, plastic, disposable, per foot	Foot	0.50				
GPG1	PG 600, 1 dose vials (5/pkg) (for initiation of estrous & ovulation in noncycling gilts)	Pkg	35.00				
GPG5	PG 600, 5 dose vial	Each	28.50				
GBOOT	Boots, plastic knot-a-boot, disposable, 25 pair/box	Box	11.50				
GDET	Lab detergent, 1 liter	Liter	26.00				
GSTS	Styrofoam box, small TK4 (inside 7 7/8 X 6 X 4 1/2) Holds up to 20 doses	Each	3.89				
GSTSL	Styrofoam box, SL10 (TK4 fits inside)	Each	4.75				
GSTM	Styrofoam box, medium, TK8 (inside 11 1/2 X 9 X 9 1/2) Holds up to 40 doses	Each	4.00				
GSTPC	Styrofoam box, PC30 (TK8 fits inside)	Each	7.25				
GSTL	Styrofoam box, large, SL10 (inside 10 3/4 X 10 1/2 X 8) Holds up to 110 doses	Each	4.75				
GSTSL	Styrofoam box, SL22 (SL10 fits inside)	Each	8.00				
GCOV	Coveralls, disposable, large	Each	4.50				
GCOV2X	Coveralls, disposable, 2xlarge	Each	4.75				
GTGC	Thermometer, glass, -20 to 110° Centigrade	Each	11.00				
GTGF	Thermometer, glass, 0 to 230° Fahrenheit	Each	11.00				
GTMC	Thermometer, metal, -10 to 110° Centigrade	Each	36.00				
GTMF	Thermometer, metal, -40 to 160° Fahrenheit	Each	36.00				
GP	Polar Packs	Each	0.50				
GPCS	Polar Packs, 36/case	Case	15.00				
GCG	Compress gas	Each	12.00				
GKW	Kimwipes, 250/box (4 1/2 X 8 1/2)	Box	3.00				
GTP5	Transfer Pipettes, 5"/ 7.7ml, 500/box	Box	18.00				

STORAGE

SDSU	Danby Storage Unit, heat & cool, preset	Each	500.00
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