

**Artificial Insemination For Swine**  
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## **QUESTIONS PRODUCERS USUALLY ASK**

### **What is artificial insemination?**

Artificial insemination (A.I.) is a process of collecting semen from a boar and depositing it into the cervix of a sow. Both collection and insemination are accomplished through artificial means. But attention must be paid to the normal biological processes to achieve success.

### **Why should a swine producer consider using A.I.?**

There are several advantages, but the most important are listed below:

1. A.I. allows the use of valuable boars that may not be available otherwise. These high value boars can be used on more sows and in more herds than could be achieved with natural service. One boar typically produces enough semen to breed 500 to 1500 sows per year. But with natural service, it's rare for a boar to impregnate more than 200 sows in one year.
2. A.I. allows the use of proven sires. Boars can be used that have a good track record for improving feedlot performance or mothering ability in their offspring. The swine industry has lot of progress to make in this area.
3. A.I. helps prevent disease. Since the primary mode of spreading disease is through pig-to-pig contact, use of A.I. can greatly reduce the risk of diseases. Bacteria and viruses have been isolated from boar semen, however, few field studies have been conducted to determine what diseases can be transmitted through the use of A.I. Three diseases known to be spread via A.I. include African Swine Fever, Porcine Parvovirus, and Porcine Reproductive and Respiratory Virus. The best assurance against possible introduction of new diseases via A.I. is purchase semen from herds from rigorous biosecurity programs.

### **What are the disadvantages of using A.I.?**

A.I. isn't foolproof. There is a lot of room for failure. If your success is limited, A.I. can get expensive. A.I. can be time consuming. Also, A.I. requires a higher level of management than that of pasture or pen breeding.

### **How can I maximize success with A.I.?**

Success will depend on 1) your ability to detect heat in sows, 2) the timing of insemination, 3) the technique you use and 4) semen quality.

Sows come into heat on the average every 21 days. The best sign of heat is when the sow stands rigidly to be mounted by the boar. Other signs include interest in the boar, swollen vulva, ears cocked to the rear and increased vocalization.

During heat (estrus) the level of estrogens is increased in the blood. The estrogens are responsible for the changes in behavior and physiology that the sow undergoes during estrus.

About 40 hours after the beginning of estrus, the eggs are released from the ovaries into the reproductive tract. The critical factor with either natural or artificial insemination is delivering the sperm to the eggs at the right time.

Sperm live for about live for 1.5 to 3 days in the reproductive tract under natural breeding conditions, and roughly one day under conditions of A.I. Eggs live for 8 to 10 hours. So conception is maximized if the sperm cells are in place before ovulation.

For producers using fresh semen and those that check heat twice per day, sows should be inseminated about 12 and 24 hours after the beginning of estrus. For producers who check only once per day, sows should be serviced each day they are in heat. More than three services is not necessary.

Most semen is available fresh, not frozen. Fresh semen must be ordered to arrive when the sows are predicted to be in heat.

### **Where should I purchase boar semen?**

Semen can be purchased from anyone that has quality semen, performance tested boars and genetically proven breeding stock. The source may be a commercial company. It may be a seedstock operation 1000 miles away. Or it could be your neighbor.

### **What do I need to get started using fresh semen?**

The essential requirements for using fresh, purchased semen include a clean room for handling, and storing and insemination pipettes. Most suppliers provide squeeze bottles or tubes for delivering the semen into the sow.

For collecting and processing your own semen, the following items are recommended (Almond, et al., 1994. The Swine A.I. Book. Published by Morgan Morrow): Semen collection vessel, 6" plastic funnels, milk filters or sterile surgical gauze, non-spermicidal latex or vinyl gloves, microscope (capable of 100X, 400X, and 1000X magnification), microscope slides and cover slips, graduated cylinder (500 ml), two 12" thermometers, one to five 1-liter bottles for handling the semen, insemination bottles and nozzles, thermostatically controlled cabinet or incubator, glass-distilled or reverse osmosis water.

Most semen costs from \$20 to \$50 per dose plus shipping. Each sow will normally need two doses. If you intend to register the litter, an additional \$50 to \$250 per litter may be charged by the supplier.

### **How many services can I get with one ejaculate?**

The average is 6-15. With concentrated ejaculates (consistency thicker than skim milk), more than 20 doses are possible.

### **What should I use for diluting the semen?**

Formulas for the Beltsville Thawing Solution and the Kiev extender are listed in the Pork Industry Handbook. The Swine A.I. Book lists formulas for BTS and Guelph (both 3-day extenders) and Zorpva and Reading (both 5-day diluents). Commercial semen companies offer extenders that are ready to be dissolved in distilled water. For any of these diluents, semen will be most viable when stored between at 61 and 68 degrees Fahrenheit.

Be sure that extender and semen are at the same temperature before mixing. A rapid change in temperature is more lethal than the wrong temperature. Always pour extender into the semen.

### **What things are harmful to semen?**

1. Cold temperature. Be sure any collection vessels and mixing containers are at body temperature.
2. High temperature. Moderately warm temperatures increase the metabolism of sperm and may activate sperm. For maximum fertility, sperm should not be activated before insemination. Very high temperatures will kill sperm cells.
3. Water. One drop of water in an insemination rod can create a problem. Re-useable rods must be rinsed immediately before use, use distilled water, then flush with skim milk at 37 degrees Centigrade (98.6 degrees Fahrenheit). It is better to use disposable rods.
4. Tap water. Always use distilled water to make the final rinse on equipment and for the dilution of extenders, since minerals from tap water can be harmful.
5. Petroleum products. Vaseline, and lubricants in syringes can kill sperm.
6. Soap. Don't use soap to clean equipment. Instead, clean with boiling tap water, then rinse with distilled water.
7. Alcohol. Avoid using any kind of alcohol to clean instruments.
8. Light. Always store semen in a dark area.
9. Others: Air, gauze, gloves (always collect boars with non-powdered gloves).



### **What's the best temperature to store sperm?**

Sixty-one to 68 degrees Fahrenheit is optimum for fresh semen. Special thermostatically controlled cabinets can be purchased to hold the temperature within this range. However, many producers store semen successfully in clean containers kept in basements where temperatures remain fairly constant year-round. Be sure to gently turn and rotate containers slightly twice per day. That keeps the sperm cells uniformly mixed in the extender solution.

### **Exactly how do I inseminate a sow?**

Artificial insemination requires more planning and preparation on your part. Boar semen for AI is usually shipped fresh, not frozen, and is fertile for five to seven days after collection. For maximum conception rate and litter size, fresh semen should ideally be used within 3 days of collection. To complicate matters, you must order semen to arrive when you expect your sow or gilt to be in heat - sometimes months ahead of time. Semen suppliers generally collect semen only two days per week - usually Mondays and Thursdays. Fresh semen is shipped next day air which means it should arrive at your doorstep on a Tuesday or Friday.

Ordering semen for sows is simpler than for gilts. You'll have control over weaning time, and can expect your sow to cycle 4-8 days after weaning. Thus you should plan to wean sows about four days before you expect your semen to arrive. Order two "doses" or vials of semen for every sow you intend to breed.

Be sure to order insemination rods along with the semen. Most rods are disposable, so order one for each service. Rods come in several shapes. One commonly used type is spiral shaped which simulates the corkscrew shape of a boar's penis. The end of another popular type looks like a foam marshmallow with a slight groove around the middle. Both the marshmallow and corkscrew types are connected to a flexible tube approximately 20 inches long through which the semen passes. Several "hybrids" of the two types are currently available. The type you choose is a matter of personal preference; all will work well.

Semen is often packaged in bottles or tubes that resemble toothpaste tubes. The pointed end to the container will be sealed. Store semen in the cooler in which it came. Keep semen in the dark as much as possible since light can damage sperm cells. Semen storage temperature should be at room temperature or slightly below. A basement is a good place to store semen until it is used. Once each day, gently mix the semen, but don't shake it. Mixing distributes the nutrients in the semen container and helps the sperm cells live longer. Shaking or rough handling can damage sperm cells.

When your sow comes in heat, plan to inseminate her twice - 12 and 24 hours after the beginning of standing heat. For instance, if you've ordered semen to arrive on Friday, you should have weaned your sow on the previous Monday. You could expect your sow to begin standing heat sometime Thursday through Sunday. For the sake of this example,

let's say she begins standing heat Saturday morning. You should breed her on Saturday evening and Sunday morning.

If you plan to breed gilts, you must have a record of at least one heat before you order semen. Then you must hope she cycles at nearly 21 day intervals, and order semen for her next expected heat. Gilts should be inseminated 12 and 24 hours after the beginning of standing heat. For example, if you expect your gilt to come into heat on a Thursday, order semen to be delivered the previous Tuesday. If she begins standing heat Wednesday evening, plan to breed her Thursday morning and Thursday evening.

Actual mating of a sow using artificial insemination is not difficult. Collect the following materials you'll need to inseminate a sow: Semen (stored in a small cooler at room temperature and out of the light), scissors (to cut the sealed end of the semen tube or bottle), and an insemination rod. If inseminating outdoors in cold weather, wrap a towel or dishcloth around the semen container to help maintain semen temperature until it enters the reproductive tract.

If a boar is available, move him to an adjacent pen. Straddle the sow's back or lean across her back to make her stand still (a second person could do this). If she doesn't stand still, she may not be in heat. Insert the marshmallow (or corkscrew) tip of the insemination rod into the sow's vulva. Tip the back end of the rod down toward the ground and insert the rod until you meet some resistance. The resistance should be the cervix. If you have the corkscrew type of rod, turn the rod to the left about 2 turns or until you can't pull the rod back out with a slight tug. If you have a marshmallow type rod, push a bit further until the rod springs back when you tug it lightly. The groove around the marshmallow should seat itself into the interlocking rings of the cervix.

While keeping pressure on the back, remove the semen tube or bottle from the cooler, and cut off tip of the sealed pointed end. Insert the opened semen container into the end of the rod and twist 1/2 turn to make sure it is seated properly. Bending the rod, lift the semen container above the level of the sow's back so that, if it wanted to, the semen could drain into the sow.

Now comes the tricky part. If the sow is in a good standing heat and properly stimulated by back pressure, the contractions of her uterus should (and sometimes will) pull the semen into her reproductive tract in a matter of a few minutes. Sometimes however it takes several minutes for these contractions to begin. Be patient. Gently stroking the sow's underline can help to stimulate the process.

If the semen does not seem to be flowing on its own, gently squeeze the semen container and watch for semen flowing back out of the sow past the rod. Ideally, there should be no back flow. If semen is coming back out of the sow, stop the insemination, reposition the rod, and start again. If gently squeezing the semen container does not get semen flowing into the sow, reposition the rod and start again.

It can take as little as 2 minutes for the sow to accept the semen, or as long as 20 minutes. Eight minutes is about average. When the semen container is empty, leave the rod in the

sow for another minute or two, then gently remove the rod from the sow. A small amount of back flow is typical when removing the rod. Discard the rod and semen bottle. Never re-use a disposable insemination rod.

What happens if you are using AI and your sow or gilt comes back in heat 21 days later? Some semen suppliers will allow you to order semen for 3 weeks later on the expected recycle date. If your sow or gilt shows no early signs of coming back into heat, you can cancel the semen order at the last minute. Be sure to ask if you can do this when you are ordering your semen. Of course, if your sow or gilt cycles late, you'll have to order more semen and wait until the next heat period to re-breed your sow.

### **How can I fit A.I. into my herd?**

One way is to identify the best sows in your herd and breed a portion of these artificially. Replacement boars (or gilts) can be derived from these matings. Note that unless the boar and sow are of the same breed, the herd boars from this mating will be crossbred. Secondly, if the sow is related to many individuals in the herd, using boars from this litter may result in inbreeding.

### **Should I attempt to use A.I. on every sow?**

Most owners and managers of large herds are doing just that. But keep in mind that even if every sow isn't bred artificially, A.I. still provides a tool for introducing superior lines into the herd with a minimum of disease risk.

### **Recommended Reading**

The Swine AI Book – Second Edition. (Publisher Pig Improvement Company)