Objectives
1) To introduce the concept of artificial insemination including advantages, disadvantages and its importance in the commercial swine operation.
2) To introduce the equipment and techniques needed to inseminate swine.
3) To discuss how natural service is used in the commercial swine industry.

Why use Artificial Insemination?

Advantages
1) Allows for widespread use of superior genetics.
   - Primarily through boar studs.
2) Increased control of breeding programs and subsequent progeny being produced including:
   - Market hogs vs. replacements females and/or both.
   - More uniform groups of pigs at weaning.
3) Fewer problems than usually encountered with using boars.
   - Less risk of injury to boar, sows, and people handling pigs.
   - Allows use of heavy boars on light females.
   - Eliminates the need to isolate and test newly introduced boars.
   - Decreased need for special facilities to test and house boars.
   - Decreased housing and feed cost.
4) Reduced risk of disease transmission.
5) Efficient use of natural estrus synchronization without the need for increased boar power.
6) Leads to increased awareness of:
   - Individual animal records and animal matings
   - Selection of breeding stock
   - True reproductive status of herd

Disadvantages
1) Increased level of management required to implement an AI program.
2) Knowledge of the how to conduct the AI procedure is required.
3) Adequate physical facilities are required for estrus detection and AI.
4) If collecting own boars, producer needs to know how to train and collect the boars as well as having a designated area to collect the boars in.

What is needed for a successful AI program?
1) Understand the selection criteria for boars
   - Breeding value appraisal
   - Performance vs. carcass traits
   - Structural and reproductive traits
2) Maintain healthy females in sound breeding condition
   - Cull gilts that do not reach puberty by 9 months of age.
   - Cull sows that have an extended anestrous period after weaning.
   - Gilts/sows that return to heat after breeding twice should be culled.
3) Accurate estrus or heat detection (Estrus detection will be reviewed later in handout).
   - Check heat twice a day, 12 hours apart.

4) Proper insemination times with extended liquid semen
   - If you purchase semen, order it ahead of time to assure guaranteed arrival when you need it
   - Optimum time (hours) to breed gilts/sows after first standing estrus

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<tr>
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<th>Single Insemination after first detected estrus</th>
<th>Double Insemination after first detected estrus</th>
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<tbody>
<tr>
<td>Gilts</td>
<td>24 – 30 hours</td>
<td>1&lt;sup&gt;st&lt;/sup&gt; 12 – 24 hours</td>
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<td>2&lt;sup&gt;nd&lt;/sup&gt; 24 – 36 hours</td>
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<td>Sows</td>
<td>28 – 36 hours</td>
<td>1&lt;sup&gt;st&lt;/sup&gt; 24 hours</td>
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<td>2&lt;sup&gt;nd&lt;/sup&gt; 36 hours</td>
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5) Handle and store the extended liquid semen correctly.
   - Liquid semen maintained at 64°F; fertility is maintained for 4 - 5 days.
   - Mix semen frequently so that the sperm do not settle to bottom of tube, MIX GENTLY!!

6) Use proper AI technique and equipment.
   - Storage unit to keep liquid semen at 64°F. Extended semen is stored in plastic bottles
   - Disposable plastic insemination spirettes. One end of the spirette has either a foam or plastic end that fit into pigs cervix and the other end has a connector for the vessel containing the extended semen. These vessels are either small bottles or small tubes similar to what toothpaste is packaged in. They hold 100 mL of extended semen.
   - Non-spermicidal jelly
   - Paper towels and water to clean the vulva of the sow/gilt prior to breeding
   - Breeding records

**Insemination process**

1) Allow the female into an area where she can see, hear, and smell the boar.

2) It may be necessary to apply pressure to gilt/sow’s back to determine if she will stand (Figure 3). Once you have determined that she is in “standing estrus”, prepare to inseminate her.

3) Clean the sow/gilt’s vulva with clean water.

4) Prepare the insemination spirette - lubricate the end with non-spermicidal jelly.

5) Insert the spirette into vagina at a slight upward angle so as to miss the opening to the urethra when first inserting the spirette. Place the tip of the spirette against the cervical os until it stops (Figure 1a).

6) Gently turn spirette counterclockwise until the sow/gilt locks down on spirette (Figure 1b & 2).

7) Attach the bottle of extended semen to spirette and slowly deposit semen into cervix. A small amount of semen may flow out the vulva. If this happens, slow movement of semen into cervix.
8) Typically 100 ml of extended semen is used per insemination, containing approximately 3 - 4 billion live sperm per insemination.

9) Once the bottle is empty, remove spirette by turning it clockwise, while gently pulling outward.

10) Throw away the spirette and bottle.

11) Congratulations, you have bred your first gilt!!!!
**Estrus or Heat Detection:** (Estrus is the period of sexual receptivity of female to male.)

1) Sow or gilt will stand to be mounted by another pig.
2) Average duration: 24 - 48 hours.
   - Ovulation occurs 38 - 42 hours after the onset of estrus.
3) Average estrous cycle length 21 days with a range of 18 - 25 days
4) The pig is polyestrous; therefore, she exhibits estrous cycles throughout the year.

**Key observations to be made during estrus detection**

1) Female becomes restless and will often seek out boar.
2) May or may not be evidence of swelling of the vulva, possibly a pink color.
   - Occasionally a mucus discharge will be observed.
3) Repeatable movement of ears toward the erect position.
4) In the presence of a male, she will assume the mating stance: “standing heat”.
   - Sow or gilt will also stand solidly when pressure is applied to her back i.e.) sit on her back.
5) Presence of boar greatly assists in finding females in heat.
6) During breeding, it is best to check heat twice a day.
   - Once in AM and once in PM, at least 12 hours apart.

**Factors influencing or associated with estrus**

1) High temperature (> 85°F) can delay or prevent the expression of estrus.
   - Also results in decreased ovulation rates and increased embryonic loss.
2) Sickness can result in irregular estrous cycles or lack of estrus.
3) Nutrition – decreased nutrient intake results in anestrous pigs
   - Lack of protein and/or energy can also inhibit the expression of estrus.
4) Failure of gilt to reach puberty; hence, no expression of estrus
   - Age at puberty is 5 - 8 months with and average weight of 150 - 250 lbs.
5) Social stress – moving and mixing of pigs not familiar with each other.
   - This process can actually enhance the expression of estrus
6) Faulty estrus detection, human errors
7) Silent heat (ovulation with no visible signs of heat)
8) Weaning
   - Standard management practice is to wean piglets 3 - 4 weeks after farrowing.
   - High proportion of sows will exhibit estrus 3 - 7 days postweaning. Therefore, it works well to synchronize estrus in sows.
Natural breeding

1) Young untested boars - TEST RUN them.
   - Test-mate the boars between 7 and 8 months of age.
   - Place a gilt that is in estrus with boar.
   - Observe the boar’s aggressiveness and libido.
   - It may be necessary to assist boar with mounting and the penetration of his penis into the vagina the first couple of times.
   - Observe boar’s ability to mount the gilt and complete mating within 3 to 10 minutes.
   - Evaluation includes physical exam of boar, as well as a microscopic semen evaluation.

2) Determine boar power requirements.
   - Recommended maximum number of services per boar, by age
     
     | Boar Age        | Individual Mating System | Pen Mating System |
     |-----------------|--------------------------|-------------------|
     |                 | Maximum Matings         | Boar to Sow Ratio |
     | Daily | Weekly |                    |
     | Young (8 to 12 months) | 1 | 5 | Between 1:2 and 1:4 |
     | Mature (> 12 months) | 2 | 7 | Between 1:3 and 1:5 |

3) Mating systems
   - Individual Mating
     Provide an adequate breeding area for the boar and gilt/sow, want slip-free breeding. Introduce female that is in standing estrus to boar, let them mate, and then separate. Allows for controlled use of boars. Observed and recorded matings.
   - Pen Mating
     Allows one boar to breed several females in a pen of weaned sows or gilts. Rotate boars on a 12 to 24 hour interval. Sexual rest is important in this system.

4) Boar housing
   - House boars individually to eliminate fighting, riding and competition for feed.
   - Keep boars comfortable during warm months (> 85°F)
     Excessive heat results in reduced boar fertility up to 4 to 6 weeks after stress period. Check for heat stress - watch respiration, want < 40 breaths/minute. Provide sprinklers, shade, or a building with air conditioning if available.
   - Remember that embryonic loss also increases during heat stress.
Additional Notes: