Title: Swine Unit  
SOP Number: 029  
Purpose: The Swine Unit located at New Deal Teaching and Research Facility, consists of approximately 60 to 80 sows producing approximately 1,600 pigs per year. There are currently two full time staff and a variable number of student workers. The objective of the unit is to produce high quality commercial swine using industry relevant production practices and support the teaching and research goals of TTU in a safe, clean and humane environment.

BREEDING HERD HUSBANDRY

A. Breeding Herd Overview
   a. The New Deal Swine Unit utilizes ‘all in, all out’ batch breeding and farrowing practices.
   b. Sow groups can have between 8 to 16 head depending on the size of the total sow herd.
   c. The farm utilizes artificial insemination, but boars are maintained for heat detection and estrus stimulation.

B. Gestating Housing
   a. Gestating or open sows/gilts are housed individually in gestation stalls or pens with up to 5 sows per pen.
   b. Each gestation stall must have dimensions of at least 2.1 m (7 ft) × 56 cm (22 in). When housed in pens, each sow must have at least 1.49 m² floor space. (Ag Guide).
      i. Sows housed in stalls should be able to lie down fully on its side without the head having to rest on a raised feeder and the rear quarters in contact with the back of the stall at the same time (PQA).
   c. The temperature at sow level (approximately 1’ above ground) should be between 50 to 77°F (Ag Guide). An optimal set point for gestating sows is 65 to 68°F with Humidity less than 65% (PQA).

C. Nutrition and Feeding
   a. Sows will be fed diets that meet or exceed the most recent NRC Swine nutrient requirements. Daily rations are to be offered in the morning.
   b. Sows will have ad libitum access to water with a recommended flow rate of 4 cups/min (PQA).
   c. Sows and gestating gilts are fed to maintain or achieve an ideal body condition score (BCS). There are 4 recommended phases for feeding sows:
      i. Full feed through the wean to service interval
      ii. Restricted feed based on BCS during gestation
      iii. Bump feeding in late gestation for gilts if their BCS is ideal or thin.
      iv. Full feed during lactation and maximize feed intake
   d. Feeding levels should be adjusted according to individual BCS during gestation. Amount of feed is determined based on diet composition and in consultation with a swine nutritionist (PQA).
   e. Feed storage bins are to be emptied and cleaned biannually to prevent mold build up.

D. Body Condition Score
   a. Body condition score (BCS) is to be measured using a Caliper. It should be measured at breeding, 30 days post breeding, 90 days post breeding, when moved to farrowing, and post weaning, and as needed to determine feeding level (PQA and PIC).
There are 3 main and 2 sub measurements detected by the caliper: Thin (plus or minus), Ideal (plus or minus), or Fat (plus or minus). To use a caliper properly:

c. Use your hand to palpate the sow’s last rib. At the sow’s last rib, use one hand to place the middle of the caliper on the sow’s backbone. Do not press the tips of the caliper into the sow. Make sure the caliper is correctly aligned. Read and record the caliper measurement.

d. A sow or gilt with a BCS of Thin or less (i.e., 1 or 2) should receive immediate attention to improve their BCS, and appetite should be closely monitored (PQA).

e. Any animal that is non-ambulatory with a BCS of 1 or 2 should be euthanized, immediately (PQA).

**E. Gilt Management**

a. Selected replacement gilts should be less than 20 weeks of age when brought into quarantine and sourced from a reputable seedstock or genetic supplier.

b. All replacement breeding gilts are quarantined for 30 days upon arrival. Quarantine procedures are outlined in SOP 014.

c. A ‘vet to vet’ consult should occur prior to acquiring new breeding stock.

d. During quarantine gilts are dewormed with either injectable or top dress dewormer and vaccinated for Parvo, Erysipelas, and Lepto according to the TTU vaccination and Deworming Protocol.

e. Gilts that are unsound, have joint issues, appear unthrifty, falling behind in weight, and/or have less than 14 potentially functional teats should be culled prior to entering the herd (PIC and PQA).

f. After quarantine, gilts can be housed together in the finisher until they reach appropriate maturity for boar exposure: 24 to 25 weeks of age and at least 290 pounds.

g. At 24 to 25 weeks of age, gilts should be exposed to a boar for every morning for 7 consecutive days for 15 minutes in a predefined boar exposure area. This is done prior to breeding to aid in inducing standing heat.

h. Gilts selected for breeding should be between 300 to 350 pounds, at least 29 weeks of age (203 days), have had one detected heat, and have at least 14 potentially functional teats. Gilts should be on full feed until after they are bred (PIC and PQA).

**F. Boar Management**

a. Because we use artificial insemination, boars are not always needed on site. Up to 4 boars may be present to aid breeding or for teaching purposes.

b. Boars are limit-fed to their BCS to limit body size and to maintain libido.

c. Boars are vaccinated semi-annually with a combination vaccine containing Erysipelas, Lepto, and Parvo and annually with PCV 2 and Mycoplasma hyo.

d. Boars are dewormed with either injectable or top dress dewormer semi-annually.

**G. Breeding**

a. Sows are bred using artificial insemination. Semen is sourced from a commercial genetic company with a known disease status.

b. Heat is detected using a boar or boar better pheromone. Sows should cycle 5 to 8 days post weaning. Once estrous cycles have begun, they normally occur every 18 to 21 days.

c. When feasible, breeding is scheduled so farrowing can occur during the work week.

d. If needed, open sow groups can be synchronized by feeding alternogest for 14 days and estrus should occur 4 to 9 days after the feeding period. Boar exposure in combination with PG600 can be used to sync gilts as needed.

e. Each sow/gilt should be breed with 2 to 3 doses of semen during standing estrus across 2 to 3 days using artificial insemination techniques. No more than one breeding per day (PIC).
f. If feasible, provide boar exposure for 1 hour right after insemination.

H. Gestation Management
   a. Post breeding estrus behaviors should be tracked to determine if a sow conceived. A sonogram machine or doppler may also be used.
   b. Stress should be mitigated during the gestation period. Avoid penning open or cull sows with gestating sows and gilts.
   c. Sows are to be vaccinated for:
      i. Clostridium Perfringens Type C and E.coli at 5 and 2 weeks prior to farrow date.
      ii. PCV 2 and Mycoplasma on an annual basis
      iii. Dewormed with an injectable or top dress 2 weeks prior to farrow date.

I. Farrowing Management
   a. Sows are transported to the farrowing room 3-7 days before their expected farrowing date. Sows are to be weighed prior to entering farrowing room.
   b. The farrowing room is to be power washed and disinfected at least 4 days prior to moving sows (PIC and PQA). The facility should be dry and prewarmed before loading.
   c. The temperature at sow level (approximately 1" above ground) should be between 50 to 79°F (Ag Guide). A temperature of 76 to 78°F at sow level is recommended for deep pit rooms prior to and at farrowing (PQA). The door to the farrowing rooms should remain shut while not in use to maintain temperature.
   d. As supplemental heat lamps is provided in each farrowing crate to create a creeping area that is 90 to 95°F (PQA; Ag Guide). All heat lamps should be inspected and ensured to be in working condition prior to loading sows (PIC and PQA).
   e. Two days after entry to the farrowing unit, crates are cleaned to remove any internal parasites which may have been expelled. Manure is to be cleaned daily behind sows from this point on until d 3 post farrowing.
   f. Two days prior to farrowing date sows are to be offered full feed of a lactation diet. Feeders are to be cleaned daily to remove old/wet feed.
   g. Sows are checked at least twice daily and made to stand and drink water as soon after farrowing as possible. Sows are routinely checked for mastitis and are treated if clinical signs appear. Feed provide is to be measured and recorded.
   h. If staff are present during active farrowing, sows should be checked every 30 minutes (PQA).
   i. Sows exhibiting signs of dystocia are given 2-3 ml of oxytocin every 20 to 30 minutes. Oxytocin should not be given to sows who have had no piglets (PQA).
   j. If a sow does not respond to oxytocin, offending piglet(s) will be removed vaginally with a lubricated glove over the hand.
   k. If a sow shows signs of milking complications, she is given Oxytocin, B-12, and Penicillin G.
   l. If a sow reaches day 116 to 117 of gestation and has not exhibited any farrowing behaviors, an injection of dinoprost tromethamine can be used to induce farrowing (PIC and PQA). Farrowing should occur within 30 hours.

J. Litter and Piglet Management
   a. Prior to farrowing, disposable biodegradable mats may be placed in the creeping area and sprinkled with drying powder to promote a warm environment for piglets. Mats should be removed within 10 days.
   b. If present during farrowing, dry newly born piglets with drying powder and encourage to nurse. Drying powder can be used as needed up to 7 days post farrowing.
   c. If staff observes parturition, each piglet’s naval cord may be sprayed with iodine to prevent bacteria from entering and causing disease.
d. Piglets may be transferred to another sow for up to two days post farrowing to equalize litter size if needed. Farm specific cross-fostering SOP should be followed.

e. Litters are processed at 1-14 days of age (3 days preferably). Processing includes:
   i. Piglets are weighed
   ii. Piglets are given Penicillin G and Iron by injection.
   iii. Needle teeth are trimmed as needed (not required).
      1. Selective teeth trimming may be performed when piglets damage each other or the sow. The top 1/3 of needle teeth are trimmed with side cutting pliers. When piglets or sows' teats are injured, that litter may have their teeth clipped.
   iv. All piglet ears are notched, using the Universal Ear Notch System to permanently identify them.
      1. The right ear is notched with the litter number.
      2. The left ear is notched with individual pig number.
   v. All piglet tails are docked to help prevent tail biting. The tails are cut 0.5 to 1.0 inch from the base; the tail is then sprayed with iodine.

f. Any piglet that weighs less than 2 pounds should be euthanized for their welfare as piglets that small have less than a 10% chance of making it to weaning.

K. Weaning Management
   a. Piglets are to be weaned at 18 to 30 days of age. The industry standard is a 21–22-day average (PQA).
   b. At weaning, all piglets are to be:
      i. Weighed
      ii. Vaccinated with combination vaccine containing Bordetella, Pasturella, Erysipelas and Circovirus and booster 21 days later, according to TTU Vaccination and Deworming protocol.
      iii. Ear tagged, (optional if it will affect a teaching or research protocol).
   c. At weaning, all sows are to be:
      i. Weighed & BCS
      ii. Vaccinated for Lepto, Parvo, and Erysipelas.
      iii. Declaws evaluated and trimmed if needed.
   d. Newly weaned piglets are moved to a clean, disinfected, and prewarmed nursery.
   e. The farrowing house is emptied and cleaned.

TERMINAL PIG HUSBANDRY

A. Nursery Management

1. Weaning is the most stressful period of in the life of a terminal market hog. The nursery period should be managed closely and carefully to maximize herd health and pig survivability.
2. The nursery rooms are to be thoroughly power-washed and disinfected prior to weaning (PQA). It is critical that organic matter is removed in from penning, hallways, feeders, etc. Cleaning should happen as soon as possible after removing pigs to allow for maximal downtime between pig groups.
3. Prior to placing pigs in the nursery, the nursery room should be warmed to 85°F at least 2 days prior. The temperature at pig level should be between 69 to 90°F (Ag Guide). The room temperature should stay at 85°F for the first 3 days, and then the temperature can be gradually decreased by 0.5°F each day until 70 to 75°F is attained (PQA and PIC).
4. Nursery pigs are to have ad libitum access to feed and water at a recommend flow rate of 1 to 2 cups per minute (PQA). Feeders should be prefilled prior to placing pigs into the nursery.

5. At weaning, pigs under 9 lbs are considered fallback pigs. Fallback pigs need extra care and are typically more susceptible to disease. These pigs should be penned together and closely monitored. Gruel or mat feeding can be used to stimulate appetite.

6. The alleys are to be washed and cleaned as needed. It is recommended that pens are scraped, and the alleys are swept, on a weekly basis.

7. At 3 weeks post weaning, pigs should receive their booster of Bordetella, Pasturella, Erysipelas and Circovirus.

8. Prior to moving to finishing, pigs are to be dewormed with injectable or top dress.

B. Grow-Finish Management

1. Pigs are transported from the nursery, weighing around 50 lb and 6-10 weeks old, enter the growing-finishing building.

2. These pigs remain in the building until they reach market weight (280 to 320 lb of live body weight).

3. The grow-finish unit is a continuous flow unit. Pigs of like size should be housed together. Cleaning and power-washing is to occur prior to moving in new pigs.

4. Grow-finish pigs are to have ad libitum access to feed and water at a recommend flow rate of 2 to 4 cups per minute (PQA).

5. Pigs are fed in phases of nutritionally adequate diets till target weight is achieved.

6. Pigs of appropriate weight are shipped to market, may be sold to private buyers or TTU researchers during any phase of production.

GENERAL HERD HUSBANDRY AND MANAGEMENT

A. Observations and Records

1. All pigs are observed daily for illness or injury.

2. Daily observations should include (PQA): Animals’ eating and drinking habits, signs of sickness or injury; the environment at the pig and barn level to make sure temperatures and air quality are correct for the phase of production; maintenance issues with fans, flooring, penning, feeders, waterers, etc.; and record any mortalities that occur on the farm.

3. It is recommended that grow-finish pens are walked daily by a staff member (PQA).
   a. Step into each pen, slowly move through the group and get each animal up.
   b. Look for: Fuzzy hair coat, Gaunt belly, Lameness (with or without swollen joints), Pale color, Coughing and/or thumping (labored breathing), Ruptures, Prolapses, Scouring, Skin problems, and other health issues.

4. Daily observations for each group of pigs are to be recorded. Any treatments or pigs of concern are to be recorded.

5. The daily herd count is to be maintained when pigs are moved, sold, euthanized, or mortality occurs.

6. Sow cards are to be maintained during farrowing with detailed records.

7. Calls to Veterinarians and their husbandry recommendations are to be recorded.

8. Animal Care Services staff (technician or Veterinarians) observes all stages of pigs monthly.

B. Animal Health and Treatments
1. The swine herd manager makes the decision to treat sick, diseased, injured, etc. pigs or to call the veterinarians for further diagnosis or treatment regimen. Staff are to make decisions under the guidance of the herd manager and ACS veterinarians. A flow chart for treatment decisions is provided.

2. Pigs that are sick are treated according to recommendations from the VCPR, and withdraw dates are to be strictly followed.

3. Medications should be provided according to label and/or the VCPR. Off label use should only occur under the guidance of the veterinarian and instructions must be recorded (PQA).

4. All treatments are recorded in the treatment records and observed on veterinarian rounds.

5. Pigs may be treated within their home pen or moved to a separate treatment pen at the discretion of the herd manager or veterinarians.

6. Everyone with access to the animal facility is responsible for informing the Animal Care Services Veterinarian staff when an animal becomes ill. Seriously ill animals should be reported IMMEDIATELY to the veterinarian. When an investigator, technician, or animal care personnel requires veterinary assistance, they should:
   a. Complete the “Animal Treatment Record” in the records. Indicate the date, room number, pen number, and/or animal ID, the problem observed, and ensure that the name (or initials) of the person making the report is recorded.
   b. Contact the University Veterinarian or the Swine Unit Manager at:

   **Edward Carrasco**  
   Swine Unit Manager  
   806-746-5170 Office  
   806-543-6785 Cell

   **Dr. Tiffanie Brooks**  
   ACS Attending Veterinarian  
   806-834-8588 Office  
   806-239-2120 Cell

   **Dr. Paul Stonum**  
   ACS Clinical Veterinarian  
   806-834-7373 Office  
   660-562-4425 Cell

7. Provide all the above information to the individual contacted above, who will give advice and authorization for the action(s) that should be taken.

C. **Veterinarian-client-patient relationship**

1. The farm staff agrees to receive advice and implement herd health programs recommended by the University Attending Veterinarian
2. The farm staff will additionally seek the advice of a swine veterinary specialist
3. A routinely updated list of Animal Health Products approved by the Veterinary Staff will be kept onsite, in the unit manager’s office.
4. A signed VCPR agreement is to be onsite and updated yearly (PQA).
5. A routinely updated vaccination and deworming protocol is to be onsite.

D. **Emergency Contact**
1. The emergency/disaster plan located in the unit manager office should be consulted for specific details. It is recommended that it is reviewed every three years (PQA).

2. During instances of natural weather elements that may cause power outages, disruption in water supply etc. contact:

   - E. Animal Handling and Restraint:
     1. All staff are to be trained on proper animal handling and restraining according to PQA guidelines (PQA) and the Ag Guide.
     2. Snaring is used to restrain animals for treatment and bleeding when the animal is too large to hold or restrain by other means.
     3. Snaring is reserved for situations where caretaker safety is of concern.
     4. Panel and sort boards are used for moving pigs.

   - F. Euthanasia
     1. There are 4 main methods of euthanasia used on farm: penetrative captive bolt, lethal gunshot, carbon dioxide gas (CO₂), and blunt force trauma
     2. Captive bolt maybe used on pigs greater than 12 pounds
        a. Only people who have been properly trained and have demonstrated competency with a captive bolt gun should handle, load or operate a captive-bolt gun. All training is to be documented
        b. Do not point a captive-bolt gun at yourself, any other person or a non-target animal. Never place the action portion of the gun against hands, fingers or any other part of the body.
        c. Two people are required to properly conduct captive-bolt gun euthanasia – one to restrain the pig and one to fire the bolt gun.
        d. Snare and restrain the animal.
        e. Load the captive bolt gun with a firing cap. Note: The charge should be adequate for the size of the animal being euthanized.
        f. After loading, cock the gun and aim. The placement should be directed at the midline of the forehead, a half of an inch above eye level (even with the eyebrows).
        g. Place the penetrating captive bolt very firmly against the skull, aimed at the brain and directed toward the tail.
        h. Stand with feet set and braced for the recoil that the bolt gun may produce.
        i. Discharge bolt gun. (If the bolt gun misfires or does not discharge for some other reason, point the bolt gun in a safe direction and refer to the operator’s manual for troubleshooting information.)
        j. Move out of the animal's way. The animal will drop to the ground and may convulse for a short period of time.
        k. Depending upon the size of the pig, the penetrating captive bolt may only stun the animal. Exsanguination can be used as a secondary means of euthanasia after stunning.
        l. All pigs greater than 200 pounds are to be exsanguinated.
        m. The animal should be confirmed dead before it is moved.
        n. The captive-bolt gun should be cleaned after ever use. Record when equipment cleaning and maintenance occurs (PQA).
     3. Gunshot is an effective method of euthanasia when properly performed and can be used on pigs greater than 12 pounds.

Edward Carrasco        Dr. Amy Petry        Jeff Manahan
Swine Unit Manager     Faculty Supervisor     Farm Resident
806-543-6785 Cell      817-550-7562 Cell     806-746-5097 Cell
a. Firearms are readily available in most areas. Human safety is the primary concern with the use of gunshot for euthanasia.
b. Proper training on firearm safety and use is imperative and gunshot should only be performed by personnel who have had appropriate training.
c. Only the Swine Unit Manager or his designee may dispatch pigs by lethal gunshot.
d. There are three possible sites (but one preferred) for conducting euthanasia in swine by gunshot or captive bolt: Frontal, temporal, and from behind the ear toward the opposite eye.
e. The preferred frontal site is in the center of the forehead slightly above a line drawn between the eyes. The projectile should be directed toward the spinal canal.
f. The temporal site is slightly anterior and below the ear.
g. Specific sites may vary slightly according to breed.
h. When the alternate site behind the ear is chosen, a .22 caliber firearm loaded with a solid-point bullet may be used.

4. Carbon Dioxide Gas can be used in an enclosed chamber on pigs less than 10 weeks of age or less than 70 lb (AVMA; PQA)
   a. Place pigs in an appropriate size chamber and fill with CO2 gas according to posted SOP.
   b. Pigs will be left in the chamber for a minimum of 5 minutes or longer as needed for effective euthanasia. Death will be visually confirmed by lack of breathing, movement or eye blink reflex.
   c. Chambers should be routinely cleaned

5. Blunt force trauma is an acceptable form of euthanasia in suckling piglets weighing less than 12 lb.
   a. It should only be used when other means of euthanasia are unavailable.

G. Transportation
1. Pigs moving between farrowing and nursery will be transported in deep well cart for the short distance that they are transported.
2. Pigs moving between buildings will be placed on the hydraulic trailer.
3. The only time a pig will enter a gooseneck trailer will be when it is leaving the farm. Be aware of the weight limits of the trailers.
4. A maximum number of pigs (based on TQA space requirements) are placed on a gooseneck trailer at a time. Driver must be PQA and TQA certified (PQA).
5. Loading and unloading procedures may also consist of moving pigs from trailer to trailer or by herding them out (by using herding boards) from the sides of the trailer.
6. Normal/Routine repairs of the vehicles and trailers are done by the swine herd manager or staff when possible, or the personnel who last used the trailers or vehicles.
7. Whenever one of the trailers is taken off site and/or has hauled non-herd pigs or other livestock, the trailer will be cleaned according to SOP089 Swine Trailer Bio-Security Procedures, before it is brought back onsite by the personnel using the trailer.

H. Enrichment
1. Forms of physical enrichment (i.e. chains, balls, spinners, etc.) can be provided, to reduce stereotypic behaviors and reduce stress.
2. Except for sows in gestation or farrowing stalls, social enrichment via group housing is provided.

I. Quarantine
1. All pigs from an outside source must be quarantined prior to entering the TTU herd.
2. Pigs will be housed in a location approved by the veterinary staff prior to acquisition.
3. Quarantine must last a minimum of 30 days
4. Specific personnel must be designated to observe and feed/water quarantine pigs and must not enter TTU swine facilities or the feed mill
5. If separate personnel cannot be designated as the case with the swine staff, then:
   a. special attire and equipment must be designated for the quarantine area
   b. quarantine pigs should be taken care of at the end of the day to avoid re-entering the herd.

6. Quarantine areas are to be cleaned and feed disposed of quarantine period.

J. Biosecurity
1. Biosecurity is of the upmost importance to maintaining the herd health. Please see IACUC Policy 01.