



Title: Beef Center

SOP Number: 022

Purpose: This document outlines the standard operating procedures for the Beef Center at the New Deal Farm. Specific experiments or teaching protocols may warrant modifications to the general procedures described below which should be outlined in the approved Animal Care and Use Protocol authored by the Principal Investigator and approved by the IACUC.

CLASSES OF ANIMALS AT THE BEEF CENTER

- A. Breeding Herd - primarily used as a teaching demonstration herd overseen by the Beef Center Manager
 - 1. Mature Cows (≥ 24 mos. of age)
 - 2. Mature Bulls (≥ 24 mos. of age)
 - 3. Replacement Heifers (7-24 mos. of age)
 - 4. Replacement Bulls (7-24 mos. of age)
 - 5. Heifer Calves (≤ 7 mos. of age)
 - 6. Bull Calves (≤ 7 mos. of age)
- B. Custom Developed Cattle - non-TTU owned breeding cattle custom fed for seedstock producers overseen by the Beef Center Manager
 - 1. Bulls (7-24 mos. of age)
 - 2. Heifers (7-24 mos. of age)
 - 3. Experimental Cattle - feedlot or stocker cattle utilized for research overseen by the PI
 - 4. Steers (5- 30 mos. of age)
 - 5. Heifers (5-30 mos. of age)
 - 6. Cull cows (≥ 30 mos. of age)
- C. Horses and Donkeys
 - 1. Horses will be used if necessary to assist in gathering cattle on pasture or sorting cattle in the confined pens.
 - a. Horses may be institutionally or privately owned
 - 2. Donkeys will be used as guard animals when cattle are housed in pasture situations.
 - 3. Horses and donkeys will be housed at the Beef Center in pens adjacent to the barn.
 - a. Shade/shelter will be provided as necessary based on the weather.
 - b. Manure will be moved from the pens daily.

GENERAL PRODUCTION SCHEDULE

- A. Breeding Herd
 - 1. Mature Cows
 - a. The target is to maintain a ≤ 365 d calving interval.
 - b. Cows will be bred during a 60-day breeding season, during which they may be artificially inseminated, naturally serviced, or utilized as a surrogate.
 - c. Cows should calve within approximately a 60-day window.

- d. During the calving season, cows will be observed a minimum of twice daily in order to provide assistance if necessary.
 - e. Timing of the breeding and calving season will be based on the marketing strategy and/or ability to compliment the current forage system.
 - f. Cows not conceiving during the outlined breeding season may be culled.
2. Mature Bulls
- a. Bulls will be administered a Breeding Soundness Exam within 30 to 60 days prior to the initiation of the natural covered breeding season.
 - b. Only bulls determined to be a satisfactory breeder should be exposed to cows.
 - c. If during the breeding season a stress related event occurs (ie. injury, heat stress, etc.), which may compromise the breeding potential of the bull then he should be re-administered a Breeding Soundness Exam.
 - d. At the conclusion of the breeding season, bulls shall be removed from the cows and managed separately until the following breeding season.
3. Replacement Heifers
- a. Any replacement heifers brought into the herd from outside sources, will be vaccinated per the vaccination schedule listed below.
 - b. The target is to have heifers calve for the first time at 20-24 months of age.
 - c. Heifers will be managed to target a body weight which is 65% of the estimated mature weight of the female adjusted to Condition Score of 5 at the start of the breeding season.
 - d. Heifers will be bred by artificial insemination or natural service.
 - e. Replacement heifers will be bred 2-4 weeks prior to the initiation of the breeding season for the mature cows.
 - f. At approximately 12 months of age, heifers will be evaluated for their adjusted 365-day weight, frame score, pelvic size, and pubertal status based upon their reproductive tract score.
 - g. Carcass ultrasound data may also be collected.
 - h. In addition, heifers will be freeze branded with their permanent identification number on their left hip.
 - i. Replacement heifers may be sold at any point to other seedstock or commercial operations or kept as replacements for the breeding herd.
4. Replacement Bulls
- a. At approximately 12 months of age, bulls will be evaluated for their adjusted 365-day weight, frame score, pelvic size, and administered a Breeding Soundness Exam.
 - b. Carcass ultrasound data may also be collected.
 - c. Bulls will be freeze branded with their permanent identification number on their left hip.
 - d. Most replacement bulls may be sold at any point to other seedstock or commercial operations.

- e. On occasion, a yearling bull may be selected for exposure to mature cows or replacement heifers during the breeding season and ownership retained for future use as a mature bull.

5. Heifer Calves

- a. Heifer calves are weighed within 24 hours of birth.
- b. Simultaneously, an ear tag is placed in the ear demonstrating the dam's identification number, the year code, and the calf number according to the chronological ranking of the calf's birthdate within the herd for that year.
- c. The year code plus calf number is then tattooed in one ear. One ear is tattooed at birth and the other at weaning.
- d. Calves are weaned at approximately 205 days of age at which point an adjusted 205-day weaning weight is recorded.
- e. At weaning, heifer calves may be sold or retained in the replacement heifer group and managed as described above.

6. Bull Calves

- a. Bull calves are weighed within 24 hours of birth.
- b. An ear tag is placed in the ear demonstrating the dam's identification number, the year code, and the calf number according to the chronological ranking of the calf's birthdate within the herd for that year.
- c. The year code plus calf number is then tattooed in one ear. One ear is tattooed at birth and the other at weaning.
- d. Calves will be vaccinated 30-45 days prior to weaning.
- e. Calves are weaned at approximately 205 days of age at which point an adjusted 205-day weaning weight is recorded.
- f. At weaning, bull calves may be sold or retained in the replacement bull group and managed as described above.
- g. If the bull calf is determined not to be herd bull quality either at weaning or prior to weaning they are castrated.
- h. To minimize stress to the animal, no calves will be castrated beyond 8 months of age. Either surgical or non-surgical castration techniques may be applied (see details under procedures).

B. Custom Developed Cattle

1. Bulls

- a. Custom developed bulls will be managed similar to the TTU owned replacement bulls described above.
- b. An official test period will be set up to measure feedlot performance (ADG, DMI, and G:F) and carcass traits in a given time frame for the customer.
- c. Non-virgin bulls will not be allowed on the premise for development.
- d. Upon arrival, all bulls are weighed, vaccinated, wormed, and a unique identification tag is placed in the ear if one is not already present.
- e. The owner of the cattle will be consulted as to the prior health history and vaccination program of the cattle so that the health program administered at the Beef Center is appropriate per Ag Animal Procurement Policy.

- f. Bulls are kept in dry lots or 10-acre paddocks and provided *ad libitum* hay and a growing ration in self feeders or a bunk.
 - g. After an adequate warm-up period, to allow the cattle to become acclimated to a concentrate diet and remove confounding effects of compensatory gain (approximately 30 days), the bulls are transitioned to a higher concentrate growing ration for an 84-to-114-day test period.
 - h. Rations fed will either be mixed by the farm manager or provided by a commercial feed company.
 - i. Initial, interim, and final body weights will be collected.
 - j. At the end of the testing period, all animals may be ultrasounded by a trained ultrasound technician for intramuscular fat, rib-eye area, back fat thickness at the 12/13th rib interface, and rump fat thickness.
 - k. Upon completion of the test, bulls will be removed from the premise by the owner(s) of the bulls.
2. Heifers
- a. Custom developed heifers will be managed similar to the TTU owned replacement heifers.
 - b. Procedures outlined for development of heifers will target the objectives of the client including the desired rate of gain, length of time to be developed, variables to be measured, and whether estrus synchronization and artificial insemination is requested.
 - c. Upon completion of the development period, heifers will be removed from the premise by the owner(s) of the cattle.
3. Experimental Cattle
- a. Management procedures, not otherwise described, or contrary to this SOP, should be outlined in the approved Animal Care and Use Form for the given experiment.

GENERAL MANAGEMENT PROCEDURES

A. Artificial Insemination

- 1. The cow should be restrained in a hydraulic, manual chute or stanchion (“AI Box”).
 - a. Restraining the cows head in the head catch of the chute is optional.
- 2. The recto-vaginal insemination technique will be utilized.
 - a. The technician will wear a palpation glove.
 - b. Obstetrical lube should be used to lubricate the anus to provide comfort to the animal based upon the quantity and texture of her manure.
 - c. With fingers together in a pointed fashion, the gloved hand is inserted into the rectum and once wrist deep the hand is opened flat against the floor of the rectum such that manure can pass over the top of the hand and arm.
 - d. Likewise, the vulva shall be gently wiped with a paper towel to remove excess manure and debris.
 - e. The loaded insemination gun should be inserted at a 30° upward angle into the vagina to avoid entering the urethral opening and bladder.
 - f. The gun should be raised level once 6 to 8 inches inside the vagina.

- g. The vagina and cervix are pulled forward, while gently pushing the gun forward towards the cervix.
- h. Once the gun tip meets the cervix, the external opening of the cervix is gripped with the thumb on top and the forefingers underneath to close the fornix and guide the gun tip into the os cervix.
- i. Once in the cervix, the cervix is manipulated over the gun while gently pushing forward on the gun until with the forefinger the technician can detect the gun tip past the cervix.
- j. Semen is deposited slowly at no more than 1 inch past the cervix into the uterine body.
- k. Once fully dispensed, the gun and the hand in the rectum are removed.

B. Blood Collection

1. The animal should be restrained in a hydraulic or manual chute and their head restrained in the head catch. The technician should wear gloves.
 - a. Jugular
 - i. A halter should be placed over the animal's head and pulled and tied to the side to further restrain the animal and expose the jugular groove. The jugular vein should be raised by applying pressure at the base of the jugular groove. A needle (18 or 20 gauge) is then inserted through the hide and into the vessel at an approximately 20 angle and the blood sample is withdrawn. The needle is removed.
 - b. Tail
 - i. The tail should be gripped with one hand and raised until it is horizontal. The groove located in the ventral midline of the tail should be located approximately 6 inches from the base of the tail. A needle (18 or 20 gauge) is inserted perpendicular to the tail midway along the body of a tail vertebrae to draw a blood sample. The needle is removed.

C. Breeding Soundness Exam

A Breeding Soundness Exam will be administered according to the guidelines outlined by the Society of Theriogenology.

1. Physical traits evaluated without restraint of the animal will be:
 - a. Body condition,
 - b. Structural soundness,
 - c. Eye soundness, and
 - d. General overall health.
2. After this portion of the physical examination is completed, the bull should be restrained in a manual or hydraulic squeeze chute.
3. Once restrained, the physical examination can continue with evaluation by palpation of:
 - a. The penis for irregularities,
 - b. Palpation of the testicles for testicular tone and
 - c. Measurement of scrotal circumference.

4. The technician shall wear palpation gloves. Obstetrical lube should be used to lubricate the anus to provide comfort to the animal based upon the quantity and texture of his manure.
5. The technician should insert his gloved hand into the rectum and palpate:
 - a. The seminal vesicles,
 - b. Ampullae, and
 - c. Prostate glands for:
 - i. inflammation,
 - ii. adhesion, or
 - iii. fibrosis.
 - d. In addition, massaging the accessory sex glands will enhance the sensitivity of the animal for ejaculation.
6. If ejaculation is not achieved through massage, then an electroejaculator may be utilized to encourage an ejaculate sample for seminal evaluation, by a technician trained and proficient in use.
7. Prior to insertion of the electroejaculator into the rectum, the gloved hand should be used to clean manure out of the rectum to promote better contact.
8. Once cleaned, the electroejaculator probe will be inserted in the rectum with the electrodes facing ventrally.
9. A hand operated rheostat will be used to provide 2 to 4 second pulses repeated with 5 to 7 second intermissions as the voltage is gradually increased until ejaculation is achieved.
 - a. Some bulls may require a quicker pulsation rate to be stimulated.
10. The ejaculate should be collected with a plastic cone attached to a conical vial held within a collection apparatus with a handle.
11. Once the sample is collected, a subsample shall be plated on a slide and viewed microscopically for evaluation of seminal motility and morphology.
12. Bulls shall be classified as satisfactory breeder, unsatisfactory breeder, or deferred for an examination at a later date if the reasons for failing the exam may change over time.

D. Calving Assistance

Guidelines concerning observation and guidelines for intervention during incidences of dystocia are based upon suggestions by R. G. Mortimer (DVM, Department of Clinical Sciences, Colorado State University).

1. Calving occurs in 3 stages.
2. Stage 1 begins with contraction of the longitudinal and circular muscle fibers of the uterus and ends when the cervix is fully dilated, and fetal parts enter the birth canal.
 - a. Physical signs of stage 1 include restlessness of the cow, frequent urination, a tendency to lie down, and expulsion and breaking of the chorioallantoic sac (first water sac).
3. Stage 2 begins when the cervix is fully dilated, the amniotic sac (second water sac) is expelled, and the fetus enters the birth canal.
 - a. The cow generally lies down and contractions occur 1 to 3 times a minute until the calf is expelled.

4. Stage 3 is expelling of the placenta and fetal membranes post-calving which generally occurs 8 to 12 hours after delivery of the calf.
5. Intervention should occur if the following scenarios occur during each respective stage:
 - a. Stage 1
 - i. If the cow has been in Stage 1 of labor longer than 8 hours.
 - b. Stage 2
 - ii. If the water sac is visible for 2 hours and the cow is not trying;
 - iii. If the cow has been trying for over 30 minutes and hasn't made any progress;
 - iv. If the cow has quit trying for over 20 minutes after a period of progress;
 - v. If the cow or calf is portraying signs of excessive fatigue and stress (swollen tongue of the calf or severe rectal bleeding by the cow);
 - vi. Or if from an observational standpoint you determine that the delivery is abnormal due to presentation, position, or posture issues.
 - c. Interventions during Stage 1 or 2 of calving may involve restraint of the cow in a head catch or haltering and tying off outside the chute.
 - i. If applicable, the technician shall scrub their hands and arm with an antiseptic and clean the vulva.
 - ii. If applicable the technician shall use a plastic palpation sleeve. The technician should insert his gloved hand into the vagina and determine the presentation, position, and posture of the calf and decide if they believe they can handle the delivery or if the University Veterinarian or John Hill, DVM in Abernathy, Texas needs to be contacted for a possible cesarean section.
 - a. Caesarian section should be an option evaluated if it is determined by the technician and on consultation of a veterinarian. Economic and genetic value must be taken into account when considering this option.
 - iii. If the technician believes he can handle the procedure without veterinarian assistance, then obstetrical chains or straps may be used in tandem with a fetal calf extraction device.
 - iv. Most importantly, timely decision making by the technician is critical to maximize calf and cow survival during dystocia.
 - d. Stage 3
 - i. If the cow hasn't passed fetal membranes within 24 hours after calving then the cow should be placed in a clean environment, the non-expelled fetal membranes should be regularly disinfected, and the cow should be closely monitored for fever and treated with oxytocin, appropriate antibiotics and anti-inflammatories as necessary. Placenta should NOT be physically removed.

- ii. Severe cases of retained placenta should be reported to the University Veterinarian or private practitioner in Abernathy, TX for consultation on appropriate treatment for specific cases.

E. Carcass Ultrasound

1. The animal should be restrained in a squeeze chute.
2. An area at least the size of the carcass probe should be shorn to $\leq \frac{1}{4}$ " horizontally between the 10th rib and 1st lumbar over the top of the *longissimus dorsi*, vertically between the 12th and 13th rib interface from the thoracic vertebrae to the lateral end of the *longissimus dorsi*, and horizontally over the hook bone.
3. Vegetable or mineral oil should be applied liberally to these areas to facilitate contact between the carcass probe and the animal.
4. A 17 cm carcass ultrasound probe should be placed over the three areas described above to capture an image which can be analyzed to estimate the percentage of intramuscular fat, rib eye area, 12th/13th rib fat depth, and rump fat depth.

F. Dehorning

Cattle raised in the Breeding Herd are selected to be homozygous polled so that dehorning is not necessary. However, some studies or teaching needs may warrant outside sourced cattle to be procured. Therefore, dehorning practices are outlined in the case that it must be performed. Ideally, dehorning is performed at < 2 months of age. If so, then a disbudding of the horn with a hot iron will be utilized. However, if calves > 2 months of age (point at which the horn bud attaches to the skull) then a Barnes Dehorner will be used with the following outlined methodology:

1. Restrain the calf appropriately for his size and tie his head to the side using a halter.
2. Give an analgesic (i.e., flunixin meglumine i.v., flunixin transdermal topically, or meloxicam orally) prior to starting the procedure.
3. Use an 18 gauge, 1 ½ in needle, inject 5 ml of Lidocaine (2% Lidocaine) per side 1/3 of the distance from the corner of the eye to the horn bud at the level of the eye. This should be right off the frontal crest bone.
4. Do a nerve block by depositing the drug in a fanning action 1 ml at a time for best results by slightly angling the injection in several different directions.
5. Clip the hair around the base of each horn. Set the knife end of the Barnes Dehorner over the horn such that when cutting a ring of hair will be present all the way around the horn (Barnes Dehorners come in different sizes; make sure they are large enough to accommodate the calf).
6. In one motion, aggressively push down and open the dehorner such that they cut underneath the horn.
7. Verify that a circle of hair is present around the horn which you just cut out (if it is not then the horn/scur is likely to grow back); if it is not then re-cut the wound so to remove keratin cells using the Barnes Dehorner or a scoop dehorner. If necessary, pull persistently bleeding arteries with a hemostat.
8. Immediately cauterize the wound. Ensure bleeding has stopped; however, recognize that burning too long may damage underlying tissues.

9. Apply antiseptic wound and or fly spray.
10. Place all surgical tools into an antiseptic wash (i.e., chlorhexidine) between calves to reduce incidences of tetanus, bovine cutaneous papilloma virus, and bovine leukosis virus.

G. Castration

Castration is necessary for animals which are not deemed desirable for breeding purposes. Ideally, castration would occur as early as possible in the animal's lifetime (i.e., within 24 hrs after birth). However, castration may be delayed because the candidate's breeding potential may yet to be determined by data recorded at weaning. In general, decisions regarding a candidate's fate should be made as timely as possible. When castration is necessary, the calf will be restrained either in a squeeze chute (larger calves) or manually restrained for calves under 1 month of age.

1. Non-surgical

- a. An analgesic (i.e., flunixin meglumine i.v., flunixin transdermal topically, or meloxicam orally) will be administered prior to starting the procedure.
- b. The rubber band will be placed on the elastrator and stretched open in preparation for placement.
- c. The testicles/scrotum will be pulled through the rubber ring and the band dispensed once the technician is confident that ring is placed above both testicles.
- d. The scrotum will be palpated to confirm that neither testicle is above the band and in the abdominal cavity.

2. Surgical

- a. A local anesthetic (i.e., lidocaine) will be administered via an injection directly into each testicle and then a minimum of 2 minutes should pass prior to initiating castration. An analgesic (i.e., flunixin meglumine i.v., flunixin transdermal topically, or meloxicam orally) will be administered prior to starting the procedure.
- b. The scrotum will be disinfected.
- c. The base of the scrotum will be pulled downward with one hand, and with the other hand a scalpel will be used to make a lateral cut to remove the bottom one-third of the scrotum.
- d. One hand will be used to palpate and push each testicle outside the scrotum to expose it.
- e. The other hand will be used to grasp the testicles once exposed. Once grasped, each testicle will be pulled away from the body until the spermatic cord is exposed.
 - i. It may be necessary to push the scrotal sac upwards to detach it from the testicle.
- f. While grasping one testicle at a time and applying tension, an emasculator will be used to crimp and cut the spermatic cord as high as possible.
 - i. The emasculators will be held closed approximately 5-15 seconds for adequate crimping to help ensure that hemorrhaging does not occur.

- g. An antiseptic powder/spray will be applied to the wound to prevent bacterial infection.
- h. Castration tools will be placed in an antiseptic (i.e., chlorhexidine) wash between calves.

H. Embryo Transfer/Flushing

1. Embryo transfer and flushing techniques should be performed by a professional embryologist (i.e., Dr. John Nelson, Nelson Embryo Services, Chickasha, OK).
 - a. Donor cows may be flushed on site or at the clinic of the embryologist.
 - b. Donor cows will be stimulated with multiple injections of follicle stimulating hormone with dosages recommended by the embryologist.
 - c. After synchronization of estrus (as described below), the donor cow will be artificial inseminated by a trained technician (as described above) and 7-day post breeding embryos will be flushed from the uterus and either cryopreserved or transferred fresh into recipient cows.
 - d. At the time of flushing, the donor cow will receive an epidural block.
 - e. Recipient cows will have estrus synchronized (as described below) and embryos will be transferred at 7 days post estrus.
 - f. Recipient cows will receive an epidural block prior to transfer and analgesic (i.e., Banamine) afterwards to reduce prostaglandin release and enhance pregnancy rates.

I. Estrus Synchronization

1. Estrus may be synchronized according to various protocols which are outlined and updated by the Reproductive Beef Task Force. Progesterone (CIDR, MGA, etc.), prostaglandin (Lutalyse, Estrumate, etc), estradiol, and gonadotropin stimulating hormone (i.e., Cystorelin, Fertagyl, etc.) may be utilized to manipulate the timing of ovulation.
2. Estrus detection aids may be used including tail patches, chalk, paint, electronic devices (Heat Watch System), or a teaser bull with a chin ball marker.
3. Signs of estrus will be observed a minimum of twice daily in the morning and afternoon.

J. Freeze Branding

1. Copper branding irons will be placed in liquid nitrogen and allowed to cool for 20 minutes before branding.
2. Cattle should be restrained in a chute and appropriate squeeze applied to discourage drastic movements.
3. Cattle will be branded on their left side in their hip area with their permanent identification number and a ranch brand.
 - a. This area should be brushed or blown free of dirt and then clipped to less than 1/4 in length.
 - b. The area should be saturated with 95-99% isopropyl alcohol using a spray bottle or sponge.
 - c. Immediately, afterwards the appropriate brand(s) should be applied to the hide and held firmly.
 - d. If surgical clippers were used, the brand should be held to the hide for 25 seconds on calves and 30 seconds on older animals.

e. If a longer hair guard is used, then the brand should be held to the hide for 35 seconds on calves and 40 seconds on older animals.

4. Branding irons should be rested for a minimum of 3 minutes between usage.

K. Growth Implant Administration

1. An appropriate implant administration gun should be utilized relative to the specific implant type being administered.

2. The needle shall be adequately sharp otherwise it will be replaced.

3. The needle shall be disinfected between animals.

4. The technician should administer the implant in the middle 1/3 of the ear in between the rib cartilages.

L. Injections

1. Procedures involving injections should always follow Beef Quality Assurance standards.

2. Products should be administered subcutaneously, intramuscularly, intravenously, or intranasally according to the labeled directions.

a. If possible, subcutaneous administration should be the preferred route of administration over intramuscular.

b. If intramuscular injection is necessary, the injection should be given in the neck.

3. Bent or broken needles should be discarded.

4. Needles will be exchanged at least every 10 animals.

5. The injection needle will never be re-inserted into the bottle.

6. No more than 10 ml of product (per BQA guidelines) shall be administered in one location.

7. Withdrawal periods will be noted, and cattle will NOT be marketed until they are outside the withdrawal period.

M. Pelvic Size Determination

1. Cattle should be restrained in a chute with a light squeeze.

2. The technician shall wear a palpation glove and use obstetrical lube.

3. Feces should be removed from the rectum.

4. Rice Pelvimeter should be inserted carefully while placed in the palm of the gloved hand.

5. Once inside, the horizontal width of the pelvic inlet at its widest point between the right and left shafts of the ileum should be obtained by squeezing the Rice Pelvimeter and reading the calibration scale on the exterior of the device.

6. Subsequently, the vertical height of the pelvic inlet between the dorsal pubic tubercle on the floor of the pelvis and the sacrum on the top should be obtained by the same means.

7. The horizontal width and vertical width should be multiplied to achieve the pelvic area.

a. It is recommended that heifers be administered a pelvic area exam 2 to 4 weeks prior to their virgin breeding season so appropriate sire selection decisions can be made relative to calving ease.

b. Bulls could be evaluated at any time but ideally around 12 months of age.

N. Pregnancy Diagnosis

1. Blood Serum Samples
 - a. Blood will be collected as described above.
 - b. Samples will be uniquely identified and sent to an appropriate lab for ELISA determination of pregnancy specific protein B.
 - c. Pregnancy diagnosis by this means should occur between 28 and 90 days after breeding.
 2. Rectal Palpation
 - a. The cow should be restrained in a chute or stanchion.
 - i. Restraining the cows' head in the head catch of the chute is optional.
 - b. The technician will wear a palpation glove. Obstetrical lube should be used to provide comfort to the animal based upon the quantity and texture of her manure.
 - c. With fingers together in a pointed fashion, the gloved hand is inserted into the rectum and once wrist deep the hand is opened flat against the floor of the rectum such that manure can pass over the top of the hand and arm.
 - d. The technician then palpates the reproductive tract for uterine tone and size, presence or absence of cotyledons, and/or presence of a palpable fetus or amniotic sac to confirm the pregnancy status.
 - e. Pregnancy diagnosis by this means should occur between 30 days to term. Earlier term pregnancies should especially be handled with care as not to traumatize the fetus and cause abortion.
 3. Ultrasonography
 - a. The cow should be restrained in a hydraulic or manual chute.
 - i. Restraining the cows' head in the head catch of the chute is optional.
 - b. The technician will wear a palpation glove.
 - c. Obstetrical lube should be used to provide comfort to the animal based upon the quantity and texture of her manure.
 - d. With fingers together in a pointed fashion, the gloved hand is inserted into the rectum with a 7.5 or 5 MHz reproductive probe in the palm.
 - e. The reproductive tract is manipulated with the rectally inserted hand until an acceptable image can be captured of the fetus or amniotic sac (or lack thereof) from which pregnancy status can be confirmed
- O. Reproductive Tract Score Assessment
1. Rectal palpation or ultrasonography of the reproductive tract are both acceptable means to evaluate the pubertal status of a heifer using a reproductive tract scoring system.
 - a. The reproductive tract score exam should be administered prior to the initiation of the heifer's virgin breeding season for decision making purposes.
 - b. Rectal palpation or ultrasonography procedures would be similar to those described above under pregnancy diagnosis except instead of confirming the pregnancy status the uterine horn size and tone, size of

the ovaries, and structures on the ovary are utilized as clues to assess the reproductive tract score on a scale between 1 and 5.

P. Tagging

1. Universal or electronic tags and their appropriate applicator may be used to place a uniquely numbered ear tag in the middle 1/3 of the ear. Cattle may have tags in one or both ears.
2. Older cattle should be restrained in a chute for tagging purpose.
3. Younger calves may be caught and handheld.

Q. Torching/Clipping

1. Cattle may be clipped, torched, or sheared to enhance their phenotype for marketing or exhibition purposes.
 - a. Cattle will be restrained in a chute if necessary or tied with a halter if halter broke.
 - b. The technician shall confirm that no flammable objects are around the area or on the animal before torching.
 - i. Specifically, torching should not be performed directly after an animal has had a topical anthelmintic applied.
 - c. A propane tank outfitted with a hose and a torch is used for singeing the rough hair off the animal at a distance of 6 to 12 inches depending upon the length of the hair.
 - i. Torching should be avoided around the eyes and ears of the animal and should be performed with quick motions to avoid burning the animal.
 - d. Clipping may be performed with a variety of sheep head or hair head blades depending upon the desired length and area to be clipped by the technician.
 - e. In both torching and clipping procedures, the technician shall be aware of the animal's behavior and not put themselves in a dangerous position in which they may be kicked.

R. Weaning

1. Calves will be weaned at approximately 6 months of age following industry standard conventional methods (i.e., fence line weaning).
 - i. Nose flap weaning can be used when experimental study requires calves to stay in experimental housing or with the cow.

GENERAL NUTRITION PROGRAM

- A. All diets will meet or exceed NRC requirements for the specific stage of growth, maintenance or gestation.
 - 1 Diets will be forage and grain based with a mineral or premix to meet requirements

ANIMAL HEALTH PROGRAM

- A. Records

1. All routine health care is performed by the Beef Center Manager and/or trained center students and staff.
2. Herd health and daily observation records are maintained and kept on file in the Beef Center office.
3. All animals are observed at least once daily for general health and performance assessment.

B. General Considerations

1. Animal health products requiring a prescription are sourced through the University Veterinarian or through a local veterinarian.
2. All other non-prescription pharmaceuticals are sourced through animal health product distributors.
3. All serious and non-routine illnesses are brought to the attention of a veterinarian for proper diagnosis and treatment.
4. In addition to the University Veterinarian, private practitioners in Abernathy, Texas and in Muleshoe, Texas may be consulted for diagnosis and treatment of sick cattle.

C. Mature Cows and Bulls

1. All cows and bulls are re-immunized annually with
2. Modified live or killed vaccine to protect against:
 - a. Bovine respiratory disease (IBR, PI3, BVD Types I and II, BSRV),
 - b. *Pasteurella and Haemophilus somnus*,
 - c. Leptospirosis (*L. pomona*, *L. canicola*, *L. icteromhemorrhagica*, *L. grippotyphosa*, and *L. borgpetersenii serovar hardjo bovis*) and
 - d. *Campylobacteriosis fetus*
3. Vaccinations are given prior to breeding according to the manufacturer's directions.
4. Cows and bulls are given an annual booster vaccination against the clostridial diseases (*Cl. chauvei*, *Cl. septicum*, *Cl. Novyi Type B & D*, *Cl. sordellii*, and *Cl. perfringens C & D*) with a seven-or eight-way bacterin toxoid.
5. Cows are supplemented with injectable Vitamin A, D, &E and Multi-min based on age and weight.
6. All adult cattle are sprayed as needed to control lice.
7. All adult cattle are treated twice per year (spring and fall) with an anthelmintic to control internal and external parasites when on pasture.

D. Replacement Heifers and Bulls

1. Heifers should be vaccinated for:
 - a. Brucellosis between 4 and 12 months of age by a veterinarian
 - b. Other immunization procedures should follow that as described with adult cattle above.
2. Non-virgin bulls and bulls >24 mos of age which are sold may require PCR testing for *Trichomoniasis foetus* by a veterinarian prior to being marketed

E. Calves

1. All calves are to be immunized at approximately three and six months of age with:
 - a. A modified live or killed vaccine to protect against:

- i. Bovine respiratory disease (IBR, PI3, BVD Types I and II, BSRV; intranasal vaccines maybe given at birth),
 - ii. *Pasteurella and Haemophilus somnus*,
 - iii. Leptospirosis (*L. pomona*, *L. canicola*, *L. icteromhemorrhagica*, *L. grippotyphosa*, and *L. borgpetersenii serovar hardjo bovis*) and
 - iv. *Campylobacteriosis fetus*.
- b. Vaccinated and re-vaccinated against the clostridial diseases (*Cl. Chauvei*, *Cl. septicum*, *Cl. Novyi Type B & D*, *Cl. sordellii*, and *Cl. perfringens C & D*) with a seven-or-eight-way bacterin toxoid.

F. Experimental Cattle

1. Exact health processing procedures should be outlined in the approved Animal Care and Use Form for the given experiment if deviate from the standard practice.
2. Light weight cattle (250 to 600 lb) that are brought in for research purposes are:
 - a. Given vaccinations for Clostridial and bovine respiratory diseases upon arrival.
 - b. Booster injections 7 to 21 days later, depending upon source of cattle.
 - c. Antibiotics may be administered depending upon the source of cattle. Animals are also treated with a commercial parasite control product (injectable, pour-on or drench).
 - d. These cattle may also receive a growth promoting implant at or shortly after arrival.
 - e. These animals will receive an ear tag to uniquely identify them.
3. Heavier cattle (700 to 900 lb at arrival) may receive these same treatments if the background is not known but may not if these practices have already occurred before shipment to the Beef Center.

G. Identification and Treatment of Infectious Diseases

1. Many cattle health problems at the Beef Center are routine.
2. Symptoms shall be noted and treatment shall be applied based upon the expertise of the Beef Center Manager.
3. If the Beef Center Manager is uncertain as to the diagnosis or upon the proper treatment the University Veterinarian shall be consulted.
4. In rare instances, extremely ill animals may need to be euthanized.
 - a. If this is necessary, cattle may be euthanized by gunshot or captive bolt, (as per BQA guidelines) or lethal injection under veterinary recommendations.

H. TTU Owned Horses and Donkeys

1. Horses and donkeys will be provided ad libitum access to water and hay.
 - a. They may be supplemented with additional grain dependent upon energy and protein requirements relative to their level of exercise and the quality of forage.
2. Horses and donkeys will be dewormed biannually (spring/fall) with approved anthelmintic rotating products each season.
3. Veterinary recommended standard vaccinations will be administered and Coggins Test will be performed annually
4. Teeth will be floated by a professional annually.

5. Hooves will be inspected and shod approximately every 4-6 weeks by a professional farrier.
- I. Animal Disposal
 1. Dead animals will be immediately removed from the pen or paddock and disposed of in the carcass pit located in the Southeast paddock of the Beef Center or rendered.

FACILITIES

A. Paddocks

1. Approximately 650 acres of the New Deal facility are utilized in support of the Beef Center.
 - a. The Beef Center Manager is responsible for maintaining fences and managing these pastures which may include weed control, fertilization, annual forage establishment, and/or permanent forage establishment and haying.
 - b. Annual forages which may be planted for grazing or haying purposes include sorghum-sudan, wheat, and oats.
 - c. All pastures have their own water troughs.

B. Holding Pens

1. Multiple holding pens with shade adjacent to animal working facilities are provided for sick animals.
2. There are larger pens (various sizes and most are shaded) for housing cattle for teaching, research, or maintenance objectives at the Beef Unit feedlot or on the hill which is located to the west of the feedlot.
3. All pens have water troughs and feed bunks.

C. Research Pens

1. There are small research pens located on the Southwest corner of the Beef Center's dry-lot area.
 - a. Each pen is 30 ft x 10 ft in size and contains a concrete apron, concrete feed bunk, and individual water trough.
 - b. Retractable shade cloths are provided 21 ft overhead running east to west at a width of 15 ft.
 - c. A platform scale is located on the west end to facilitate group weighing of pens of experimental cattle at interim periods.
2. There are large research pens located in the Beef Center feedlot area which can be used for maintaining teaching cattle, conducting confined cow/calf system research, or conducting growing/finishing cattle research.
 - a. Each pen is 90 ft x 120 ft in size and contains a concrete apron, concrete feed bunk, and individual water trough.
 - b. Retractable shade cloths are provided 21 ft overhead (@ 40 ft x 60 ft).

D. Working Chutes and Sorting Pens

1. Adjacent to the office is a Bud Box which leads to a long alley and hydraulic chute containing weight scales where cattle can be restrained.

2. Smaller pens (12 ft x 12 ft) are also available for holding animals in the barn when necessary to hold animals for teaching or to give animals relief from environmental stresses.
3. A calving chute is also available to provide assistance as needed. The calving chute consists of a head catch and gates which can be used to either constrain the female in labor or be opened up so she can lay on the floor.
4. Beef Center cattle may be worked in chutes at the Beef Center, on top of the hill or the chute/stanchions at the Burnett Center.
5. There are 8 sorting pens (20' x 40') adjacent to the south side of the Beef Center barn with a 12' alley surrounding the pens to hold or sort cattle. These pens are outfitted with water troughs/concrete aprons and most have shade. The pen surface consists of a crushed caliche base to minimize mud during precipitation events.

E. Facility Maintenance

1. The herd manager takes care of all routine maintenance, which includes:
 - i. Electrical, irrigation, building, and regular vehicle maintenance.
2. If a situation occurs when the herd manager is not able to repair something, then independent service personnel will be called at the manager's discretion and the service personnel's availability.
3. Texas Tech University Building Maintenance and Utilities is called if the herd manager cannot make repairs.

F. Animal Science Livestock Arena

1. On occasion, cattle from the Beef Center may be transported following SOP030 to the Animal Science Livestock arena located on campus for teaching purposes.

TRANSPORTATION AND HANDLING OF LIVESTOCK

A. Cattle Handling

1. Care shall be taken not to provoke stress or excitement of cattle when being shipped or processed. Electronic prods and sorting sticks should only be used as last resort to encourage cattle movement.
2. Cattle being gathered, sorted or moved in a pasture setting, may be accomplished with the use of horses or motorized ATV's.

B. Cattle Transportation

1. Cattle shall be hauled in a 7 ft x 28 ft or 7 ft x 24 ft gooseneck trailer and truck owned by the Animal and Food Sciences Department. Refer to SOP030 Animal Transportation.

LEASING OF CATTLE

- A. The Faculty Coordinator reserves the right to lease cattle to other entities including but not limited to:
 1. Other academic institutions,
 2. Livestock organizations, and
 3. Individual cattle producers as it targets the teaching and outreach mission of the department.

- B. Conditions of the lease shall be outlined in a separate document and signed by both parties.
1. Conditions outlined in the agreement should include but not be limited to the duration and timing of the lease, the compensation for leasing the animal(s), and the party responsible for taking care of the animal(s) during the lease.
 2. During the time that animal(s) are engaged in the lease and not at the Beef Center they shall not be required to be managed according to the Beef Center SOP022 or be required to be managed underneath an approved IACUC protocol until they are returned to the Beef Center premise.
 3. Owners of the cattle may come to the Beef Center and work their cattle at TTU facilities.

FLOOD CONTINGENCY PLAN

- A. During periods of heavy rain accumulations cattle in the Beef Unit feedlot will be subjectively assessed for a mud score to determine proper intervention strategies to ensure their comfort. Scores should be made on individual cattle and then calculated as a percentage of cattle obtaining a specific score by pen. The Temple Grandin **Cattle Mud Score** for scoring will be used:
- 1 = Clean animals with some mud on feet and ankles.
 - 2 = Mud on the legs above the knees. Sides and belly clean.
 - 3 = Belly of the animals has mud cakes on them. Sides are clean.
 - 4 = Belly and sides of body have mud caked on them.
- B. If 100% of the cattle in the pen score a 3 or higher or if 50% of the cattle score a 4 then intervention measures should be employed.
1. Primary intervention strategy: Clean the concrete apron of the pen at a minimum of every other day.
 2. Secondary intervention strategy: If cattle still do not appear comfortable and willing to lay down on the apron then bedding (ie. cotton burrs or straw) should be provided on aprons. Aprons should still be cleaned and re-bedded at a minimum of once weekly.
 3. Third Intervention strategy: If conditions are too extreme such that the primary and secondary interventions are not perceived to be adequate then the cattle should be removed from the pen and relocated to a drier pen or paddock outside the feedyard if a pen inside the feedyard is not suitable.