

Artificial Insemination - Practical Information

Artificial insemination (A.I.) provides the cow-calf producer an opportunity to use bulls possessing superior genetics. Depending upon the needs and goals of an individual's breeding program, A.I. offers an economically feasible means of increasing productivity over a wide range of traits. In spite of this enormous potential to improve production levels, many beef producers have not put themselves in a position to take advantage of the benefits offered by A.I.

The missing or limiting ingredient in implementing a successful A.I. program is often management. The use of A.I. necessitates a sound management program. Establishment of an effective A.I. management program is best-approached one step at a time.

Factors to be considered are:

- 1) *Implementation of an efficient record keeping system;*
- 2) *A well-designed, strong, cattle handling facilities;*
- 3) *A sound nutritional program;*
- 4) *An effective herd health program;*
- 5) *Accurate heat detection;*
- 6) *A knowledgeable, well trained A.I. technician.*

Records:

The use of accurate and complete records is an essential ingredient in the implementation of any intensive management system such as A.I. For an A.I. program to be successful, a manager must know both the present reproductive status of each individual cow in the herd and the reproductive history of each cow. Statistics such as calving date, date of first postpartum estrus, actual length of cow's estrus cycle, consistency of estrus cycle length, number of services required per pregnancy, incidence and severity of dystocia, and individual cow ages are all useful in helping a manager to operate and to pinpoint weaknesses in the system. Only after management deficiencies have been identified can appropriate solutions be devised and implemented. Individual cow identification is also a necessary part of a successful record keeping system. There are a number of ear tags on the market, which provide an effective, economical means of individual identification for the cowherd. In purebred herds, it is necessary to also use a permanent form of identification, such as an ear tattoo. Brands (hot or freeze) are also effective.

Facilities:

A.I. facilities should provide an efficient means of sorting and restraining individual cows. They need not be elaborate or unduly expensive. It is essential, however, that they be strong and solid. They should be designed and constructed with the idea of minimizing stress and injury to the cattle. Excessive stress and excitement

can markedly reduce conception rates. Although an alley way may be sufficient in which to A.I. cows, a chute and headgate is a wise long-term investment.

Nutrition:

Nutrition can have a profound effect on the fertility of the cowherd. Nutritional requirements are dependent upon the physiological state of the individual cow. Lactation, growth, pregnancy, and events surrounding and including parturition exert high demands upon a cow's metabolism. When the level of feed intake is insufficient to meet the demands of the various physiological states that a cow may be experiencing at any given time, nutrients are diverted towards those functions most essential to the survival of the cow and her calf. When this happens, the cow's ability to cycle regularly, and to conceive and maintain a pregnancy is often impaired. Particularly critical times in most beef cow operations are the last 60 days prior to calving and the first 60 days following calving. Research has shown that during the late prepartum period, cows receiving an insufficient level of energy to maintain their body condition experience a prolonged postpartum anestrous period. Because of the demands exerted by the initiation of lactation, the postpartum period is also critical. Feed requirements of cows in different physiological states and cows with different production potentials can vary greatly. It is therefore advantageous to separate and feed cows based upon their age, lactation status, pregnancy status, and production potential. This can help eliminate the economic losses produced by both underfeeding and overfeeding of cows. Classes of nutrients that are important are energy, protein, vitamins and minerals. While adequate energy intake can be effectively estimated by monitoring changes in body condition, deficiencies in other nutrients are more difficult to detect. In general, protein deficiencies are rare in beef cows. Dry cows require approximately 8% crude protein; lactating cows about 12%. Cows on green growing forages rarely experience vitamin deficiencies. However, several vitamins become inactive under prolonged storage conditions and in some ensiling processes. Specifically, vitamins A, D and E are important in maintaining the integrity of the reproduction tract, synthesis of steroids and normal cyclicity. Therefore, injections of vitamins A, D and E prior to parturition may be beneficial for cows wintered on poor quality forage. Several minerals can be deficient in the brood cow's diet. Calcium and phosphorus are two minerals, which are essential for both milk production and reproduction. Another mineral of particular importance is selenium (Se). Se supplementation has resulted in significant increases in overall fertility in certain areas of the nation. Additionally, Se has been implicated in the immune system.

Herd Health:

Reproductive performance and the ultimate success of an A.I. program can be greatly affected by the health status of the cowherd. Based upon a producers herd history and area, a veterinarian can establish a safe and effective vaccination and overall herd health program. Plan a proper herd health program with your veterinarian and follow your plan for maximum reproductive efficiency.

Heat Detection:

Conception is dependent upon proper timing of insemination with ovulation. Insemination 10-14 hours following standing heat is the best way of ensuring this. Accurately identifying the period of standing estrus or heat is often the most difficult and limiting aspect of an A.I. program. Heat detection is difficult for two reasons.

First, it requires a serious commitment of time. Good heat detection involves careful observation of the cowherd at several times during the day. Each period of observation should last for a minimum of 15-20 minutes. Furthermore, a successful estrus detection program involves 3-4 observation periods per day. Heat detection aids such as Kamar Heat patches, tail-head chalking, chinball markers, gomer bulls and/or androgenized females can be valuable tools in any heat detection program. A computer assisted heat detection monitoring program, Heat Watch®, is also available to producers, and provides pinpoint accuracy concerning each female's estrus activity.

The **Second** requirement of accurate estrus detection is a practical understanding of the cow's behavioral responses and physical reactions around and including estrus.

Signs that indicate a cow is approaching estrus include:

- 1) increased activity, nervousness, and restlessness
- 2) riding or mounting of herd mates
- 3) swelling and moistness of the vulva
- 4) presence of a clear mucous discharge on the tail, vulva, and/or rump
- 5) and finally, standing to be mounted by herd mates

Generally speaking, standing to be mounted is the best sign of estrus to use for scheduling insemination. Insemination averaging 12 hours following standing heat will result in maximum conception rate. Using the signs of approaching estrus usually results in insemination too far ahead of ovulation to allow for spermatozoa to survive.

A.I. Technician:

The final ingredient in a successful A.I. program is a properly trained and knowledgeable A.I. technician. Effective training sessions are conducted by most A.I. organizations. An adequate clinic session normally lasts 3-4 days and is a combination of classroom training and practical lab sessions on live cattle. The average cost of a training program in Texas varies, but is generally \$400-500 for A.I. and another \$400.00 for pregnancy determination. Two important areas that require the most proficiency are semen handling and proper placement of the semen in the female's reproductive tract. Bovine Elite, Inc. emphasizes proper semen handling and practical training on over 70 cattle during a four-day clinic. Extreme caution must be exercised when handling semen. The first procedure that requires care is the thawing process. The gold standard for thawing semen in straws is 95°F (35°C) water for 30 seconds. Semen is stored in liquid nitrogen at a temperature of -196°C. Any rise in temperature above -130° prior to thawing can be detrimental to the long-term quality of frozen semen. The technician needs to be aware of proper procedures for storing semen and proper

maintenance of the liquid nitrogen container. Careful adherence to thawing instructions and insemination techniques will maximize conception rate in an A.I. program. It must also be noted that water is lethal to spermatozoa. Careful drying of the semen straws post-thaw and proper loading of the insemination syringe is essential to maximize fertility. The use of new clean dry paper towels or tissues is important.

Palpation of the reproductive tract, finding the insemination target and good A.I. technique are skills that require practice and repetition in order to become proficient. Research shows that even experienced A.I. technicians have difficulty depositing semen at the desired location within the uterine body. Studies testing inseminator efficiency have been conducted using radiography. In one study, the inseminating syringe tip placement and inseminate distribution was measured for 40 A.I. technicians. Results of this trial and others indicate that approximately 20% of all A.I. attempts result in semen deposition in the cervix and not in the proper site, the uterine-body. Other studies show that cervical deposition of semen during A.I. results in near-zero conception rates. More recent studies show that A.I. technicians can be trained so that well over 90% of inseminations will result in uterine body or uterine horn deposition.

While A.I. provides many advantages to beef producers for genetic improvement, it requires improved management techniques that parallel the potential improvements. Although not a "free-lunch", A.I. can provide significant return on investment when implemented within carefully planned and conducted management programs.

Basic A.I. Equipment:

A.I. Kit:

Plastic disposable gloves, lubricant, insemination syringe, disposable insemination sheaths, heavy-duty carrying case, electric thawing unit, stainless steel tweezers, stainless steel scissors or cito-cutter, paper towels or tissues, record book, pen or pencil, isopropyl alcohol.

Semen Tank:

The most popular liquid nitrogen container holds approximately 500 straws of semen, 20 liters of liquid nitrogen, weighs approximately 65 lbs when full of liquid nitrogen and should be filled with liquid approximately three times per year under normal circumstances.

