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Using Artificial Insemination

Beef and Cow Management

Michigan State University Extension Service

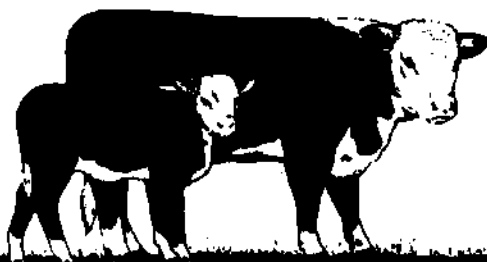
Prepared by John Peters, West Virginia University in cooperation with extension specialists from Michigan, New York, Ohio, Pennsylvania, Virginia and West Virginia as part of a project sponsored by the Extension Service, USDA.

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# BEEF COW MANAGEMENT



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## Using Artificial Insemination

Interest in using artificial insemination as a breeding and management tool in beef production is rapidly increasing. The use of exotic breeds and the realization by cattlemen that records of performance are essential to efficient production has stimulated interest in AI. Artificial insemination provides the opportunity to utilize bulls of superior genetic producing ability. AI studs usually purchase the highest performing individuals in a bull test and then as these bulls are used progeny test information is added to their records. Utilizing all of the available information allows the producer to make wise decisions concerning his breeding program. To judge the net benefit or liability of an AI program to the farmer, a look at the requirements needed to make an AI program successful is essential.

There are other reasons for using AI besides the availability of high quality performance tested bulls. These include insuring that there is plenty of bull power available without the added costs and problems associated with maintaining more bulls; the chance to utilize bulls from a wide variety of breeds or of mating all the cows in a herd to one genetically superior individual; AI provides a golden opportunity for utilizing crossbreeding techniques for increasing production opportunities; the problems associated with rotating bulls and maintaining separate breeding herds can be minimized by using AI.

### REQUIREMENTS OF AN AI PROGRAM

An AI program requires attention to detail concerning management, nutrition, and the reproductive cycle. AI programs consist of much more than just depositing

semen in a cow's reproductive tract. The successful AI program is a result of (1) good fertility of the semen used (2) high cow fertility (3) a high percentage of the cow herd inseminated and (4) the ability of the technician to handle and deposit semen correctly.

#### Identification

A good AI program requires planning and a commitment from the cowman that his program must work. The first step in a good management program is to identify all the cows in the herd. The use of ear tags has proven to be very useful as they are easy to read when checking heat. Another means of ID such as an ear tattoo or brand (freeze or hot) should be used in case a tag is lost.

#### Facilities

Proper breeding facilities are also essential to an AI program. Good conception rates cannot be expected if cattle have to be mistreated or mishandled prior to breeding. Well designed handling facilities should be located where cows can be moved to them easily and without undue disturbance of the cow. A holding pen with a chute is all that is necessary. Many technicians prefer not to use a head gate when breeding. Cows in the chute can be confined by placing sliding bars behind them. A chute should be 26 inches wide and have a side gate to provide access to the rear of the cow by the inseminator.

### COW FERTILITY

Cow fertility is an often underestimated problem in any breeding program and becomes particularly impor-

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tant in an AI program. Most cattlemen turn bulls with the herd for a period of time and never really get a measure of cow fertility. Fertility is measured by the number of services per conception. If a cow in the herd requires 2, 3 or more services before conceiving then something is obviously wrong. Fertility is usually dependent on (1) nutrition (2) an adequate recovery interval from calving to breeding and (3) freedom from disease or other abnormalities.

### Cow Nutrition

Nutritional requirements of lactating cows must be met to insure a large percentage of the cows coming into heat and conceiving. This is a major factor determining the success of an AI program. If a high percentage of the cows are in heat during the first 25 days of the breeding season then an AI program has a real chance of success. Total energy in the ration appears to be the most important single nutrient in determining efficient reproduction. An important rule of thumb is that cows nursing a calf must be fed enough to be gaining between one-half and one pound per day prior to and during the early part of the breeding season. This requires 12-16 lbs of TDN per day. Vitamin A, protein, calcium and phosphorous also are involved in reproduction and must be provided the cow in adequate amounts.

**Table 1. When Cows Show Heat Postpartum.**

Days from calving	49	50	60	70	80	90	100
Older Cows (5 years & up)	55%	70%	80%	90%	90%	95%	100%
Younger Cows	15%	30%	40%	65%	80%	80%	90%

### Post-Partum Interval

An adequate interval from calving to breeding is important in maintaining cow fertility in a AI program. This becomes more important in cows that calve late in the calving season because they may exhibit heat and be bred artificially before the reproductive tract has recovered sufficiently from the previous pregnancy. Studies have indicated that insemination during the first 20 days postpartum resulted in 0 fertility. After 20 days fertility improved with time up to 90 days postpartum when all cows should be bred to maintain a yearly calving interval. Other reports have shown conception rates of 33% when cows were bred starting at 30 days postpartum compared to 62% for cows starting at 60 days. An AI program will have a better chance of success if no cows are bred prior to 40 days postpartum.

A successful AI program resulting in breeding most cows to superior bulls requires that a large percentage of the cows in the herd be bred artificially. This is difficult to achieve in a cow herd that is calving over a 3-6

month period. When the management level in the herd reaches the point of achieving a high conception rate with natural service in a 60-day breeding season, then AI has an excellent chance. An AI program cannot be successful under poor management.

### Disease

Disease factors can destroy an AI program even more rapidly than a breeding program using natural service. This is particularly true if the plan calls for AI for 25 days followed by a clean up bull. Certain diseases can affect conception rate. Infectious diseases such as Vibriosis, Leptospirosis, IBR and BVD directly affect fertility by preventing conception or by causing abortion. The logical course of action is to develop a complete herd health plan with your veterinarian.

Occasionally non-specific uterine infections which result from retained placenta or calving difficulty also affect conception rates. Cleanliness and judicious use of antibiotics when aiding cows in trouble can help to prevent this type of infection.

## AI TECHNIQUES

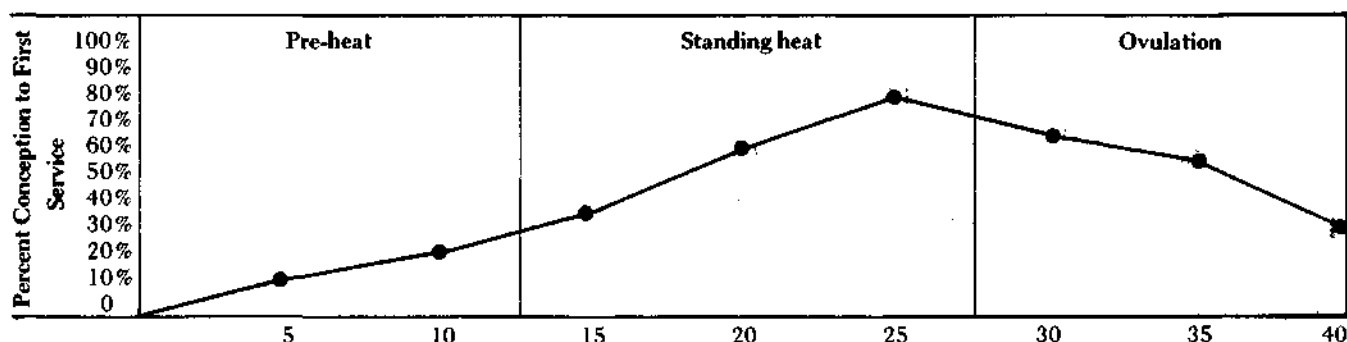
Once management problems have been minimized, the actual technique of AI needs to be considered. An important aspect of a successful program is semen fertility. The cardinal rule regarding semen fertility is to purchase semen from a reputable organization. Collecting, processing and freezing semen requires excellent technical skills. Most organizations that have been in the business for many years have the skilled personnel necessary to maintain high semen fertility. The possibility exists of transmitting disease to a cow herd through the use of AI. Such diseases as Trichomoniasis and Vibriosis have been transmitted by AI. A reputable organization generally has a health program to prevent disease transmission.

### Heat Detection

Detection of heat requires considerable effort and is extremely important in insuring success of an AI program. Heat is defined as the psychological and physical manifestation of sexual receptivity. In other words the cow will stand to be ridden by a bull, another cow or a steer. The period of receptivity generally coincides with the time when an egg has been produced and is ready to be united with a sperm cell to produce a new individual. Emphasis must be placed on the willingness to stand. Cows exhibiting mounting behavior or other signs of sexual activity may not actually be in heat. The farmer using AI should insist on standing heat as the only acceptable criterion for determining the optimum time for insemination. Sometimes a clear mucus discharge and swollen vulva also indicates heat.

Various techniques can be used to detect heat. Observation of the herd from daybreak to about 8:30 a.m.

**Table 2. Conception to First Service in Relation to Stage of Heat When Inseminated.**



and from 4:00 p.m. until dark results in a good rate of heat detection if the cow herd is not disturbed. Aids for heat detection such as heat detection pads which mark cows when they are mounted by other cows have proven useful. Use of Gomer bulls that have been altered to prevent penis insertion or rendered sterile by vasectomy is a proven heat detection method. Use of chin ball markers identify cows that are in heat. These aids for heat detection still require individual observation at least twice a day.

#### Time of Insemination

Once a cow has been determined to be in heat, the time of insemination becomes important. High conception rates are attained when cows are bred during the 10 hour period at the end of standing heat. The general rule of thumb that has been tested and proven is cows observed in standing heat in the morning should be bred that evening and cows observed in heat in the evening should be bred the following morning. Standing heat in a cow lasts about 18 hours with considerable variation. The basis for breeding at or shortly after the end of standing heat is that ovulation in the cow occurs several hours after the end of standing heat. Breeding a few hours before ovulation occurs results in a high number of sperm cells present at the site of fertilization when the egg arrives and an improved conception rate.

**Table 3. Optimum Time for Insemination.**

Cows First Showing Estrus	Should be Bred	Too Late for Good Results
In the morning	That evening	Next day
In the evening	The next morning	After 3:00 next day

#### Insemination

We now have a large percentage of the cows coming into heat, high quality semen and a good heat detection system. The one remaining factor concerns the one actually breeding cows. The human factor can negate all

that has been done to insure a successful AI program. Even good inseminators can develop bad habits and workmanship may suffer.

The farmer may do the breeding himself or place a capable employee in charge or hire an experienced AI technician. Inseminating cows is a technique that can be learned and can be improved with practice. The first step if you or an employee are going to inseminate cows is to attend a good AI school. Here the essentials for storing and handling semen, thawing procedures and insemination techniques are taught. These AI schools are offered at various times by AI organizations or as short courses at the state agricultural colleges. These courses should offer a study in gross anatomy of the reproductive system of the cow and its location in the body of the cow. Semen must be deposited correctly or conception rates will suffer.

Recommendations for storage, handling and thawing frozen semen:

1. Maintain frozen semen at  $-196^{\circ}\text{C}$ . Liquid nitrogen in an insulated tank is essential for this.
2. Open the tank only when absolutely necessary and minimize the length of exposure as much as possible.
3. Keep the canister in the neck of the tank. Do not expose semen ampules longer than 9-11 seconds. Do not transfer ampules in wind or sunlight. Handle ampules with a mechanical device and not your fingers.
4. Thawing semen.
  - a. Prepare an ice bath and allow ampules to completely thaw in the bath (8-10 min.) before using.
  - b. Do not allow ampules to touch ice cubes or each other.
  - c. Do not use semen thawed more than one hour.
  - d. Maintain thawed semen in the ice bath until it is used.
  - e. Straws of semen are thawed by placing the straw in the folds of a paper towel and allowing the semen to thaw at ambient temperature.

## ESTRUS SYNCHRONIZATION

Recent advances in techniques for synchronizing heat in cow herds may result in more efficient use of AI in beef cow herds. With these procedures a large percentage of the cow herd can be induced to come into heat in a short period of time. The obvious goal is to have all the cows in a herd ovulate at the same time so that all can be inseminated at the same time. These procedures eliminate the labor involved in heat detection and insemination of a few cows at a time. Techniques and products will soon be on the market that will allow the farmer to treat his cow herd and breed them X hours later. Some research has indicated that injection of certain compounds will cause about 90% of the cycling cows in a herd to come into heat 80 hours after the injection. Conception rates have been 50-70%.

Estrous synchronization techniques hold a great deal of promise for the future. Management of the cow herd however may be even more critical in terms of using these techniques.

### SUMMARY

Rules for a successful AI program:

1. Improve management of your cow herd.
  - a. Identify all cows.
  - b. Develop good handling facilities.
  - c. Establish a 60-day breeding season.
  - d. Insure proper nutrition.
  - e. Allow an adequate post partum interval before initiating artificial insemination.
  - f. Establish a good herd health program.
2. Purchase good semen.
  - a. Determine the bull or bulls to be used.
  - b. Buy from a reputable semen supplier or AI organization.
3. Develop procedures for the insemination program.
  - a. Develop a heat detection system. Check for heat at least twice a day.
  - b. Breed cows approximately 12 hours after they are detected in heat.
4. Insemination technician.
  - a. Learn to breed cows yourself or have a trusted employee learn. Use AI training school.
  - b. Hire an experienced technician.