

ESTRUS SYNCHRONIZATION AND ARTIFICIAL INSEMINATION FOR BREEDING BEEF CATTLE

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Artificial insemination of cattle has proven to be very effective for the improvement of the genetic potential for production. In dairy production, over 80% of all cattle are now bred artificially. The success of dairy producers in improving milk production has been impressive. A large proportion of the success is due to improvement of the genetic potential of dairy cattle through use of outstanding sires by artificial insemination.

Artificial insemination in beef cattle has had limited use. The management necessary for success has limited its application primarily to seed stock producers. One of the main barriers to use in commercial beef cattle operations is the time and labor necessary for detection of estrus (heat) and insemination at the proper time during heat.

This barrier has been effectively removed with the availability of methods to synchronize heat. With estrus synchronization groups of cattle can be induced into fertile heat and bred at a specified time following initiation of the heat period. The success of this program is based upon a total management program. **Synchronization will not improve cattle fertility.** In fact, it is difficult to achieve fertility levels similar to those resulting from natural mating. For success, a total fertility management program is necessary.

KEY ELEMENTS OF FERTILITY MANAGEMENT

There are three groups of animals which need to be considered separately:

1. Replacement heifers
2. Young cows with their first calf
3. Mature cows, having 2 or more calves

Replacement Heifers

If the goal is to breed the replacement heifers at 12-14 months of age, a special heifer development program is essential. Some general rules apply:

1. They must be at least 12 months old or preferably older at breeding.
2. They must weigh at least 650 lb at breeding.
3. They must have a body condition of 5 or higher at breeding.

When replacement heifers are selected, usually in the fall, plans for the development program must be made.

1. Evaluation of heifers in the fall:

An estimate of the age, weight and condition of the heifers is required so that the heifer development plan can be made.

For example: For a heifer, born in March/April and weaned on or about 1 October, the following calculations should be made:

Weaning weight	500 lb
Age at weaning	6 months
Target weight breeding season	650 lb
Gain necessary to meet target wt.	150 lb
Breeding date desired	1 May
Days weaning to breeding	211 da
Average daily gain to breeding	0.75 lb/day

Nutrition required to achieve target weight:

Generally the nutrients which are most likely to be required for growth and development are protein, energy and phosphorus.

Heifers, pregnant with first calf in the fall.

Requirements for the desired gain are:

<i>Protein</i>	lb/day	1.5		
<i>Energy</i>	lb TDN daily	10.0		
<i>Phosphorus</i>	Daily	14.0g	.03lb	.5 oz

Evaluate weight and condition of heifers in the fall. Condition is the most important indicator of management needs prior to calving and rebreeding for second calf:

In alfalfa hay equivalents the heifers would require:

Alfalfa hay 16% protein, 52% TDN, .25%P

<i>For protein requirement</i>	9.4 lb daily
<i>For TDN requirement</i>	19.2 lb daily
<i>For phosphorus requirement</i>	12.0 lb daily

In fall, condition of these heifers should be at least 5-6. During winter, without extra feed, except range forage, they would be expected to lose weight and at least one condition score. If the condition score at breeding in the spring is 4 or less, the fertility in the breeding season will be lowered. At fall evaluation, you can anticipate whether or not supplements may be required during late pregnancy and into the breeding season for this group. If fall condition appears to be marginal, supplements begun 1 month prior to calving and into green feed following calving should be planned.

The heifers would have to eat 19 lb alfalfa hay daily to meet energy (TDN) requirements. At the weight and age of our example, they would not likely eat 19 lb. Therefore, to ensure desired performance, a better energy source would be necessary.

It takes about 80 lb gain in weight to improve 1 condition score. Cattle will not usually gain weight during the winter and most likely will lose weight on range forage. Heifers should be handled separately, if possible, and wintered on the best winter range. A second condition evaluation about 1 month prior to calving should be made and supple-

For our calculations, we will feed an average of 9 lb alfalfa hay daily and choose a good energy source for the rest of the ration:

For example:

1. *Corn at 80% TDN to supply required energy:*

TDN required		10.0
TDN from hay 9 lb x .52	=	4.7
TDN needed from corn		5.3
Lb corn = 5.3/0.80	=	6.6 lb corn daily

Ration for heifers:

9 lb alfalfa hay
6.6 lb corn
15.6 lb Total

2. *Whole cottonseed at 90% TDN to supply energy:*

5.3 lb TDN required/.90 TDN cottonseed = 6 lb cottonseed daily

Ration for heifers:

9 lb alfalfa hay
6 lb cottonseed
15 lb daily ration

ments of PEP planned if needed. If a gain of 80 lb is needed (1 condition score) two months prior to the breeding season, the animals would have to be fed to gain 1.3 lb per head daily. For this gain the requirements are as follows:

Mature cows, age 2 or more in the fall.

Fall condition score should be 5 or greater.

	Last 1/2 Pregnancy	Lactation/Breeding
<i>Protein (lb/day)</i>	1.7	2.0
<i>TDN (lb/day)</i>	10.0	12.0
<i>Phosphorus (g/day)</i>	19/0	25.0
Again, alfalfa hay required lb/day		
<i>Protein</i>	10	12.5
<i>TDN</i>	18	22
<i>Phosphorus</i>	16	24

Generally extended feeding of the cow herd should not be necessary except for unusual years where summer/fall range growth and quality is limited by drought. An evaluation of the condition of the cows and of the quantity of forage available in the fall should help you to

It would require about 20-25 lbs alfalfa hay daily which could be provided and eaten. However, a combination of hay plus an energy source could be superior.

anticipate potential fertility problems the next spring. A minimum supplement of 1-2 lb. daily may be required if the range is primarily grass. Supplements should be fed based upon cow condition and nutrient content of the range forage.

For example: Feed 10 lb alfalfa daily

TDN required	12
TDN from alfalfa	<u>5.5</u>
TDN from energy source	6.5 lb
With corn $6.5/.82 = 8$ lb corn daily	
<i>Ration:</i> 10 lb alfalfa hay	
8 lb corn	
With cottonseed	
$6.5/.9 = 7$ lb cottonseed daily	
<i>Ration:</i> 10 lb alfalfa hay	
7 lb cottonseed	

Generally: cows will not gain weight or condition in the winter. Therefore, fall condition evaluation will identify potential problems and culling/supplementation decisions made accordingly.

The ration to be fed approximately 1 month prior to calving up to greenup.

Much less feed would be required if the cows were condition score 4 or higher just prior to calving. Ideally condition would hold up from the fall without more than a supplement containing PEP fed at 3-4 lb/head daily, 1 month prior to calving and up to greenup.

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