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## G85-741 Estrous Synchronization for Beef Cattle

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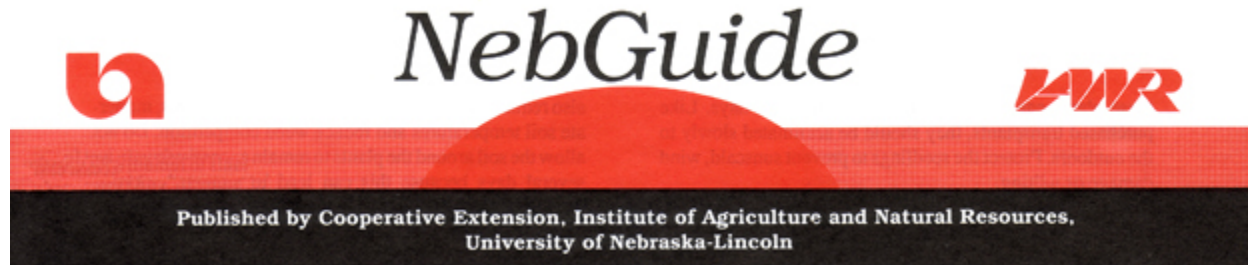
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## Estrous Synchronization for Beef Cattle

This NebGuide discusses the potential benefits of estrous synchronization, how the products and programs work, and the results and costs involved.

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*Gene H. Deutscher, Extension Beef Specialist*

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Estrous (heat) synchronization can help beef producers improve production efficiency and economic returns. Controlling estrus and ovulation in cycling females means breeding is completed in a short period of time.

Instead of females being bred over a 21-day period, synchronization can shorten the breeding period to less than 5 days, depending on the program selected. The use of synchronization has great potential for improving beef production, but it requires good management for success.

Producers should understand the advantages, as well as the requirements for a successful estrous synchronization program. They should know how different estrous synchronization products and programs work, and expected results and costs involved before initiating the practice.

Estrous synchronization can shorten breeding seasons from 60 to 45 days or less in heifers. It can concentrate breeding and calving periods, and produces a more uniform calf crop due to similar ages of calves at weaning. It allows greater use of superior sires through artificial insemination (AI) or by natural service, makes AI programs more practical by reducing time and labor for heat detection, and allows more uniform management of cows and calves.

For an estrous synchronization program to succeed it must be well-planned and implemented.

Fertile heifers and cows must be on an adequate nutrition program, and there must be quality semen for AI and experienced inseminators.

Healthy, aggressive, fertile bulls for synchronized natural breeding as essential, as are more concentrated labor at breeding and calving times and facilities for bad weather during concentrated breeding and calving periods.

Lower pregnancy rates may occur if procedures and requirements are not followed.

Yearling heifers and mature cows in good body condition, gaining weight prior to treatment, are the best candidates for successful synchronization results. Two-year-old heifers usually are poor candidates because they are slow in cycling and rebreeding after their first calf.

Yearling heifers need to reach "target weights" (650 to 750 lb., depending on breed) for a high percentage to be cycling before the breeding season. Cows generally should be 45 days post-calving before treatment starts. The majority of synchronized females will calve during a two-week period, with a maximum of 20 percent calving in one day.

### **Synchronization Products and Programs**

*Table I* shows the products approved for use in estrous synchronization without adverse side effects on general health. All products are approved by the FDA except the combination product, MGA-prostaglandin, which has been approved separately.

Three types of products are available -- prostaglandins, progestones, and their combinations. These products work differently and are administered differently, so an understanding of their actions is necessary.

**Table I. Products for estrous synchronization**

<i>Product</i>	<i>Company</i>	<i>Type</i>	<i>Administration</i>	<i>Dose (cc)</i>	<i>Available from</i>
Lutalyse	Upjohn Co.	Prostaglandin	IM injection	5	Veterinarian
Estrumate	Mobay Corp.	Prostaglandin	IM injection	2	Veterinarian
Bovilene	Syntex Agri Bus.	Prostaglandin	SC injection	2	Veterinarian
Syncro-mate B	Sanofi-CEVA	Progestin + estrogen	Implant + IM injection	2	AI supplier
MGA	Upjohn Co.	Oral Progestin	In feed	—	Feed dealer

### **Prostaglandin Products**

Three products, Lutalyse, Estrumate and Bovilene, have been approved for use in beef cows and heifers for estrous synchronization. All are prostaglandins and work similarly, but differ slightly in their chemical makeup with different half-lives and dosage levels.

When injected at the recommended dosage, these products act by rapidly regressing the corpus luteum (CL) on the ovaries of cycling females in *Days 6 to 16* of their estrous cycles. The injection decreases

the function of the CL, which allows these females to return to estrus within 2 to 5 days and synchronizes their estrous cycles. Females in *Days 17 to 20* will be in estrus normally within 1 to 4 days and also will be synchronized. Females in *Days 1 to 5* of the cycle and non-cycling females that do not have a mature CL will not respond to the injection.

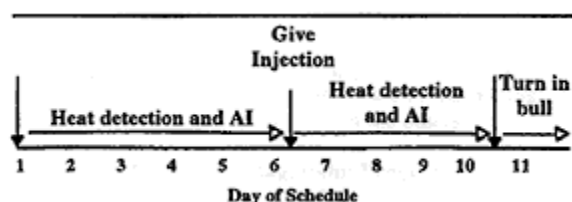
Only about 75 percent of the cows cycling in a herd can be synchronized with one injection. If all cycling females are to be synchronized, two injections are needed.

Label precautions on these products indicate the drug will cause abortions in pregnant cows and **should not be handled by pregnant women or persons with asthma or bronchial problems.**

## Prostaglandin Programs

A variety of programs can be used, depending on your goals. Facilities, time and labor, heat detection, AI experience and cost limitations should be considered. Carefully consider all programs to determine which will be most beneficial for your operation.

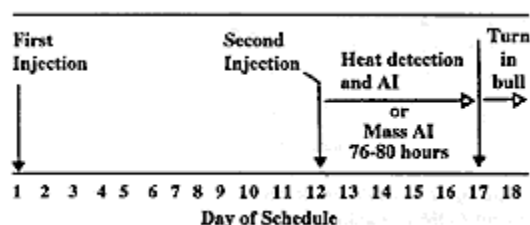
**One-injection program** -- This program, shown in *Figure 1*, is the most popular. It has the advantages of lower drug and semen costs and less risk because a producer has a good indication of the percent of females cycling in the herd before the injection is given. However, it requires more labor for heat detection and involves a 10-day breeding period.



The program consists of 5 days of conventional heat detection and AI. On the sixth day, the producer decides whether or not to inject the remaining females based on the percent cycling during the first 5 days. About 20 percent of the females should have cycled during this period to justify injecting the remainder.

The injected females are then heat detected and bred AI for the next 5 days.

**Two-injection program** -- *Figure 2* outlines this program. It has the advantage of a short breeding period with little or no heat detection, but involves more drug costs and may yield low pregnancy rates if a high percentage of the females are not cycling.



This program best fits the producer who knows a high percentage of the females are cycling and is willing to risk the higher drug costs for less time and labor spent on heat detection. The program consists of giving two injections of prostaglandin to all females 11 days apart; then conventional heat detection and AI can be done for the next 5 days, or all females can be mass

inseminated between 76 and 80 hours after the second injection. Adequate facilities, labor and strict scheduling are needed if mass AI is used. *Table II* compares results and costs of these prostaglandin synchronization programs.

Other prostaglandin programs are available, but not as popular. The one-injection program can be modified by not breeding before the injection. This would allow about 65 to 70 percent of cycling females to be synchronized.

Another version of the two-injection program uses a split breeding period. This involves heat detecting

and breeding for 5 days after the first injection, then giving the second injection on *Day 12* to the females not detected in heat and breeding for the next 5 days.

**Table II. Comparison of estrous synchronization programs using AI**

<i>Program</i>	<i>Injections (No)</i>	<i>Times Cattle Handled (No)</i>	<i>Heat Detection (Days)</i>	<i>AI Breeding Period (Days)</i>	<i>Est. Synch. Preg. Rate<sup>a</sup> (%)</i>	<i>Est. Costs/ Preg. Female<sup>b</sup> (\$)</i>
One injection	1	3	10	10	55	37
Two injections with heat detection	2	3	4	4	50	39
Two injections without heat detection (mass AI)	2	3	0	1	45	44
Syncro-mate B with heat detection	1 + I <sup>c</sup>	3	4	4	60	37
Syncro-mate B without heat detection (mass AI)	1 + I <sup>c</sup>	3	0	1	55	40
MGA + Prostaglandin with heat detection	Feed + 1	2	5	5	60	34
<sup>a</sup> Estimated pregnancy rates of total group during synchronization period based on research results on heifers from well-managed herds in Nebraska. <sup>b</sup> Costs include drugs, semen, AI supplies, labor, clean-up bulls, interest and other expenses for a 70-day breeding season as published in 1990 Neb. Beef Cattle Report (Loseke et al.). These costs can be compared to \$32 for natural service without synchronization. <sup>c</sup> Includes one injection plus implant.						

### **Syncro-mate B Product and Program**

Syncro-mate B (SMB) consists of an ear implant containing a progestin (synthetic progesterone) and an injection containing an estrogen and progestin. It is a nonprescription drug approved for use in both beef and dairy heifers and beef cows. It is not approved for use in dairy cows.

The implant is about 1/8 inch in diameter and 3/4 inch long, and is inserted under the skin in the middle of the back side of the ear. The injection is given intramuscularly in the rump at the time of implanting. Nine days later, the implant must be removed.

The SMB program can be used on females in all stages of the estrous cycle. It works by regressing the immature CL during early stages and by blocking estrus in all stages until the progestin implant is removed after 9 days (day 10). Females will cycle within 1 to 4 days after the implant is removed.

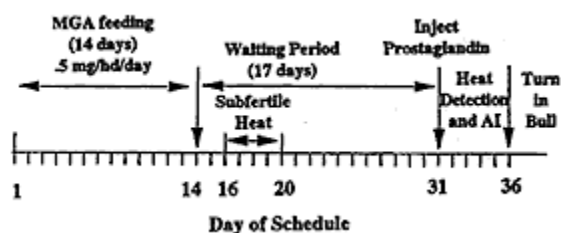
One advantage of SMB is that it can stimulate cycling in some non-cycling females, although conception rates may be slightly lower in these females. It has another advantage of not causing abortions in pregnant animals, but is more difficult to administer due to the implant insertion and removal.

*Figure 3* diagrams the SMB program. The implant and injection are given at the same time, then the implant is removed after 9 days. Females can be heat detected and bred AI for the next 4 days, or mass inseminated at 48 to 54 hours after implant removal. Most estrous activity will occur between 24 and 40 hours after implant removal, so breeding at an appointed time with this program has been successful.

Advantages are a short breeding period with a short or no heat detection period, but drug and semen costs are higher. *Table II* compares this program with the others.

### MGA - Prostaglandin Program

MGA, melengestrol acetate, is a common inexpensive oral progestogen used in feedlots to suppress estrus of heifers and improve feed efficiency. MGA works by allowing ovarian follicular development, but inhibits estrus and ovulation. After MGA treatment females have a synchronized estrus, but the estrus is subfertile. A program was developed combining MGA with a prostaglandin to produce a synchronized estrous with high conception rates. Research shows heifers given prostaglandin in days 10-15 of the estrous cycle have a high estrus response and high fertility.



*Figure 4* shows the outline of the MGA-Prostaglandin program. The heifers are fed 5 mg/head/day of MGA for 14 days. The MGA can be purchased in a pellet form and mixed with a grain ration. This mixture can be fed alone or top dressed over other feed in bunks.

MGA also can be purchased in a protein cube and fed in bunks or on the ground. It is critical that enough bunk space is available so all heifers can consume their share of MGA feed each day. If they do not eat the MGA or skip eating more than one day, they will exhibit estrus and will not respond to the program.

After the MGA feeding period, heifers will have a subfertile estrus during the next 5 days. They **should not be bred at this time**.

Producers should wait 17 days (range 16 and 18 days) after the end of the MGA feeding period before giving an injection of prostaglandin. The heifers will show estrus during the next 5 days (synchronization period) and can be heat detected and bred by AI.

Most of the estrous activity will occur between 48 and 84 hours after the injection. This program also may have potential with cows but has not been proven, since only limited research is available.

The MGA-Prostaglandin program's advantages are: low drug cost, it is easily administered, there is one handling of cattle in the chute, and there are good pregnancy rates. The program also has an advantage of inducing estrus in a portion of prepuberal heifers and anestrus cows.

The disadvantages are that more advanced planning is needed because the program requires about 30 days to implement, and all females need to consume the MGA feed. A comparison of this program with others is shown in *Table II*.

Another version of this program omits the prostaglandin injection and uses natural breeding; it is discussed in the next section. This program can be used with calf removal to stimulate cycling in anestrus cows, that is discussed later.

## Using Bulls with Synchronization

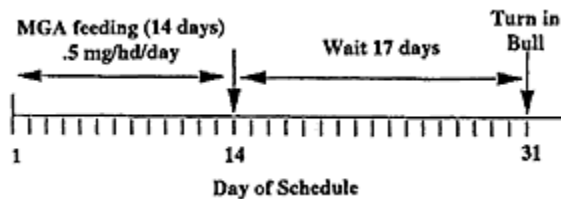
Because the main advantages for using synchronization are to get more females pregnant early in the breeding season and to use superior sires, AI is usually the preferred method of breeding. However, some producers would like the benefits of synchronization but cannot use AI.

Research shows natural service can be a viable alternative to AI if managed properly. Select bulls for high fertility and sexual aggressiveness. All bulls should pass a breeding soundness examination and, ideally, a libido exam.

One bull per 15 to 20 females in a small pasture (5 to 10 acres) or drylot, rotated every 24 hours with a rested bull, is recommended during the synchronization period (4 to 5 days). Watch bulls closely during the breeding period to make sure they are servicing the females, and injuries do not occur. Divide large groups of females into smaller groups (40-60 head) in small pastures or lots during synchronization.

Research has shown much variation in number of females serviced per bull (5 to 20 head) during a 24-hour period. Pregnancy rates during the synchronization period have ranged from 60 to 80 percent, and during a 30-day breeding season, from 75 to 95 percent.

Bulls can be used in all synchronization programs, but the most popular programs are: 1) give an injection of prostaglandin and then place the bulls with the cows, or 2) feed MGA for 14 days, wait 17 days, and then place the bulls with the cows (see *Figure 5*).



The advantages of these programs are low drug cost, no heat detection, and a less concentrated breeding period so the bulls have more time to service the cows. Another advantage of feeding MGA is that it helps stimulate cycling in prepuberal heifers and anestrus cows. Producers wanting more females bred early in

the breeding season may obtain considerable benefit from these synchronization programs.

## Calf Removal During Synchronization of Cows

Removing calves from cows for a short period (usually 48 hours) can stimulate an increase in luteinizing hormone production and cycling activity. A positive response to cycling and a small increase in pregnancy rates were found when 48-hour calf removal was combined with the Syncro-mate B program.

Calves are removed at the same time the implant is removed and held separate from the cows until after mass AI at 48 hours. The same procedure can be accomplished during the two-injection prostaglandin program by removing the calves about 24 hours after the second injection and returning them to the cows after mass AI at 76 to 80 hours.

The 48-hour calf removal also can be combined with the MGA-Prostaglandin program (*Figure 4*) and the MGA and natural service program (*Figure 5*). Calves are removed on day 16 (or two days after the end of the MGA feeding period) for a 48-hour period. Research on calf removal shows a small increase in estrous response and pregnancy rates during the synchronization period. Cows in moderate to good body condition and over 40 days post-calving show the greatest response to calf removal and estrous synchronization.

Separate calves by a corral fence and provide clean water and hay. This has not caused calf sickness,

mothering problems or a decrease in calf weaning weights.

### **Costs/Benefits of Synchronization**

Many factors influence the costs of a synchronization and AI program: availability and cost of labor and facilities, nutrition and cycling status of the herd, conception rates, costs for the drug, semen, AI supplies and clean-up bulls.

*Table II* shows a comparison of various synchronization programs. Estimated pregnancy rates during the synchronization period are based on research results on yearling heifers. Estimated costs per pregnant female can vary from \$34-44 depending on the program selected and its results. These costs can be compared to \$32 for natural service by bulls without synchronization. The greatest benefits of AI-synchronization calves over natural sired calves include:

- more calves saved due to use of calving-ease sires and group calving (about 3 percent);
- calves born earlier in shorter calving season so older at weaning (5-8 days);
- heavier calves at weaning due to better genetics and older age (up to 35 lbs);
- better quality heifers for replacements (up to \$50 premium);
- fewer bulls needed for breeding (maybe 1/3 fewer);
- better use of labor and management (\$?).

Producers must weigh the cost/benefit ratio to decide if a synchronization and AI program will be profitable in their operation. They need to evaluate all the programs and select the best one to meet their objectives.

Good management of the cow herd and of the synchronization program are the keys to success. Overall herd management, including nutrition, health, breeding and reproductive programs, should be above average.

Estrous synchronization is a powerful management tool for improving beef production, but it is not a cure-all for breeding or management problems. It will not replace good management and will not be successful under poor management. Producers interested in beginning a program should consult experienced producers, veterinarians and extension personnel to obtain additional information and to determine the most beneficial program.

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