

Problems or pay dirt: both are possible with heat synchronization

Editor's note: If there's a synchronization program tailor-made for your operation—one that can be put in place with little additional effort or adjustment—count yourself blessed. The odds most producers will need to make major changes in facilities, management, or objectives are quite high when going to a heat synch program.

Pros and cons of the practice may be best left to the hot-stove league. Some producers are committed to making it work, others condemn it as tampering with nature. This article argues for neither position but rather attempts to describe the basics of the various procedures plus list the requirements that must be there before synchronization can even be considered as a wise management tool.

And the question becomes, "Why would purebred breeders need to consider heat synchronization? There are those of us that follow a two-calving season scheme for the marketing, showing, and testing outlets in our area."

Yes, having a variety of calves of various ages and stages of development has proved an advantage for many seed stock producers. But, it remains unknown if such will always be the case in the light of changing markets, increasing costs, and the opportunities posed by new merchandising channels. As more customers and commercial cattlemen consider ways to lower costs and increase efficiency, their sights will likely train on synchronizing techniques. Can today's purebred producer afford to not be well-versed in the mechanics of the various methods?

Here are some comments from beef men well informed about the potential and pitfalls of heat synchronization...

*** Dr. Gene Deutscher, extension beef specialist at the University of Nebraska North Platte Center:**

"You need to be a top manager to make it work... but more producers should try to incorporate a program into their program. Information is available if the producer will take time to read it, but the problem is some producers don't use the product and the program the way they should. When they get bad results, they blame the product."

*** Daryl Strohbehn, extension beef specialist at the Iowa State University:**

"Making synchronized A.I. work is no more difficult than a normal A.I. program—in fact, it may be easier. We've done hour estimates on the amount of time it takes to accomplish a whole synchronization program versus a normal A.I. program. A normal A.I. season was running 1 1/4 hours per cow and we were able to cut it down to one-third hour in a 200-cow herd using a two-shot method."

*** Dr. Jim VanBuren, regional technical services manager for The Upjohn Company, [describing the importance of cycling with the prostaglandin products, Lutalyse (Upjohn); Estrumate (ICI-Bayvet); and Bovilene (Diamond Syntex)].**

"An average of three to five percent of the herd should be in heat each day, if all the animals are cycling at a normal rate. If three to five days of observation determines that the rate of cyclic activity in the herd isn't close to five percent cycling per day, it's advisable to either not synchronize or have a veterinarian examine and palpate the animals."

*** Randy Nelson, Nelson Brothers Cattle Co., near Salesville, Ohio, a 600-head herd enrolled in the American Angus Assn. Young Sire Evaluation program:**

"That first year, we expected a lot from the Lutalyse. We thought that with this new drug we would just go in and breed them all in one day. What we didn't realize was the facilities and the amount of organization it would take—and that we couldn't get that many cows together and breed them under the conditions we had (reclaimed strip mining land with no facilities)." Nelson estimates he's now getting a 60-percent conception rate of first service A.I., using Lutalyse to save time and labor.

It's been the experience of other producers that cattle grouped together by a synchronization program tend to stay grouped, so the theory (and practice) finds there are fewer individual cows not marching rank and file with the rest. Labor savings are just one advantage when everyone's together. This article, developed by Dr. Gene Deutscher, points out the others.

By Gene H. Deutscher
Extension Beef Specialist
University of Nebraska



Estrous (heat) synchronization is a management practice that may help beef producers improve production efficiency and economic returns. Its purpose is to control estrus and ovulation in cycling females so breeding can be completed in a short period of time. Instead of cows being bred over a 21-day period, synchronization may shorten the breeding period to 10 days or less, depending on the program selected. The use of synchronization has great potential for improving beef production, but it requires top management for success.

Producers must understand the benefits and disadvantages of synchronization, how the different products and programs work, and the results and costs involved before initiating the practice. And they need to set goals for the practice and what is expected.

Potential benefits

- ★ Reduces time and labor for heat detection in artificial insemination (A.I.) programs.
- ★ Greater use of superior sires through A.I. or natural service.
- ★ Easier selection of sires of various breeds for cross-breeding through A.I.
- ★ Better scheduling of labor for A.I.
- ★ Shorter breeding seasons.
- ★ Concentrates breeding and calving periods.
- ★ More uniform calf crop due to similar calf age and calf sire.
- ★ More uniform management of cows and calves.

Potential disadvantages and needs

- Must have good management and planned program for successful results.
- Heifers and cows need to be cycling normally before treatment and on a good nutrition program.
- Cows need a minimum of 45 days post-calving before treatment.
- Requires more intensified labor at breeding and calving time.
- Must allow for bad weather during concentrated breeding and calving periods.
- Requires adequate corrals, facilities and additional labor for handling cattle during treatment and breeding. Bulls and females likely need separating the major part of the year.
- Need very active, healthy, fertile bulls for concentrated breeding.
- Need quality semen for A.I. and experienced inseminators.

- Requires additional costs of synchronization product and semen for A.I.

- May result in poor conception rates if requirements are not followed.

Normal estrous cycle

In a herd of cows or heifers with normal estrous cycles of 21 days, about five percent should be in heat on any given day during the breeding season. Figure 1 is a diagram of the 21-day cycle with the corresponding changes on the ovary and the production of progesterone. On Day 21 estrus (standing heat) occurs. Ovulation (release of egg from ovary) generally occurs about 31 hours after the beginning of estrus, on Day 1. The ovary then begins to develop the corpus luteum (CL) at the site of ovulation from Days 2 to 5. On Day 6 the CL is mature and secretes progesterone until Day 17.

If the cow is not pregnant, the CL regresses or decreases in size and production of progesterone declines from Days 17 to 20. During this period a new follicle and egg develop on the ovary for ovulation on Day 1, and the cycle repeats.

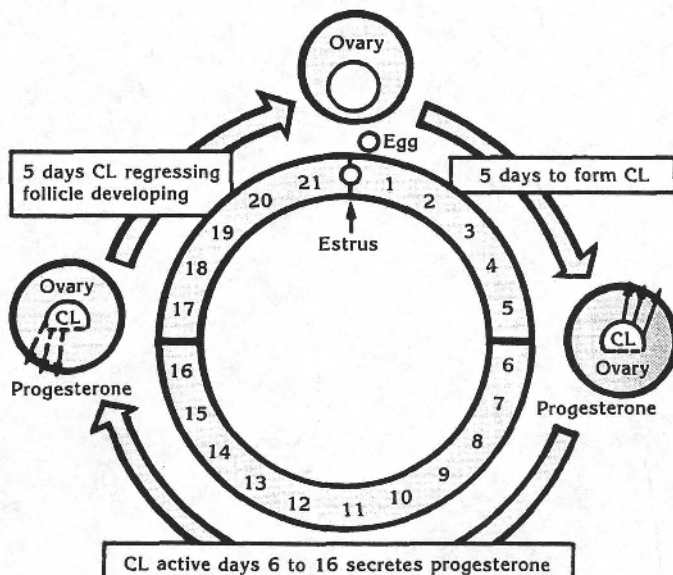


Figure 1. Normal estrous cycle of cow showing formation and regression of CL on ovary.



Prostaglandin programs

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

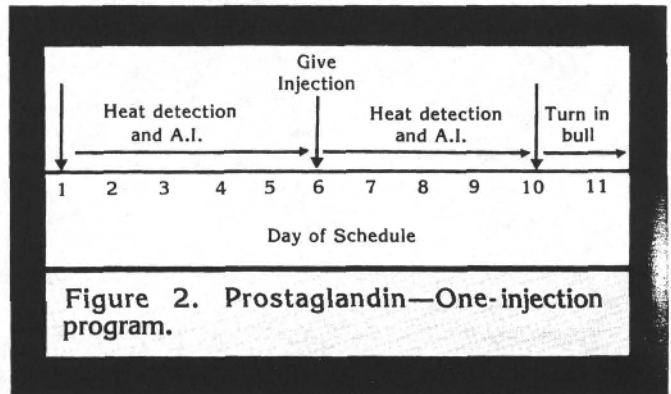


Figure 2. Prostaglandin—One-injection program.

Products and how they work

Table 1 shows the products approved by the FDA for effective use in estrous synchronization without adverse side effects on fertility or general health. Two types of products are available—one is a prostaglandin and the other a combination of progestin and estrogen. These products work differently on the ovary and are administered differently, so an understanding of their actions is necessary. Several management alternatives must also be considered to fit the products and programs to a producer's operation and capabilities.

Prostaglandin products

The products Lutalyse and Estrumate have been approved for use in beef and dairy cows and heifers for estrous synchronization. Bovilene is currently approved only for beef and non-lactating dairy cattle. All three are prostaglandins and work similarly, but differ slightly in their chemical make-up with different half-lives and dosage levels.

When injected at the recommended dosage, these products act by rapidly regressing the CL on the ovaries of cycling females that are in Days 6 to 16 of their estrous cycles. In other words, the injection decreases the function of the CL, which allows these females to return to estrus within two to five days and synchronizes their estrous cycles. Females in Days 17 to 20 will be in estrus normally within one to four days and will also be synchronized.

Females in Days 1 to 5 do not have a mature CL and will not respond to the injection, nor will females that are not cycling. Therefore, with one injection only about 75 percent of the cows cycling in a herd can be synchronized. 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.

One injection program—This program, shown in Figure 2, 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 cows 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 five days of conventional heat detection and A.I. On Day 6, the producer decides whether or not to inject the remaining females based on the percent cycling during the first five days. About 20 to 25 percent of the cows should have cycled during this period to justify injecting the remainder. The injected cows are then heat detected and bred A.I. for the next five days.

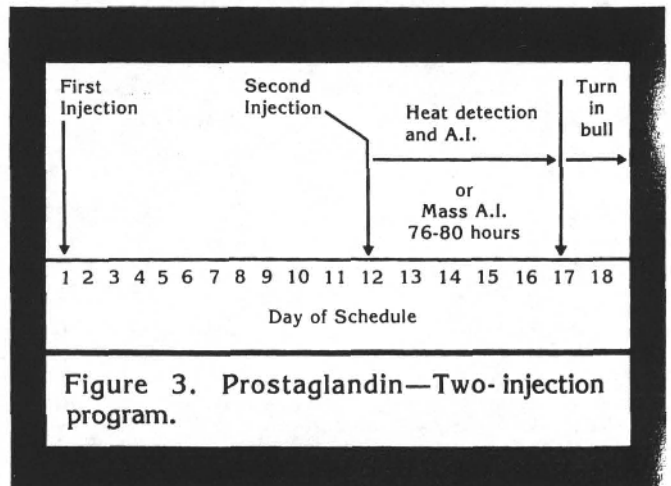


Figure 3. Prostaglandin—Two-injection program.

Two-injection program—Figure 3 outlines this program. It has the advantages of a short breeding period with little or no heat detection, but involves more drug and semen costs and may yield low conception rates if

a high percentage of the females are not cycling. This program best fits the producer who knows a high percent of the herd is cycling and is willing to risk the higher drug and semen costs for less time and labor spent on heat detection. The program consists of giving two injections of prostaglandin 11 days apart; then conventional heat detection and A.I. can be done for the next five 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 A.I. is to yield satisfactory results. Table 2 compares the various synchronization programs.

Syncro-mate B Product and Program

Syncro-mate B (SMB) consists of an ear implant containing a synthetic progestin and an injection containing an estrogen and a progestin. It is a nonprescription drug, and is approved for use in both beef and dairy heifers. It's approved for mature beef cows also.

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 activity in all stages until the progestin implant is removed after nine days. Females will cycle within one to three days after the implant is removed. SMB has been shown to stimulate cycling in some non-cycling females, although conception rates may be lower in these females. It has the advantage of not causing abortions in pregnant animals but is more difficult to administer due to the implant insertion and removal.

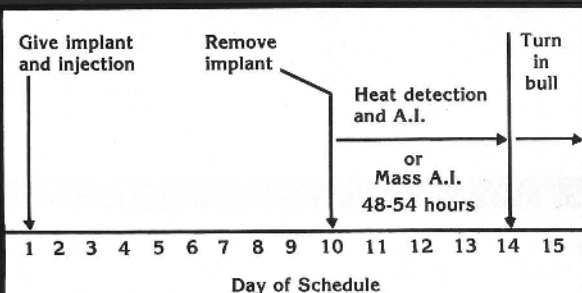


Figure 4. Syncro-Mate B program.

Figure 4 diagrams the SMB program. The implant and injection are given at the same time, and then the implant is removed after nine days. Females can be heat detected and bred A.I. for the next four days or mass in-

seminated at 48 to 54 hours after implant removal. Most of the estrus activity will occur between 24 and 40 hours after implant removal, so mass A.I. fits this program well. The advantages are a short breeding period with little or no heat detection, but the costs for drug and semen are higher, and the risk is higher since the percentage of females cycling is unknown. A comparison of this program with the others is shown in Table 2.

Using bulls with synchronization

Since the main advantages of using synchronization are concentrating the breeding period and using superior sires, A.I. is usually the preferred method of breeding. However, herd bulls can be used if enough are available and they are sexually aggressive with good fertility. One bull per 10 to 20 females in a small pasture or lot for a couple of days, and then replaced with another bull, is recommended during the synchronization period.

All bulls need a breeding soundness examination before being used.

Watch them closely during the breeding period to make sure they are servicing the females and that injuries do not occur. Colorado research has shown much variation in the number of cows serviced per bull (five to 35 cows) during a short (two to three days) synchronization period.

In general, 77 percent of the cows in heat were serviced with an average pregnancy rate of 46 percent. Bulls can be used in all synchronization programs, but the most popular program is to give one injection of prostaglandin and then place the bulls with cows. The advantages are low drug cost, no heat detection and a less concentrated breeding period (only 60-75 percent of cows will respond to the injection). Producers desiring to use a superior bull on more females may benefit from this synchronization program.

Cost/benefits of synchronization

Many factors are involved and influence the costs of a synchronization and A.I. program. These include availability and cost of labor for heat detection and A.I. facilities available, cycling status of the herd, conception rates, plus costs for drug, supplies, and semen.

Breeding results during the synchronization period can be predicted by using the following formula: percent cycling in herd x percent responding to treatment x percent conception rate = percent pregnant.

As shown in Table 2, pregnancy rate can vary according to the program selected. Programs using mass A.I. can yield lower pregnancy rates and higher costs because some cows will be bred that are not cycling.

Depending on the program selected and its results, the breeding costs per A.I. calf can range from \$25 to \$60, compared to \$30 for natural service by bulls without

synchronization. The greatest benefits of A.I.-synchronization calves over natural sired calves may include:

- better quality heifers for replacements (\$50 premium),
- more calves saved due to use of calving ease sires and group calving (3 percent),
- heavier calves at weaning due to better genetics or crossbreeding (25 lb),
- older calves at weaning due to earlier calving (5-8 days),
- less bulls needed for cow herd ($\frac{1}{3}$ less),
- more efficient use of labor and management (\$?).

Therefore, a producer must weigh the cost/benefit ratio and decide if synchronization and A.I. will be profitable in his operation.

Requirements for success

The following need special attention to make a synchronization program successful.

1. Cycling heifers and cows—Synchronization will only work on cycling fertile females. Therefore, it is imperative that cattle be healthy, in good body condition and gaining weight prior to the synchronization treatment. Yearling heifers and mature cows are the best candidates for good synchronization results.

Results on two-year-old heifers are usually poor since they are slow in cycling and rebreeding after their first calf.

Yearling heifers need to be of sufficient age and weight for a high percent to be cycling before the breeding season. Cows should be at least 45 days post-calving before treatment is started. Observe females for cycling activity for several days prior to treatment to determine if a high enough percentage are cycling to justify treatment costs (four to five percent per day).

2. Select program and follow procedures—Evaluate all of the programs and select the best to meet your objectives. Careful planning and scheduling of the program with accurate timing of injections and breeding are essential. Follow procedures closely, especially with injections (and implants) and mass A.I.

3. Quality semen from superior sires and experienced inseminators—Select only high quality, fertile semen from sires that will add genetic value to the herd. Follow directions for proper handling of the semen. Use experienced, well-trained technicians. Several technicians are needed when a large number of cows are inseminated so fatigue does not lower conception rates.

4. Good facilities and equipment—Adequate working facilities in good repair are needed for rapid handling of a group of cattle. The breeding chute should allow for easy passage through it with a minimum of noise and labor. Two chutes may be necessary if a large number of cattle are mass-inseminated during a short time period.

5. Top management—The quality of management of the cow herd and the synchronization program is the key to success. Overall herd management, including nutrition, health, breeding and reproductive programs, should be above average. A well-planned program prepared in advance with special attention to details for implementation will increase the degree of success.

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.

Anyone interested in beginning a program should consult with experienced producers, veterinarians, and A.I. representatives to obtain additional information and determine the most beneficial program. **AJ**

Table 1. Products for estrous synchronization.

Product	Company	Type	Administration	Dose (cc)	Approximate Cost/dose (\$)	Available from
Lutalyse	Upjohn Co.	Prostaglandin	IM injection	5	2.3	Veterinarian
Estrumate	ICI-Bayvet	Prostaglandin	IM injection	2	2.3	Veterinarian
Bovilene	Diamond Syntex	Prostaglandin	SC injection	2	2.3	Veterinarian
Synco-mate B	CEVA Labs	Progesterin + estrogen	Implant + IM injection	2	7.8	A.I. supplier

Table 2. Comparison of estrous synchronization programs. (Based on Nebraska trials.)

Program	Injections (No)	Times Cattle Handled (No)	Heat Detection (Days)	A.I. Breeding Period (Days)	Know Percent Cycling	Costs ^a		Est. A.I. Conception Rate ^b (%)
						Drug	Semen	
One injection	1	2	10	10	Yes	Low	Low	55
Two injections with heat detection	2	3	5	5	No	Med	Low	50
Two injections without heat detection (mass A.I.)	2	3	0	1	No	Med	Med	45
Synco-mate B with heat detection	1 + 1c	3	4	4	No	High	Low	55
Synco-mate B without heat detection (mass A.I.)	1 + 1c	3	0	1	No	High	Med	50

^aCosts indicate amount of drug and semen used in program and are relative.

^bEstimated conception rates of total group during synchronization period based on research results from well-managed herds.

^cIncludes one injection plus implant.