Synchronization of Estrus in Cattle
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**Introduction**

Estrous synchronization is the manipulation of the reproductive process so that females can be bred with normal fertility during a short, predefined interval. This control facilitates breeding in two important ways: it reduces and in some cases eliminates the labor of detecting estrus (heat), and it allows the producer to schedule the breeding. If the majority of a herd can be induced to exhibit estrus at about the same time, the producer can arrange for a few days of intensive insemination. Although the total amount of labor involved with insemination may not be reduced, it is concentrated into a shorter period. Other advantages of estrous synchronization include creating a more uniform calf crop, enabling more cows to be artificially inseminated (AI) to a genetically superior bull and reducing the length of the breeding season.

Estrous synchronization may not be for every producer. Use of this technology generally requires skilled management and adequate facilities. Cows will respond poorly if not fed properly or if body condition is less than adequate. Level of herd health is also a factor, as many diseases cause reproductive failure.

**The Estrous Cycle**

A successful estrous synchronization program requires an understanding of the estrous cycle. Figure 1 depicts important points during the estrous cycle. Day 0 is the first day of behavioral estrus. This is when a female will stand to be mounted by
another female or bull. At this time, natural breeding would occur. The hormone estrogen peaked the day before (day -1) and then declined.

Progestrone levels are low because a corpus luteum is not present. Ovulation, the release of the ova, or egg, from a follicle on the ovary occurs 12 to 18 hours after the end of “standing heat.” A corpus luteum, which produces progesterone, develops at the site of ovulation and undergoes rapid growth from day 4 to day 7. This growth is concurrent with an increase in progesterone. From day 7 through day 16, a fully mature corpus luteum is present and producing high levels of progesterone. During this time, one or two follicles may become large, maintain their size for a short time and then regress. On approximately day 16, prostaglandin F2α is released from the uterus if pregnancy has not occurred, which causes regression of the corpus luteum and a subsequent drop in progesterone levels. When progesterone levels become low, estrogen levels rise as a new follicle begins rapid growth. Estrogen levels will peak on day 20, followed by behavioral estrus on day 21. At this point, the cycle repeats itself.

**Products Used for Estrous Synchronization**

Research has dramatically increased the number of synchronization options. A producer has many choices to pick from to tailor a synchronization protocol to his operation, his production goals and his available labor. One of the oldest ways to synchronize estrus is by using a luteolytic agent such as prostaglandin F2α or one of its analogues, which causes the regression of the corpus luteum. Prostaglandin F2α is only effective if administered after day 7 of the estrous cycle. Examples of these products are sold under the trade names of Lutylase®, Estrumate® and Prostamate®. Synchrony of estrus and fertility with these products is good with cyclic females, such as virgin heifers, but will not induce estrous cycles in non-cycling cows following calving (postpartum anestrus). The hormone treatments used in these protocols are the least expensive; however, they often require skilled labor for estrous detection.

Another way of creating estrous synchrony is by using gonadotropin-releasing hormone (GnRH) or an analogue, which causes ovulation of a large follicle. This product is sold under the trade name Cystorelin®, Fertagyl® or Factrel®. Treatment with GnRH is combined with prostaglandin F2α, as these hormones have different functions. Synchrony of estrus and fertility with a combination of GnRH and prostaglandin F2α are good for cyclic females, and some research indicates that this combination may induce cyclicity in cows experiencing postpartum anestrus. However, protocols using only GnRH and prostaglandin F2α are not advised for use in yearling heifers due to extremely variable response.

A third method for synchronization of estrus is to use a progestin, which will maintain high levels of progesterone in the female’s system even after the regression of the corpus luteum. Synchrony of estrus occurs 2 to 5 days following progestin removal. Commercial products that fall into this category are melengesterol acetate (MGA) and Controlled Internal Drug Release (CIDR®). All other products for synchronization are delivered as injections, but available prostegstins are administered differently. MGA is added to the feed and has been used in the past to suppress estrus in feedlot heifers to maintain feed efficiency and feed intake. Synchrony of estrus is good for cyclic females; however, fertility is poor immediately following MGA removal. Breeding should be on the second estrus following removal. Combining MGA with prostaglandin F2α treatment improves synchrony of the second estrus following MGA removal. The CIDR® is inserted into the vagina. CIDR® protocols have become very popular synchronization options for beef cattle producers.

**Other Management Considerations for Estrous Synchronization**

**Timed Insemination Versus Breeding on Visual Observation of Estrus**

Many research studies have examined the effectiveness of breeding on a timed insemination following estrous synchronization rather than visual observation of “standing heat.” Almost every type of synchronization regime has been modified to include a timed or appointment breeding option. Time breeding is a desirable alternative to heat checking especially when time to detect estrus is limited. While results from these studies are somewhat conflicting, generally conception rates on timed insemination are lower than for visual observation, especially in Brahman-influenced females. However, this lower conception rate may be offset by the reduction in management costs because of timed insemination. Some synchronization programs even call for a combination of visual observation and timed insemination, which may improve conception rates above either option alone.

**48-hour Calf Removal**

In beef cows, frequency of suckling by calves causes a hormonal response that inhibits return to estrus (suckling inhibition). Many studies have
concluded that short-term calf removal combined with other forms of synchronization improves response of cows to synchrony and conception rates.

Even 48-hour calf removal alone has been shown to cause synchrony and cyclicity in some cows. This procedure is useful but does require increased management and good facilities to prevent separated cows and calves from rejoining each other. In addition, it is essential that the calves are given clean water and a highly palatable feed, such as a type of calf pellet or high quality hay.

**Estrous Synchronization Programs**

**One Shot Prostaglandin**
(Figure 2)

Option 1 shows a single injection of prostaglandin is given to cyclic females, and then these females are bred as they express estrus. The disadvantage of this program is that one-third of the females will not respond to the injection, but the advantages are the lower cost of one injection and that females are only handled once other than for breeding.

A second one shot option requires detection of estrus before any prostaglandin treatment is administered. The producer detects estrus for 5 days and breeds each cow as she exhibits estrus. The cows that have not exhibited estrus by the fifth day are given an injection of prostaglandin, which should induce them to come into estrus in about 3 to 5 days. A relatively large percentage (75 to 80 percent) will require this injection.

Option 2 represents the greatest savings in cost and labor associated with treatments because only one injection is given and not all the cows will need it. In addition, detecting estrus for 5 days gives the producer some idea of the total number of cows that are cycling. During this 5-day period, approximately 20 to 25 percent of the cows should show estrus (4 to 5 percent per day). If 4 to 5 percent of the cows are not exhibiting estrus each day, then the cows are probably not cycling. This will allow time to evaluate the effectiveness of the estrous synchronization program. The disadvantage of this program is that it requires 5 days of accurate detection of estrus before prostaglandin treatment is administered. This program is recommended because of the opportunity to determine the reproductive status of the herd before animals are treated for synchronization.

**Two Shot Prostaglandin**
(Figure 3)

Option 1 uses two injections of prostaglandin spaced 14 days apart. Detection of estrus is not required before or between injections. All cycling cows

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**Figure 2. One Shot Prostaglandin**

<table>
<thead>
<tr>
<th>Option 1 – One Injection with Prostaglandin</th>
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<tbody>
<tr>
<td>Inject</td>
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<tr>
<td>Prostaglandin</td>
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<tr>
<td>Estrous Detection and Inseminate</td>
</tr>
<tr>
<td>Day of Schedule 1</td>
</tr>
<tr>
<td>2 3 4 5 6 7</td>
</tr>
<tr>
<td>8 9 10</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Option 2 – Estrous Detection and Prostaglandin</th>
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<tbody>
<tr>
<td>Inject</td>
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<td>Prostaglandin</td>
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<tr>
<td>Estrous Detection and Inseminate day 1 to 10</td>
</tr>
<tr>
<td>Day of Schedule 1</td>
</tr>
<tr>
<td>1 2 3 4 5 6 7 8 9 10</td>
</tr>
</tbody>
</table>
should respond to the second injection regardless of what stage of the estrous cycle they were in when the first injection was administered. Remember the non-cycling cows will not generally respond to prostaglandin products.

The advantage of this option is that more cows should come into estrus at any given time than with the one shot options. The disadvantage is that it involves the cost and labor of administering two injections of prostaglandin to all cows. This two-shot option has met with some inconsistent results. This may be due to the stage of the estrous cycle when cows were injected, or perhaps a high percentage of the cows were not exhibiting estrous cycles.

A second two-shot option (Option 2) is to give the first injection, breed all females exhibiting estrus and then give the second injection to only females that were not bred. This option lowers expense and handling, but results in two synchronized groups instead of one and a longer breeding period. Timed insemination instead of estrous detection may be used, but conception rates are generally lower than with estrous detection. Short-term calf removal may improve the response in cyclic postpartum cows.

**Ovsynch**

The Ovsynch program (Figure 4) calls for an injection of GnRH on day 1, an injection of prostaglandin on day 8, a second injection of GnRH on day 10 and then timed insemination on day 11. This program's advantages are tight synchronization of estrus, most females respond to the program and it encourages estrus in non-cycling cows that are at least 30 days postpartum. The program's disadvantages are...
the relative expense and that females are handled three times before breeding. Short-term calf removal (48 hours) following the prostaglandin injection may improve the response in postpartum cows.

**CO-Synch**

The CO-Synch program (Figure 5) calls for an injection of GnRH on day 1, an injection of prostaglandin on day 8 and then a second injection of GnRH with breeding on day 10. This program’s advantages are tight synchronization of estrus, most females respond to the program and it encourages estrus in non-cycling cows that are at least 30 days postpartum. The program’s disadvantages are the relative expense and that females are handled twice before breeding, which is the only difference between CO-Synch and Ovsynch. Some females will show improved estrus response when 48 hour calf removal is utilized after the prostaglandin injection.

**Select-Synch**

The Select-Synch program (Figure 6) calls for an injection of GnRH on day 1, injecting cows not artificially inseminated with prostaglandin on day 8 and then estrous detection and breeding following day 8. Program advantages are lower cost and reduced handling compared with Ovsynch and CO-Synch. The primary disadvantage is the time required for estrous detection. Short-term calf removal combined with Select-Synch tends to show improved increased pregnancy rates.

**Hybrid-Synch**

The Hybrid-Synch program is a combination of the Select Synch and CO-Synch protocols. This system calls for an injection of GnRH on day 1, an injection of prostaglandin on day 8 (cows not artificially inseminated) and then estrous detection and breeding from day 6 to 11 (Figure 7). Females not observed in estrus from day 8 to day 11 are bred on day 11 and given a second injection of GnRH. This program has a lower cost and less handling compared with Ovsynch and CO-Synch but more than Select-Synch. The primary advantage is that Hybrid-Synch appears to have the highest conception rates among all GnRH/prostaglandin programs. No research has been conducted evaluating the effectiveness of
short-term calf removal combined with Hybrid-Synch at this time. Use of GnRH protocols in heifers has shown lower pregnancy rates than other types of protocols. If a progestin (CIDR) is added to a GnRH protocol, more desirable pregnancy rates can be attained.

**Melengesterol Acetate (MGA)**

MGA is the only synchronization product that is administered orally. MGA is added to feed such that females receive 0.5 mg per head per day for 14 days. Upon removal of MGA from the feed, cyclic females will begin to show estrus. This estrus is subfertile, and it is not recommended to breed. Females should be bred on the second estrus following MGA removal (Figure 8). A second MGA feeding option (Figure 9) would be to give an injection of prostaglandin 19 days after removal of MGA from the feed. This would increase synchrony of the females and shorten time spent in estrous detection and breeding. The third option (Figure 10) would be to give an injection of prostaglandin at the time of MGA removal from the feed as well as 19 days following removal. This further reduces time spent in estrous detection and breeding. Synchronization with MGA alone is low cost and has minimal handling, but time spent in estrous detection and breeding may be several days. Addition of one or two injections of prostaglandin increases the cost and handling but provides more concentrated synchrony. All programs with MGA require that females be fed daily, which increases the level of management and equipment needed. Research showed that where calves were removed for 48 hours starting on the second day after completion of MGA feeding, conception rates were somewhat improved.

**Controlled Internal Drug Release (CIDR®)**

One of the most recent advances in estrous synchronization protocols has been the increased use of CIDR devices. These progestin-impregnated plastic devices are placed into the vagina so hormones can be diffused into the female’s system. Protocols using CIDRs can range from extremely simple to extremely involved (Figure 11). The most basic protocol (Basic) involves placing the CIDR into the female for seven days and giving an injection of prostaglandin F2\(\alpha\) at CIDR removal. Heat detection is implemented for approximately 3 to 4 days on the basic protocol.
As shown in Figure 11, CIDR inserts can be incorporated into many of the previously mentioned systems. Generally, the more steps involved in synchronizing the females, the shorter the observation time will be for estrous detection. As with other protocols mentioned, 48-hour calf removal can be incorporated into a CIDR system, usually after the PGF injection.

Conception Rates From Estrous Synchronization and Artificial Insemination

One of the greatest concerns that producers have when implementing an estrous synchronization and artificial insemination program is the expected conception rate. Research reports for the various synchronization programs report varied results.

In 37 research papers where cows and/or heifers were synchronized and bred once or bred once at a normal estrus, the average conception rate was 49 percent with a standard deviation of 11 percent. This means that two-thirds of these studies reported conception rates within a range of 38 to 60 percent.

With healthy, cyclic heifers in good body condition, first service conception rates with skilled AI technicians may approach 75 percent. However, this is usually not the case, and a more accurate estimate is 50 to 55 percent. Conception rates are affected by the number of females that are cyclic, healthy and in good body condition due to level of nutrition. Skilled estrous detection and AI technicians also affect conception rates. Inadequacy in any of these areas can spell disaster for an estrous synchronization program.
Figure 11. Estrous Synchronization Using CIDR

Co-Synch + CIDR (Cows)  
GnRH Injection  
\[\text{CIDR} \quad \begin{array}{cccccccc} 1 & - & - & - & - & - & - & - \\ 8 & 9 & 12 & 13 \end{array} \]
Estrous Detection and Inseminate (day 8 to 13)

Co-Synch + CIDR (Heifers)  
GnRH Injection  
\[\text{CIDR} \quad \begin{array}{cccccccc} 1 & - & - & - & - & - & - & - \\ 8 \end{array} \]
66 hrs.
Timed Insemination

GnRH Injection  
\[\text{CIDR} \quad \begin{array}{cccccccc} 1 & - & - & - & - & - & - & - \\ 8 \end{array} \]
54 hrs.
Timed Insemination
Table 1: Comparison of Estrous Synchronization Programs

<table>
<thead>
<tr>
<th>Program</th>
<th>Estimated Cost</th>
<th>Handling Times</th>
<th>Breeding</th>
</tr>
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<tbody>
<tr>
<td>1-Shot PGF2 (Option 1)</td>
<td>$23.23</td>
<td>2</td>
<td>Detection</td>
</tr>
<tr>
<td>1-Shot PGF2 (Option 2)</td>
<td>$22.50</td>
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<td>$26.66</td>
<td>3</td>
<td>Detection</td>
</tr>
<tr>
<td>2-Shot PGF2 (Option 2)</td>
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<td>2.5</td>
<td>Detection</td>
</tr>
<tr>
<td>Ovsynch</td>
<td>$31.03</td>
<td>4</td>
<td>Timed</td>
</tr>
<tr>
<td>CO-Synch</td>
<td>$31.03</td>
<td>3</td>
<td>Timed</td>
</tr>
<tr>
<td>Select-Synch</td>
<td>$26.95</td>
<td>3</td>
<td>Detection</td>
</tr>
<tr>
<td>Hybrid-Synch</td>
<td>$29.11</td>
<td>3</td>
<td>Both</td>
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<tr>
<td>MGA</td>
<td>$21.63</td>
<td>1</td>
<td>Detection</td>
</tr>
<tr>
<td>MGA + Prostaglandin</td>
<td>$24.96</td>
<td>2</td>
<td>Detection</td>
</tr>
<tr>
<td>MGA + Prostaglandin (2 shots)</td>
<td>$28.29</td>
<td>3</td>
<td>Detection</td>
</tr>
<tr>
<td>CIDR (Basic)</td>
<td>$33.33</td>
<td>3</td>
<td>Detection</td>
</tr>
<tr>
<td>Co-Synch + CIDR (cows)</td>
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<td>3</td>
<td>Timed</td>
</tr>
<tr>
<td>CO-Synch + CIDR (heifers)</td>
<td>$41.03</td>
<td>3</td>
<td>Timed</td>
</tr>
<tr>
<td>Select Synch + CIDR</td>
<td>$37.18</td>
<td>3</td>
<td>Detection</td>
</tr>
</tbody>
</table>

*Costs are based only on the following items. GnRH = $3.85/shot; prostaglandin = $3.33/shot; CIDR = $10.00 per head; MGA = $0.23 per pound; semen = $20 per straw. Cost of labor, feed, etc. were not included.

Handling is considered to be processing the female through a chute or similar device.

Comparing Estrous Synchronization Programs

Table 1 ranks the cost and handling needs of each estrous synchronization program. This information can be used as a guide to select the right program for each situation.

Cost of an Estrous Synchronization and Artificial Insemination Program

Like all management practices, estrous synchronization and artificial insemination come with a cost. In actuality, an artificial insemination...
program may be economically beneficial to one producer and not to another. It should also be noted that artificial insemination has benefits other than economic ones. Some advantages of artificial insemination include control of venereal diseases, greater genetic progress, easier calving sires used for heifers, more uniform calf crop, crossbreeding and shorter breeding season. Most of these advantages, however, have either direct or indirect economic returns. For the advantages with direct economic returns (growth traits, crossbreeding, etc.), the return on the artificial insemination investment is easy to determine. However, for the advantages with indirect economic return (control of venereal disease, value of returned breeding stock), the returns are not as easily determined. Not all ranches will experience the same cost and returns. Actual cost and returns will vary from ranch to ranch and from year to year.

Tips for a Successful Synchronization Program

Calving Distribution

The greater the proportion of cows calving in the first 21 days of the calving season, the better the response expected from a synchronization and AI program. Although some synchronization protocols can induce estrus and ovulation in some non-cycling cows, cows that calved during the 30 days just before the start of the breeding season are unlikely to respond.

Using a synchronization protocol every year can gradually increase the proportion of cows that calve in the first 30 days of the calving season and subsequently increase the pregnancy rates to AI in a parallel fashion. With longer breeding seasons (more than 70 days) and less than 60 percent of the herd calving in the first 42 days of the calving season, expect much lower AI pregnancy rates. Timed AI of the entire herd would not be recommended.

Cow Age

Duration of postpartum anestrus averages 20 days longer for first-calf heifers than mature cows. Even in herds where heifers calve ahead of cows, the proportion of primiparous cows cycling at the start of the breeding season was 9 percent less than multiparous cows.

Body Condition

Body condition influences the length of postpartum anestrus and thus the proportion of cows cycling at the start of the breeding season. Cows need to be in a positive energy balance to resume normal estrous cycles. Over a range of body condition scores (BCS) of 4 to 5.5 (1=thin to 9=fat), the proportion of cows cycling increased 18 percent for each unit increase in body condition score. This response would likely level out for cows with BCS greater than 6.5. The cow’s ability to conceive early in the breeding season also increases over this range of BCS.

Mature Cows

- BCS ≥ 5 – Good candidates for synchronization and AI.
- BCS 4 to 4.5 – AI pregnancy rates will be lower. The risk of poor response may be reduced if plane of nutrition has been increasing three to four weeks before the onset of the breeding season. Timed AI is not recommended.
- BCS < 4 – Poor candidates for synchronization. Timed AI is not recommended.

First-calf Heifers

- BCS ≥ 5.5 – Good candidates if calved three weeks ahead of mature cows.
- BCS 4.0 to 4.5 – High risk. Response to induction of ovulation with GnRH is about half of that in mature cows at similar BCS. Consider using multiple methods to induce anestrus first-calf heifers to cycle (e.g., calf removal and a progestin).

Semen

Semen should be processed at a Certified Semen Service (CSS) certified lab. Be aware that considerable sire-to-sire variation in pregnancy rates exists for bulls even when they have passed a BSE. Keep accurate records to check individual sire conception rates. For bull studs, consider at least 250 inseminations before evaluating fertility. However, suspected problems observed after fewer inseminations warrant further examination. Ask semen salesperson to identify high-fertility sires before making final semen purchasing decisions, especially if timed breeding is to be utilized.

Technicians

Variation in conception rates between technicians can range up to 20 percent or more. When inseminating large numbers of females during timed AI, ensure you have enough technicians to complete the job. Rotating jobs between loading guns and inseminating every 15 to 25 head is recommended to minimize effects of fatigue. Size of inseminator’s forearm, particularly for heifers, can be negatively related to the ability to inseminate large numbers. The pressure of the rectal sphincter on a large forearm speeds fatigue.
Treatments

Injections

- Use appropriate sizes of syringes and needles, follow label directions and Beef Quality Assurance guidelines. Accuracy is the goal, not speed.
- Do not inject in the top butt. Make sure you have the proper equipment in sufficient supplies (at least one needle per 10 to 15 cows).
- Have a specific place to discard old needles. An old milk jug works well.

CIDRs

- Follow package directions. Cleanliness is important during insertion.
- In confined situations or for heifers, you may wish to shorten the tail of the CIDR, leaving 2.5 inches exposed so pen mates do not play with the tail and remove the CIDR early
- Reuse of CIDRs is not recommended.

MGA

- Uniform, consistent daily consumption is increased when adequate bunk space is available (18 to 24 inches for heifers and cows, respectively).
- Make sure all animals are up to the bunk or gathered before feeding.
- Feed MGA mixed with a small amount of grain (3 to 5 lbs) that can be cleaned up in a relatively short time, yet allows for everyone to get their share.
- When feeding MGA in a high volume total mixed ration, deliver half or less of the daily ration at first feeding with the entire MGA dose, delivering the remaining ration later in the day. This increases the odds that those females with lower intakes will consume the entire daily dosage.
- Cows that are just getting new-growth grass in the spring at the time MGA feeding begins may ignore the MGA feed completely. To improve consumption, remove free-choice salt from the pasture before MGA feeding and include 0.5 oz of salt per head per day in the MGA supplement.

Timing

Do not combine administration of synchronization drugs with routine vaccination, especially with modified live vaccines. Most vaccinations should be completed several weeks before the breeding season begins. Make sure to give the appropriate treatment on the appropriate day. Changes by even a day may seriously harm results.

If you intend to precisely identify AI versus natural service calves, wait at least 10 days after the synchronized period to turn out bulls and employ early pregnancy detection. Pregnancy detection at 30 to 50 days after AI will minimize errors in proper identification of AI pregnancies.

Heat Detection

Synchronized Estrus

Detection for two hours morning and evening and one hour at noon identified 40 percent more cows in estrus than checking twice a day for 30 minutes. Many successful operations have someone watching cows during all daylight hours of the recommended synchronized observation period. During days of peak estrus, females that are identified in heat should be sorted off several times during the day. This allows animals that are just coming into heat to be identified more easily and increases the chances of detecting heat in timid animals.

Attempting to watch cows in large pastures is nearly impossible. Gathering cattle into a smaller pasture or moving cattle into a corner of the pasture or large pen always facilitates better heat detection. Moving and sorting stimulates heat activity. Animals need legible, clean ear tags or other forms of identification so they can be identified at a reasonable distance and accurately recorded for later sorting.

Having at least one person observing heat per 100 head during peak hours is recommended. Heat detection in very large herds may be more effective if subdivided into groups of 200 or fewer. Heat detection aids may be useful but are not as effective as visual observation.

Naturally Occurring Estrus

Detecting for 30 minutes, twice a day, is considered a minimum. The frequency of mounting activity is considerably less for naturally occurring estrus than a synchronized estrus, increasing the need for diligent observation. Gomer animals, tail chalking, or heat-mount patches may be useful heat detection aids, but their effectiveness depends on examining each animal twice daily for signs of standing activity.

Timing of AI

The highest conception rate to AI has been noted 4 to 12 hours after on the onset of standing activity. So for producers using intense visual observation, and thus having an accurate estimation of when standing
estrus began, insemination by the AM/PM rule should produce the highest conception rates. If heat detection only occurs two times per day, an accurate estimate of the initiation of standing activity will not be achieved and insemination once a day may provide similar results to two times per day. If animals continue to exhibit standing estrus for long periods (12 to 14 hours) after the initial insemination, the conservative approach is to reinseminate.

**Facilities**

Well-designed facilities in good repair minimize stress on animals and people to optimize results. If breeding on observed estrus, areas for easy sorting and holding animals are needed. Often cows bred on observed estrus are moved immediately after AI to make heat detection and sorting on the remaining group easier. If cows can be moved to an adjacent pasture, a creep gate may work to let calves sort themselves, saving considerable time and effort.

Cows generally stand quietly in a breeding box without heads caught. Make sure to have a plan for rainy weather. Semen handling and thawing should be done out of direct sunlight. As a synchronized group of females begins to show signs of estrus, even the best fence may not deter neighboring bulls. If direct fence-line contact with bulls cannot be avoided, a hotwire set a reasonable distance from the permanent fence may prevent unplanned breedings.

**First-time Synchronization**

- Make sure animals are in adequate BCS.
- Start with a smaller group; heifers or early calving cows.
- Consider synchronizing and using bulls natural service the first year.
- Consult an expert when selecting a synchronization system.
- Trade help with an operation that has experience with AI and synchronization to learn how they do things and to have expertise on hand when it’s your turn.

**Characteristics of Successful Estrous Synchronization Programs**

- Good year-round nutrition program.
- Mature cows are in a minimum BCS of 5 at calving time and first-calf heifers a BCS of 6.
- Total breeding season is 60 days or less.
- Functional facilities for sorting, administration of treatments and AI.
- Skilled help.
- Good record keeping.
- Effective vaccination and health program.
- Attention to details.

**Conclusion**

Estrous synchronization can be a useful tool in the reproductive management of a cow herd. However, if proper levels of nutrition, body condition and health are not maintained, the program is likely to fail. Improvements in facilities and management may be necessary before implementing an estrous synchronization program.