Estrous Synchronization Protocols for Lactating Dairy Cows

Dr. Rick Rorie, Professor

Fertility in high-producing dairy cows has declined over the years, while fertility of dairy heifers remains high. This indicates fertility problems in lactating cows are more related to environmental conditions than genetics. Contributing to the decline in dairy cow fertility is the difficulty in detecting lactating cows in estrus (heat), especially under confinement situations. Hormone treatments have been developed to either minimize or eliminate the need for heat detection and to allow for a more programmed breeding approach. The hormones used alone or in combination in synchronization/breeding programs are Prostaglandin F2alpha (PGF2alpha), Progesterone (P4) and Gonadotropin-Releasing Hormone (GnRH).

Prostaglandin F2alpha products (Lutalyse, Estramate, Prostamate, estroPLAN and In-Synch) induce estrus by causing premature regression of the corpus luteum, resulting in a loss of progesterone production, which in turn allows the cow to return to estrus a few days later. Prostaglandin F2alpha products are only effective when the corpus luteum is actively producing progesterone (between 6 and 16 days after the onset of estrus). Progesterone products like the Eazi-Breed CIDR insert have the opposite effect of prostaglandin F2alpha products: they maintain progesterone at levels high enough to prevent estrus and ovulation. When treatment is stopped, progesterone levels then decline, allowing the cow to come into estrus and ovulate. Gonadotropin-releasing hormone (GnRH) products (Cystorelin, OvaCyst, Factrel and Fertagyl) are used to control the time of ovulation and/or to control when follicles start to grow and mature. This allows for more precise control of the cow’s reproductive cycle and allows for the use of fixed-timed inseminations.

Pregnancy rates are usually higher when breeding is delayed until about 70 days of lactation. A breeding program can start by injecting PGF2alpha at 14-day intervals. However, cows that have lost excessive body condition during the first two months of lactation will likely be anestrous and not respond to PGF2alpha. Cows observed in estrus after PGF2alpha treatment are inseminated. Fourteen days later, cows not previously observed in estrus are injected with PGF2alpha again and inseminated if observed in estrus. This process can continue every 14 days or be used as a pre-synchronization treatment to improve the success of an OvSynch protocol.

The Presynch-OvSynch protocol involves giving PGF2alpha injections 14 days apart. [Cows observed in estrus after each PGF2alpha treatment can be inseminated as described above, reducing the number of cows requiring further treatment.] Eleven or twelve days after the second pre-synchronization PGF2alpha injection, GnRH is given to start an OvSynch protocol. Seven days later, cows are injected with PGF2alpha. At 56 hours after PGF2alpha, cows are injected with GnRH and then inseminated about 16 hours later. An alternative
protocol (CIDR-OvSynch) is to skip the pre-synchronization PGF2alpha treatments and follow the OvSynch protocol described above but insert a CIDR progesterone insert at the time of first GnRH injection. The advantage of the OvSynch and CIDR-OvSynch protocols over the use of PGF2alpha alone is that they allow for timed inseminations without estrus detection and are more likely to work on anestrus cows.

A ReSynch protocol can be used to minimize the days open for cows that fail to become pregnant from a prior insemination. With this protocol, all cows are injected with GnRH a week before pregnancy diagnosis. Cows identified as pregnant do not receive any additional hormone treatments. Cows found to be open are injected with PGF2alpha at the time of open diagnosis and then with GnRH 48 hours later. Cows are inseminated 8 to 20 hours after GnRH treatment. A key to the success of any breeding program is strict compliance with the protocol in timing of hormone treatments. There are numerous variations of the synchronization protocols described above, which vary in the time between hormone treatments, the number of treatments required and the timing of insemination. More information is available from the Dairy Cattle Research Council (http://www.dercouncil.org/resources/reproduction-protocols.aspx), which has both dairy cow and heifer synchronization protocol sheets available for download that illustrate the various recommended synchronization options.

**Update on Trich Cases in Arkansas**

Dr. Jeremy Powell, Professor and Veterinarian

A total of 30 positive cases of Trich have been reported in bulls across the state of Arkansas for the first quarter of 2013. A total of 527 bulls have reportedly been tested over that time period, according to the Arkansas Livestock and Poultry Commission. A total of seven counties have identified positive cases in 2013, including Howard (20 cases), Randolph (5), Lawrence (1), Hempstead (1), Sebastian (1), Madison (1) and Boone (1).

Trichomoniasis, commonly referred to as “Trich,” is a venereal disease of cattle caused by the protozoa organism, *Trichomonas foetus*. The disease leads to infertility, poor pregnancy rates, an extended breeding season and a diminished calf crop in cattle. Trich is typically transmitted from an infected bull to the cow’s reproductive tract during breeding. Infected cows will experience infertility and early embryonic death, causing the cow to return to estrus (heat) and subsequently leading to poor pregnancy rates and an extended breeding season. Trichomoniasis causes very few outward signs of illness in infected bulls, and infertility in cows may go unnoticed, allowing it to be present for a considerable time before it is suspected and diagnosed. Most bulls, once infected, will stay infected for life. Currently, there is no approved treatment for breeding bulls in the U.S.; therefore, infected bulls must be condemned to slaughter. The majority of infected cows will clear the infection if given 120-150 days to overcome the illness.

Testing for Trichomoniasis can be performed by your veterinarian and can be easily accomplished in your herd bulls when performed in conjunction with a breeding soundness exam. Two weeks of breeding rest is recommended before a bull is tested. This allows the infection a period of time to build up to an easily detectable level. A testing sample is collected by scraping the inside the preputial sheath then placed into special growth media and shipped to a laboratory. Results can be expected in about 7 days. Trichomoniasis is a reportable disease in Arkansas, and any bulls testing positive will be sent to slaughter within 2 weeks.

You can be proactive to protect your operation from becoming exposed to Trichomoniasis by following a few simple recommendations.

- When purchasing bulls, purchase virgin bulls if possible.
- Keep fences in good repair to prevent accidental contact with potentially infected cattle. Monitor traffic in and out of the herd.
- When purchasing female replacements, purchase virgin heifers and/or mature cows from a reputable source.
- If you suspect a disease issue in your herd, test your current bull battery for Trichomoniasis. Any positive bulls should be culled and sold for slaughter.
- Perform a pregnancy evaluation in a timely manner after breeding to identify a potential problem early. Keep good records of a herd’s reproductive efficiency, and use these to help identify a possible problem.

Regulations for Arkansas require testing for all bulls changing ownership or being imported into Arkansas with the following exceptions:

- Bulls that are being sold for slaughter.
- Bulls accompanied by an Arkansas Virgin Bull Affidavit (virgin bulls under 24 months of age).
- Bulls sold for feeding and slaughter. Similar regulations have recently been adopted by other states across the U.S. to target the control of this disease in cattle.

A current list of regulations regarding testing bulls for Trichomoniasis in Arkansas can be found at the Arkansas Livestock and Poultry Commission web site: [http://alpc.arkansas.gov/](http://alpc.arkansas.gov/).
True Armyworms: During the first half of May, we have had a couple of reports of true armyworms in forage. One report was from a fescue field in Searcy County where the population was about 8-10 caterpillars per square foot, which is well above the treatment threshold. The other report was from a lawn in south Arkansas. True armyworms are primarily springtime pests; seldom do we see true armyworm numbers sufficient to warrant treatment during the summer.

They feed on a variety of forage crops, but fescue, oats, rye, wheat and other cool-season grasses are the major forage concerns. This is because these forages are actively growing in the spring when armyworms are most active.

When scouting for true armyworms, remember that they primarily feed at night and remain hidden in ground litter by day (so be sure and look in the ground litter and thatch). It is best to examine at least 10 one square foot samples at random across the field and count the number of armyworms in each square. Also make note of the relative sizes of the worms. Female armyworm moths prefer to lay eggs in areas of lush growth, so be sure to include a few of these areas in your 10 samples.

Chemical control is usually needed when an average of three or more worms per square foot are found. Read label instructions and follow harvesting and grazing restrictions. Armyworms are more difficult to control when they are greater than ¾ inch long, and those that are near 1½ inch have already done most of their damage and are probably ready to pupate (become nonfeeding pupae that burrow into the soil). Hay harvesting is a good alternative to treating for armyworms if the grass is mature and ready to cut.

Fall Armyworms: Fall armyworms usually appear in south Arkansas sometime in July; in north Arkansas, their appearance is a week or so later. Fall armyworms are usually found in bermudagrass but will also attack cool-season forage that is planted in late summer or early fall. Unlike the true armyworm, fall armyworms feed during the day or night. Fall armyworms are scouted in the same manner as true armyworms. Treatment thresholds for the fall and true armyworm are also the same (average of three or more per square foot). It is not uncommon to have multiple generations of fall armyworms from July through the fall.

More information on armyworms is available in the fact sheet Managing Armyworms in Pastures and Hayfields, FSA7083, and online at http://www.uaex.edu/Other_Areas/publications/PDF/FSA-7083.pdf.

MP144, 2013 Insecticide Recommendations for Arkansas (Forages Section), lists insecticides labeled for controlling armyworms and is available online at http://www.uaex.edu/Other_Areas/publications/PDF/MP144/C_Forages.pdf.

Grasshoppers: We have received a couple of reports of fairly large grasshopper nymph infestations in forages. Broadcast insecticide application is not economically feasible if less than 10 grasshoppers per square yard are present. Another option to consider is spot treating areas where a large number of grasshopper nymphs (small grasshoppers that lack wings) are observed. This technique can reduce grasshopper numbers in local areas because newly hatched nymphs remain concentrated in the hatching areas for some time.

Later, as wings develop, grasshoppers are capable of flying from the hatching area in search of suitable forage. Insecticides labeled to control grasshoppers in pastures and hay fields can be found in MP144, 2013 Insecticide Recommendations for Arkansas (Forages Section), which is available online at http://www.uaex.edu/Other_Areas/publications/PDF/MP144/C_Forages.pdf. Dupont Crop Science recently released a Section 2 (ee) recommendation that allows for the use of Prevathon to control grasshopper nymphs and suppress grasshopper adults in grass forage, fodder and hay. When using Prevathon against grasshoppers in forages, applicators must have a copy of this Section 2 (ee) recommendation. A copy of the Section 2 (ee) recommendation is available online at http://www.cdms.net/LDat/idA6E019.pdf.
Imported Fire Ant Infestations From Baled Hay?

Dr. Kelly Loftin, Associate Professor

Last year’s drought resulted in the transport of hay potentially infested with fire ants into many areas of north Arkansas. Over the last few months, I’ve received numerous calls about the potential for imported fire ants to establish in north Arkansas from the importation of fire ant-infested baled hay. Don’t assume that fire ants will be killed by cold winters. Recent models predict that fire ants can survive winter temperatures that occur in northern Arkansas. Reproducing fire ant colonies have been identified in extreme northern Arkansas and the Missouri bootheel.

Farms most at risk are those that received noncertified baled hay (hay not certified to be fire ant free) from fire ant-infested areas such as south Arkansas, Louisiana, Mississippi, Alabama, Florida and parts of Tennessee and Texas. Baled hay from fire ant-infested areas that was stored in contact with the soil is far more likely to harbor fire ants than hay that has been stored on concrete or a hard-packed surfaces. The federal imported fire ant quarantine is in place to limit the artificial spread of imported fire ants, and hay that has been stored properly can be certified for shipment to non-fire ant infested areas. More information about the federal imported fire ant quarantine and the quarantine area is available online at: http://www.aphis.usda.gov/plant_health/plant_pest_info/fireants/.

Arkansas counties with fire ant infestations.
A few fire ant colonies originating from infested hay received last year might be visible this year but are more likely to be noticeable this fall and in the spring of 2014. However, now is the time to begin looking for imported fire ants. Look for a mound without an external opening that is fluffy in appearance.

Mounds can range from a few inches to 24 inches in height, and ants will become aggressive when the mound is disturbed. Another key characteristic is that worker ants are $\frac{1}{8}$- to $\frac{1}{4}$-inch in length. Fire ants can also be sampled when temperatures are above 70°F. Use lures such as greasy potato chips or hot dogs in the hay storage and feeding areas to collect fire ants that are foraging. Suspected fire ants can be taken to your local county extension office for identification. The goal of early detection is successful control and NOT to punish or fine those who may have accidentally introduced fire ants into north Arkansas.

**Warm Weather Is Coming: It’s Time to Start Thinking About Heat Stress**

Dr. Karl VanDevender, Professor
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The heat and humidity of a typical Arkansas summer combine to make a very uncomfortable environment for lactating dairy cows. During hot summer weather, milk production may decrease by as much as 50 percent and reproductive proficiency of lactating dairy cows is greatly diminished. Some data indicate that only 10 to 20 percent of inseminations in “heat stressed” cows result in pregnancies.

Some signs of heat stress in lactating cows are obvious, especially the reduced milk production and the lethargic behavior of the cows. Moderate signs of heat stress may occur when the temperature is between 80° and 90°F with the humidity ranging from 50 to 90 percent. These signs include rapid shallow breathing, profuse sweating and an approximately 10 percent decrease in milk production and feed intake by cows. As heat stress increases, the cow will show severe depression in milk yield and in feed intake as her body temperature elevates. She will begin exhibiting more significant signs of heat stress, such as open mouth breathing with panting and her tongue hanging out.

The first step to reduce heat stress is to provide cool water and shade for all milking and dry cows plus heifers. Water is the primary nutrient needed to make milk, accounting for over 85 percent of the content of milk. Also, water requirements increase as the environmental temperature rises. It also is very important that cows have water in a location that is close to shade, since they will not travel great distances for water in a hot environment. Water should be placed away from the milking parlor but in an exit lane from the barn as well as near the feeding location of the cows. Water should be available for cows near their loafing area, either in the shade of native trees or artificial shade. Water also should be clean and fresh, at approximately ground temperature.

Shading from direct sunlight is also very important, as this allows cows to rest in a more comfortable environment. The possible sources of shade range from trees to portable shade cloth structures to permanent roofed structures. Each approach has its own set of advantages and disadvantages.

The second step to alleviate heat stress in lactating cows is to provide a more comfortable environment in the holding and feeding areas. Ideally, the holding pen area is cooled with combination of shade, air movement and water. When combined with air movement, water can increase the cooling ability of the cow. However,
adding water in humid or poorly ventilated holding pens can increase heat stress. If it does not evaporate from the cow, the water can actually limit cooling.

One system that works very effectively is sprinkling water onto the cows just long enough to wet their backs. Fans are then used to help remove evaporated water vapor away from the cow. When the cows’ backs are dry in a few minutes, the process is repeated. Avoid allowing water to run onto the udder. If water does reach the udder, it is possible that bacteria can be transferred into the mammary gland and result in more mastitis. If possible, blow air onto the cows continuously. However, in some cases the fans may need to be off for the period when the sprinklers are running so the water droplets land on the cows’ backs. The floor of the holding area should be grooved or rough-surfaced concrete or some other suitable footing so that cows do not slip in the wet environment. As a general rule, water should not stand in the holding pen and the feet of cattle should be exposed to limited water. Also, care and design should be used to avoid unintended consequences with manure and heavy use area management.

For additional information, the publications *Heat Stress in Dairy Cattle* (FSA3040) and *Cooling Dairy Cattle in the Holding Pen* (FSA4019) are available at www.uaex.edu/Other_Areas/publications.