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While some breeders are content to let Mother Nature decide when a mare's body is ready for pregnancy, others take a more proactive approach. There are many reasons why an owner might seek closer control over a mare's estrous cycle, ranging from herd synchronization to a desired foaling date to putting a breeding career on hold for a performance career. And nearly as numerous as the reasons for starting or stopping an estrous cycle are the ways veterinarians and owners can accomplish the task.

At the 2014 Kentucky Breeders' Short Course, held Feb. 8 in Lexington, Ed Squires, DVM, PhD, Hon. Dipl. ACT, executive director of the Gluck Equine Research Foundation, reviewed methods owners have by which to control mares' estrous cycles.

Heat Cycle Review

Before talking about starting and stopping a mare's heat cycle, it's important to understand how the cycle works normally.

In early spring, as days get longer and temperatures rise, the mare's hypothalamus gland is stimulated and starts producing a gonadotropic releasing hormone (GnRH). GnRH stimulates the mare's pituitary gland, which secretes two hormones that affect the ovaries. The first hormone is follicle stimulating hormone (FSH), and it stimulates development of one or more follicles.

When the follicles reach 20 to 25 millimeters (mm) in diameter they secrete estrogen, which stimulates estrual activity and stimulates the pituitary gland to release the second hormone—luteinizing hormone (LH). This hormone facilitates maturation and ovulation of the growing egg-bearing follicle.

Ovulation occurs when the mature egg leaves the follicle and travels through the oviduct. In the wake of ovulation, estrogen levels fall and the remains of the ovulated follicle are converted to form a corpus luteum (CL), which secrete the hormone progesterone. The progesterone shuts down the estrus-stimulating hormones and sets the stage for maintaining a pregnancy. After 12 to 14 days, if pregnancy has not occurred, the uterus secretes prostaglandin, which causes CL regression and a decline in progesterone secretion. This allows the mare to return to estrus and repeat the cycle.

Transitional Mares

Squires said that, left to her own devices, the average mare's first ovulation of the year is somewhere around May 1, which is much too late for breeders interested in having foals on the ground early in the year. Thus, some owners might seek to get transitional mares—those in the phase between winter anestrus (not cycling) and regular cyclic ovarian activity—cycling. And the most common and easiest method to encourage early cycling is by simply leaving the lights on longer.

In this common practice in the Thoroughbred industry, barn managers maintain broodmares indoors under barn lighting until 11 p.m. for eight to 10 weeks beginning around Dec. 1. The artificially extended day length acts to inhibit the hormone melatonin and fools the mare's reproductive system into activating earlier in the year. Historically, managers have successfully induced estrus using light from a 100-watt light bulb in a 12-by-12-foot stall; researchers have loosely defined this amount of illumination as "enough light to read a newspaper."

Recently, however, scientists evaluated a mobile blue-light mask's efficacy in suppressing mares' melatonin secretions, thereby inducing estrus earlier in the year. The team found that exposing mares to as little as 10 lux via a blue-light mask effectively induced estrus in healthy Thoroughbreds. This might mean managers can save money on lighting and stabling costs by maintaining mares at pasture with the mask; however, Squires noted the masks are expensive.

Veterinarians also have a number of pharmaceutical options for inducing estrus in transitional mares. The most common method used to bring transitional mares into estrus is a progestin, altrenogest, marketed as Regu-Mate or Altresyn. Squires said many managers and veterinarian put mares under artificial light for 60 days before administering altrenogest for 10 to 14 days. At that point, the mare should come into heat.

Squires cautioned that, while this method remains the gold standard for inducing estrus in transitional mares, some administration issues exist for humans handling the drug. The solution can be absorbed through human skin and adversely affect women's hormone activity, so always wear rubber gloves when handling altrenogest.

Administering GnRH twice daily can also help hasten the breeding season, Squires said. Veterinarians can choose from two GnRH analogues: deslorelin and busserelin.

Similarly, Squires said, administering human chorionic gonadotropin (hCG) has proven very successful in inducing ovulation in mares within 48 hours of administration if mares had a follicle measuring 35 mm prior to administration and evidence of being in estrus.

Study results have shown that recombinant follicle stimulating hormone (reFSH) is effective in inducing estrus in anestrus mares; however, availability is an issue as its no longer on the market.

Oral domperidone administration stimulates prolactin production and is also effective in bringing transitional mares into estrus.

Cycling Mares

Once a mare ovulates she's considered a cycling mare, and estrus and ovulation can be more easily manipulated. Again, veterinarians commonly employ altrenogest—the synthetic progestin—to cycling mares to aid in:

- Estrus suppression (more on this in a moment);
- Estrus synchronization (Squires noted that veterinarians frequently administer the hormone prostaglandin F2? after eight to 10 days of altrenogest administration when synchronizing estrous cycles; the progestin alone might not effectively inhibit follicle development, he said.);
- Pregnancy maintenance;
- Maintaining high-risk pregnancies;
- Embryo transfer;
- Post-surgery; and

During transit ("The stress of transportation can lower progesterone in the blood, so altrenogest can protect the mare from experiencing low progesterone," he explained).

Estrus Suppression

Owner might want to suppress estrus for many reasons, from eliminating behavioral issues associated with heat cycles to keeping an equine athlete out of heat during the competition season. Aside from administering altrenogest, veterinarians have several other options, including:

- **Oil infusions**—Researchers in one study showed that infusing plant oil (such as corn or coconut oil) in the uterus might extend corpus luteum function and suppress estrus;
- **Oxytocin injections**—When administered during diestrus (not in heat), oxytocin has been shown to increase the duration of mares' corpus luteum, thus keeping her out of heat;
- **GnRH vaccines**—"Vaccinating" mares against GnRH stops a mare from cycling by inactivating the GnRH she produces. Simply put, it temporarily interrupts the whole hormonal cascade and essentially deactivates the ovaries. However, Squires noted, there isn't an equine GnRH vaccine available in the United States, and it's generally impossible to predict when a mare might come back into heat after vaccination;
- **Diestrus ovulation**—Inducing a mare to ovulate during diestrus results in a CL that is not old enough to respond to prostaglandin F2? secreted late in diestrus;
- **Pregnancy**—Getting a mare pregnant and then eliminating the pregnancy at 16 to 20 days of gestation will suppress estrus reliably for 60-90 days; however, Squires said, this technique is not overly practical; and

Ovariectomy—Often, the last resort (because it's **completely irreversible**) in estrus control is an ovariectomy, or removing the mare's ovaries.

Postponing Ovulation

Finally, Squires said, there are some cases in which breeders might seek to postpone, but not stop, ovulation. If shipped semen hasn't arrived yet or their stallion of choice isn't available for breeding, for example, owners might want to delay estrus by a day or two. Squires said for this purpose, altrenogest can be administered for one or two days when the follicle is 30-35 mm. Researchers have shown that this can delay ovulation, with fertility rates remaining similar between test and control mares; however, some follicles (25%) became atretic (abnormal and fail to ovulate) when mares received altrenogest for this purpose, he cautioned.

Take-Home Message

Regardless the reason for seeking to start or stop an estrous cycle, your veterinarian will be able to help you through the process. With a variety of methods available, veterinarians have numerous options by which to "tailor" a mare's reproductive cycle to meet her and your needs.