

## Understanding the Mare’s Reproductive Cycle

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To be successful at breeding horses it is critical that mare owners understand the reproductive cycle of the mare. Knowledge of the events that occur will enable breeders to better manage their efforts. This article will outline the major events in the estrous cycle of the mare with special attention relating to the hormonal control of the cycle.

The mare is unique compared to the other livestock species because the estrous cycle differs between individuals and between cycles in the same individual. Mares are seasonal breeders and thus cycle during the spring and summer when day length is greatest. When spring approaches the hours of daylight increase, which is the signal for the mare to begin cycling. Mares have light receptors in the back of the eyes which send signals to the brain to release hormones that initiate the cycle. The two hormones produced by the pituitary gland at the base of the brain, which are responsible for controlling the estrous cycle, are follicle stimulating hormone (FSH) and luteinizing hormone (LH). The first estrus (heat) of the season is called spring transition. During the spring transition mares will typically be in estrus for an extended period of time and in some cases mares will not ovulate during this first cycle. Following the transition mares will cycle approximately every 22 days until pregnancy, seasonal anestrus or a pathologic condition.

Follicle stimulating hormone production increases after ovulation and induces follicle development on the ovaries. Several small ovarian follicles will begin to grow and one follicle will become the dominate follicle. This process is called the follicular wave and usually begins about nine days after ovulation and lasts about seven days. The dominate follicle will continue to grow and produce large amounts of estrogen which is responsible for behavioral signs of estrus. The estrus phase will typically last from five to seven days. The increasing amounts of estrogen from the dominate follicle signals the brain to increase production of LH. This is known as the LH surge which is a rapid increase in this hormone that induces ovulation of the follicle. The follicle contains the unfertilized egg called an oocyte which is transported into the oviduct to await fertilization. The behavior of the mare is not always indicative of the time of ovulation. Behavioral estrus will generally cease the day following ovulation and the mare will not stand to be mounted. However, some mares will continue to show signs of estrus for up to two days following ovulation. Once ovulation occurs the follicle tissue undergoes changes and develops into a structure called the corpus luteum (CL). The CL produces the hormone progesterone which is responsible for maintaining the uterus to sustain pregnancy and prevents the production of LH. This phase of the cycle is called diestrus and usually lasts 14 to 16 days. If fertilization does not occur and pregnancy is not recognized by the mare then a substance called prostaglandin  $F_{2\alpha}$  ( $PGF_{2\alpha}$ ) is produced by the uterus, which will cause the CL to regress and thus allowing the onset of the next cycle.

With the advances in science and technology, horse breeders can use synthetic hormones to control the estrous cycle and better manage breeding. The ultrasound has enabled veterinarians to diagnose pregnancy as early as two weeks following ovulation. Additionally this tool is being used to measure follicular growth to better utilize artificial insemination and

minimize the number of inseminations. Typically a veterinarian will monitor the growth of the follicle and when it reaches 35 millimeters or greater in size ovulation can be induced by giving the mare synthetic LH or an LH like compound. With the acceptance of embryo transfer by many breed associations there is a need for synchronizing estrus in a recipient mare or group of mares. This is often done by using PGF<sub>2α</sub> to induce the regression of the CL and bring a mare into estrus. The mare must have a fully developed CL before PGF<sub>2α</sub> will induce regression. It is essential to know what stage of the cycle the mare is in or determine a functional CL exists via ultrasound. To synchronize a group of mares in which the stage of their cycle is unknown PGF<sub>2α</sub> can be given in two doses 15 days apart. This will bring the majority of the mares (78% to 92%) into estrus, however this does not synchronize ovulation as this is variable in mares. This management technique is useful in grouping mares to all foal within an abbreviated time frame. Progesterone can be given to prevent a mare from coming into estrus and prolonging the diestrus stage of the cycle. After the progesterone treatment is stopped the mare will come into estrus within a few days. Older mares often have difficulty maintaining pregnancy and the use of synthetic progesterone has enabled some older mares to successfully carry a foal to term.

Once a mare has foaled it is ideal to have her rebred in a timely fashion so that she will foal the same time next year. The first estrus following foaling is called “foal heat” and generally occurs around 10 days after foaling, but can be as soon as five days or as late as 30 days. After foaling the uterus must undergo involution to be able to support a new pregnancy. This can be determined by a veterinarian with the aid of ultrasound and should be done before breeding on foal heat.

Many horse breeders strive to have mares foal soon after the first of the year and the use of artificial lighting is a useful tool in a horse breeding operation. The decreased day length in winter can be circumvented by putting mares under lights for 16 hours a day. This regimen should be implemented two months prior to the breeding season. Mares that are due to foal in January and February will often undergo a seasonal anestrus from the influence of short periods of day length. It is recommended that these mares also be put under a light regimen for 16 hours per day two months prior to foaling.

Understanding the mare’s estrous cycle and the hormones that regulate the estrus cycle allow horse breeders to better manage their breeding program. For more information on breeding horses consult the Mississippi State University Extension Service.