Artificial Lighting: Preparing for Early Breeding

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Horses are long day breeders that depend on natural sun light for reproductive function. Mares are seasonal polyestrous animals that have multiple estrous cycles throughout the warmer months of the year. During periods of shorter daylight and colder weather, reproductive cyclicity in the mare becomes more irregular, eventually leading to a period of anestrus, or lack of estrus or heat. Stallions also experience a decrease in the number of sperm produced and variable shrinkage of the testes in response to shorter daylight. Consequently, reproduction in both stallions and mares slows down in the northern hemisphere during this time of year and mares will not resume predictive and continuous estrous cycles until around April.

The horse industry has determined that January 1st of every year is the day at which a horse gains a year in age. As a result, foals born later in the year are at a distinct competitive disadvantage if their biological age is less than their registered age. This is especially true for racing horses born in late spring or summer that find themselves competing against other two year olds that are in fact several months more mature both physically and mentally. For these reasons, the optimal time to breed a mare is usually mid-February in order to ensure that foals are born as close to January 1st as possible. Breeding earlier than February 15th can be risky if the mare has an average gestation of 343 days but foals out several weeks early. The result would be a December foal that actually turns 1 year of age on January 1st according to registry rules, but is in fact only a few days or weeks old. Mares exposed to natural day length during the fall through winter will not typically begin to cycle normally until April. Therefore, to achieve early foals, mares need to be induced to cycle to selectively breed in February.

Artificial lighting is an effective method that can be used to stimulate a mare to resume estrous earlier than what is biologically normal. Light enters through the retina and suppresses the release of melatonin from the pineal gland thus allowing the resumption of hormones to be released from the hypothalamus of the brain and the anterior pituitary. GnRH (gonadotropin releasing hormone) is released from the hypothalamus and stimulates the production of FSH and LH (follicle stimulating hormone and luteinizing hormone) to act on the ovary to stimulate follicular development and subsequent ovulation of oocytes or eggs.

Mares need approximately 16 hours of continuous light and 8 hours of darkness in order to maintain reproductive function. Unfortunately, daylight savings time renders this part of the northern hemisphere with roughly ten or less hours of daylight. The use of artificial lighting in stalls or pastures can be employed to prevent the release of melatonin and stimulate release of hormones. The light
emitted from 100 watt bulbs or 10 foot candles is sufficient for photostimulation. A general rule of thumb is that one should be able to read a newspaper in a stall and avoid creating dark spots where the mare can escape lighting. You can also use a light meter for a more specific measurement.

Timers are often used to employ this tactic and can be set to automatically turn on for 6 hours after sunset each day and then turn off at the end of the artificial lighting period. An alternative approach would be to keep horses in stalls from 7:00-10:00am under lights (3hrs) and then turn them out into pasture from 10:00 am to 4:00pm (6 hrs). Lights can then be set to turn on automatically at 4:00 pm and go off at 11:00 pm (7 hrs) for a combined total of 16 hours. Additionally, timers can be set to activate light three hours before daylight and then three hours after sunset. Any number of combinations can be effective as long as adequate light is supplied. It should be noted that leaving mares under lights for more than 16 hours in one day is of no additional benefit.

Mares generally require 60 to 90 days of photostimulation before resumption of the first estrous cycle of the season. Therefore, lighting programs should be implemented around December 1st to ensure the ideal situation in which a mare has a normal estrous cycle before the first breeding attempt and that any pre-breeding practices are accomplished in a timely manner. Furthermore, mares will often go through a “transitional phase” as winter ends and spring begins which can result in the development of multiple, small anovulatory follicles and unpredictable estrous cycles. Starting mares under lights in December helps to control the time of the spring transition and ensure a more predictable ovulation in an environment that is suitable for maintaining pregnancy.

Although the horse industry dictates the age of foals, not every person is concerned about when their mare will foal out. Some prefer to allow mares to cycle during more natural times of the year (April through July) and allow their foals to be born into warmer weather. The choice is ultimately at the discretion of the owner. Using artificial lighting can be an effective method for manipulating breeding for those who require earlier foals.