Donkey Differences In regards to Reproduction

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In many ways our long eared critters are similar to their short eared cousin, the horse but in terms of reproduction there are several key donkey differences that breeders and owners should know. This article will focus on the reproductive differences when comparing jennies and mares and touch on freezing jack semen. Although other differences do exist for jacks when compared to stallions such as taking slower to breed, or some jacks will only service jennies and some will only breed mares, more difficulties when experienced when freezing jack semen compared to stallions etc. but most of these differences will be discussed in a later article. For example, the gestation period of jennies is 12 months, which is about a month longer than in horses (11 months). Some researchers have claimed that the difference is about 36 to 37 days longer to be exact (Fielding, 1987). Other differences a breeder should be aware of are the length of the estrous cycle, specifically diestrus. The estrous cycle is defined as the period from one ovulation to the next ovulation as well as the period of time the jenny prepares for conceptus. The estrous cycle can further be defined into two phases, 1) estrus cycle and 2) diestrus.

The estrus cycle is defined as the follicular phase or the period where the jenny is in heat and is receptive to the jack or stallion and an ovum (or egg) will ovulate. The estrus cycle is similar to that of a mare and can average anywhere from 6 to 8 days. The average estrus cycle of mares is about 5 to 7 days. Diestrus is the luteal phase, the period where the jenny prepares for pregnancy due to a structure on the ovary that forms after an ovum or egg has been released or ovulates, known as the corpus luteum which produces a hormone that signals pregnancy, progesterone. Progesterone helps prevent her from coming into heat or displaying signs of heat. The diestrus period in the donkey is on average 18 to 19 days which according to research is approximately 2 to 3 days longer than diestrus in mares which is approximately 14 to 15 days. Therefore, the estrous period of the horse, remember this includes both the estrus and diestrus period is about 19 to 22 days and the total estrous period of the jenny is longer about 25 to 26 days (Vandeplassche et al., 1981, Ginther et al., 1987, Henry et al., 1987 and McKinnon and Voss, 2003). Other differences associated with the estrous cycle in donkeys include the behavioral differences, cycling throughout the year, and the increased number of ovulation or twins in mammoth jennies when compared to horses.

When jennies display signs of estrus or being in heat typically the jenny will open and shut her mouth, known as mouth clapping, as well as increase braying and she will allow other jennies to mount her or she will mount other jennies. This type of behavior is also seen in cows and heifers when they come into heat. Although like the mare the jenny will also display signs such as frequent urination, winking of the vulva and raising her tail. Some studies have indicated that jennies are less likely to display signs of estrus when being teased by stallions, also stallions have often been documented as not being very interested in jennies but most mares will still show signs of heat when being teased

or bred to jacks. In addition when breeding jennies to stallions the conception rate is much lower than when breeding mares to jacks. Mares bred to jacks typically have normal fertility rates according to researchers but when making the reciprocal cross, the conception rate varies from 10 to 14.7% (McKinnon and Voss, 2003 and Allen, 1982). Another major difference when comparing the length of estrous cycles of jennies and mares is the seasonality issue.

Most mares are considered to be polyestrous, meaning they come into heat when the photoperiod increases or daylight becomes longer and as daylight decreases they become less reproductively active. Light triggers the retina in the eye of the mare to signal to the the hypothalamus in the brain to release hormones to other parts of her body that will prepare her to come in estrous and when the light is decreased this signals to the hypothalamus to stop signaling the rest of the body and she does not come in heat. A majority of the mares do not show signs of estrus in the winter months beginning around November through early February (depending on the location) due to a decrease in daylight, and this period is called anestrus. However, jennies, especially mammoth jennies seem to be less sensitive to the length of daylight and continue to cycle throughout the winter months. A study conducted at Texas A&M University reported that the length of estrous cycle throughout 4 seasons (winter, spring, summer, and fall) in 33 jennies were similar among all seasons, estrous cycle lengths was 23.3 +/- 2.6 days and the length of estrus was 5.9 +/- 2.9 days (Blanchard et al., 1999). Other researchers have reported similar findings in mammoth jennies but not in standards (Ginther, 1987). Some researchers have reported that standards do experience an anestrous period during the winter months, meaning they do not show signs of heat in the winter (Henry et al., 1987). Although research from around the world has documented that jennies are more sensitive to the nutritional availability than the photoperiod in regards to when they come in heat. One study done in the Southern hemisphere in temperature areas such as West Africa, indicated that jennies do come in heat all year but during the rainy season (when daylight is decreased but forage availability is maximized) the days of estrus are longer when compared to the dry season (when the sun shines all day but forages become limited due to lack of water), therefore this research indicates that in donkeys the availability of food or nutrients has a stronger implication over the estrous cycle than the photoperiod like in mares (Lemma, 2006).

Not only have differences been reported in jennies in terms of when they come in estrus and for how long but there can also be a higher chance for twins especially in mammoths. Several researchers indicated that standard jennies had multiple ovulations (meaning more than 1 egg or ovum is ovulated at a time) but only 5.3 to 31.8% of the time. However, other researchers indicated that mammoth jennies had approximately 61% multiple ovulations which are much higher than standards (Blanchard et al., 1999). Multiple ovulations or twins are seen in horses and most often it's associated with larger breeds of horses, so the same maybe true for the mammoth donkeys since they are a larger breed of donkey. It's important to keep in mind that mares and jennies who produce multiple ovulations can likely pass this onto their foals. Studies have indicated that multiple ovulations are not correlated to the season of the year and they either happen on the same day or can be separated by as much as 11 days apart. The jenny will

not go out of estrus or heat until the second ovum has ovulated (Ginther et al, 1987 and Blanchard et al., 1999). If you are raising mule or donkey foals it's highly recommended to have your veterinarian check for pregnancy from 15 to 22 days and no later than 30 for twins.

Some mares and jennies will successfully raise twins but it's best for the mare and the other foal if one foal is removed. Often times one or both foals will be born dead. If one or both foals survive most often complications are involved such as being small, and weak. Although twins can survive and live a normal and healthy life as well as a foal that was a sibling to a twin that did not make it but it's best to have a veterinarian do a pregnancy check within a month after breeding to 1) detect pregnancy, 2) if pregnant possibly decrease the chances of twinning, and 3) improve reproduction efficiency (i.e. if the mare or jenny is not in foal, the breeder is aware of this and can prepare for rebreeding next month instead of waiting a year thinking she is bred). At a glance, a few other differences to consider when comparing donkeys and horses in general include the successful use of reproduction technologies such as freezing semen and success rates of embryo transfers.

Embryo transfers in donkeys have proven to be less successful when compared to success rates in mares. Typically in surgically placed embryos in mares the results average around 73% and nonsurgically from 40 to 72%. In jennies, nonsurgically transferred embryos were only 20% successful; meaning 5 to 7 days after the transfer the embryo was still alive (Panzani et al., 2006). Interestingly, efforts to save endangered breeds such as the Baudette Poitou have led researchers to try alternative methods for transferring embryos such as placing donkey embryos into mares. This method has proven to be more successful and yielded higher pregnancy rates about 70% (Allen et al., 1985). One of the first successful embryo transfers from a Poitou donkey, was conducted in 2002 by Dr. Angus McKinnon in Australia at Monash University using a Standardbred mare as the recipient. Complications have also been experienced when trying to preserve other endangered European donkey breeds such as the Zamorano-Leones, a rare Spanish breed of donkeys.

Researchers were studying the most affective cryopreservation methods of freezing these jacks' semen. Donkey semen typically does not freeze as well as stallion semen due to some specie specific differences such as differences in the membrane's lipid composition, particularly the Phospholipid: cholesterol ratio. The cholesterol stabilizes membranes and this study looked at adding a cholesterol cryoproctant that helped increase motility and viability when the semen was thawed. This method did help improve the frozen jack semen when it was thawed (Alvarez et al., 2006). Freezing jack semen is not uncommon and can be done. It's suggested that if you have a prized jack or a line of genetics you would like to continue to have foals out of, I would recommend looking into freezing some of your jack's semen for future use. Each jack like each stallion may require different concentration of cyroprotectant as well as some variation in the temperature in which it is thawed. In the study mentioned above they used 3 different jacks and noticed that their semen thawed the best at 20 degrees Celsius where other studies reported jacks thawing at 24 degrees. However, just like when using cooled semen it will take some

testing to formulate the best conditions in terms of extender for cooled semen or cyroprotectant for frozen semen and each jack maybe somewhat different just like stallions.

Hopefully, these interesting differences will prove helpful when breeding your jenny or mare, or jack this year! Best of luck producing a healthy foal that has beautiful long ears!

If you have additional questions please do not hesitate to contact me at mcleana5@msu.edu, or via phone at 706-296-8743, or mail at 1284 Anthony Hall, Animal Science Department, Michigan State University, East Lansing, MI 48824, or speak with your local veterinarian for more information on breeding. Also, for additional information on equine reproduction, check out MSU Global's educational equine website, www.myhorseuniversity.com, it will be offering an online course in the near future on equine reproduction. This course will feature extensive information about equine reproduction covering both species, horses and donkeys, from detecting heat, to reproductive anatomy, as well as reproductive technologies such as embryo transfer and cloning.

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