



## **SUPEROVULATION: The Future is Now**

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Stimulating mares to have multiple ovulations has been an elusive goal in the equine breeding industry for many years. In contrast, superovulation is routinely performed to increase the efficiency of embryo transfer in cows. Attempts to use hormones successful in inducing multiple ovulations in cows, such as follicle stimulating hormone purified from pig pituitary glands (pFSH) and a hormone produced by the equine placenta (equine chorionic gonadotropin or eCG) have met with little or no success in mares. The ability to stimulate multiple follicles to develop and ovulate would have immediate practical application in an embryo transfer program.

A single egg or oocyte is released from each follicle that ovulates. The egg is transported down the oviduct where fertilization may occur. Mares that ovulate one follicle have a 40 to 60% chance of becoming pregnant on any given cycle, depending on the type and quality of semen used and the reproductive health of the mare. Mares that ovulate multiple follicles have a greater probability of becoming pregnant, or donating an embryo, than mares that ovulate a single follicle.

Horse owners, breeding managers and veterinarians involved in embryo transfer have traditionally been limited to attempts to

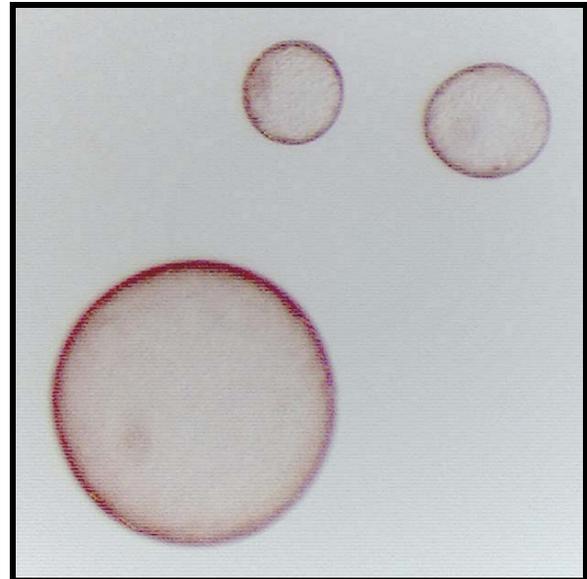
collect one embryo per estrous cycle. However, a pharmaceutical company (Bioniche Animal Health USA, Inc.) has recently made available a purified equine follicle stimulating hormone (eFSH). The hormone is extracted from horse pituitary glands and purified using techniques similar to those used in purifying porcine FSH. A controlled clinical trial performed in 2002 documented that administration of eFSH to cycling mares stimulated multiple follicles to develop. Inducing ovulation of the stimulated follicles was most efficient using human chorionic gonadotropin (hCG). Mares treated with 12 mg of eFSH followed by hCG ovulated an average of 3.4 follicles per cycle. Untreated control mares ovulated an average of 1.1 follicles per cycle.

Timing is critical for successful use of eFSH to induce superovulation in mares. The goal of hormone treatment is to stimulate continued development of a group of follicles in one wave. A control mechanism exists in mares to limit the number of follicles that develop to the large preovulatory size. Basically, a wave of follicles starts to develop simultaneously. One follicle soon emerges as the larger or dominant follicle of that particular wave. The dominant follicle produces hormones that limit or suppress the development of the smaller follicles in the wave. The dominant follicle continues to develop and eventually

ovulates, while the remainder of the follicles regress and are permanently lost. Administration of eFSH twice beginning 5 or 6 days after ovulation, followed by prostaglandins one day later to eliminate the corpus luteum, will result in continued development of multiple follicles in follicular wave. Administration of hCG is required to induce a synchronized ovulation of most or all of the large follicles.

Embryo collection should be performed 7 or 8 days after ovulation of the first detected ovulation. Previous research studies have noted that embryo collection success increases as the number of ovulations increase in mares. This is especially true for young reproductively healthy horses. Older mares may have a decreased response to superovulatory hormones and embryo collection success may be further limited if the uterine environment is compromised. In general, however, superovulation should increase the efficiency of embryo transfer in mares.

Clinical uses for eFSH in addition to superovulation include advancing the first ovulation of the year in transitional mares and enhancing pregnancy rates in mares bred to subfertile stallions. Research performed in the spring of 2003 demonstrated that administration of eFSH to mares in the spring transition period resulted in ovulation after approximately 6 to 8 days of treatment. Consequently, eFSH may be an effective management technique to get mares bred early in the season that are slow to respond to an artificial photoperiod or have not maintained under lights at all. Additional research in the use of eFSH to improve pregnancy rates is ongoing.



**Multiple embryos collected from a superovulated mare**



**Equine follicle stimulating hormone (eFSH) preparation**