

## Competitive Session

### Anti-luteogenic and luteolytic effects of PGF<sub>2α</sub> during the post-ovulatory period in mares

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In the present study, it was hypothesized that mares receiving multiple doses of PGF<sub>2α</sub> during the post-ovulatory period would undergo luteolysis similar to control mares given a single injection of PGF<sub>2α</sub> during mid-diestrus. The specific objectives were to document the effects of PGF<sub>2α</sub> treatment on concentrations of plasma progesterone ( $P_4$ ) and interval to ovulation. Cycling mares were examined using transrectal ultrasonography once daily (when in estrus) and were allocated to treatment groups as follows: Group I ( $n = 10$ ) received 2.5 mg of PGF<sub>2α</sub> IM (Lutalyse<sup>®</sup>, Pfizer Animal Health, New York, NY, USA), on Day 10 (ovulation = Day 0); Group II ( $n = 10$ ) received 2.5 mg of PGF<sub>2α</sub> once daily on Days 2, 3, and 4; Group III ( $n = 7$ ) received 2.5 mg of PGF<sub>2α</sub> twice daily on Days 0, 1, and 2; and Group IV ( $n = 6$ ) received 10 mg of PGF<sub>2α</sub> twice daily on Days 0, 1, and 2. Plasma samples were collected daily and stored at  $-20^\circ\text{C}$  pending determination of  $P_4$  (RIA). An ANOVA was used to compare plasma  $P_4$  concentrations and intervals from PGF<sub>2α</sub> treatment to ovulation. Data are presented as mean ( $\pm$ S.E.M.) and intervals from treatment to ovulation were relative to the first PGF<sub>2α</sub> treatment. For Groups I, II, III, and IV, plasma  $P_4$  concentrations (ng/mL) before treatment were  $12.05 \pm 1.6$ ,  $5.3 \pm 0.7$ ,  $0.2 \pm 0.04$ , and  $0.5 \pm 0.3$ , respectively ( $P < 0.05$ ), 3 d after the start of treatment they were  $0.6 \pm 0.1$ ,  $1.3 \pm 0.14$ ,  $1.3 \pm 0.5$ , and  $0.48 \pm 0.2$  ( $P > 0.05$ ), and 5 d after the start of treatment they were  $0.5 \pm 0.07$ ,  $1.8 \pm 0.4$ ,  $2.9 \pm 1.0$ , and  $0.5 \pm 0.4$  ( $P < 0.05$ ). All mares in Group I ovulated  $8.2 \pm 0.7$  d after treatment. In Group II, six of 10 mares underwent complete luteolysis and ovulated  $9.4 \pm 1.4$  d after treatment; the remaining four mares underwent partial luteolysis, followed by a resurgence in luteal function ( $P_4 > 1.0$  ng/mL), and ovulated  $14.7 \pm 2.1$  d following treatment. For all mares in Group III, PGF<sub>2α</sub> treatment markedly suppressed the rise in plasma  $P_4$ , followed by resurgence in luteal function. Six Group III mares ovulated 14–26 d after treatment and one remained anovulatory. In Group IV, PGF<sub>2α</sub> treatment also had an

anti-luteogenic effect; mean plasma  $P_4$  on Day 5 remained  $< 1.0$  ng/mL, and four of six mares ovulated  $7.0 \pm 1.8$  d after treatment.

In summary, luteal function was affected by PGF<sub>2α</sub> treatment in mares during early diestrus (Group II); the immature CL was responsive to multiple PGF<sub>2α</sub> injections. Serial administration of PGF<sub>2α</sub>, beginning on the day of ovulation, had an anti-luteogenic effect, manifested as low plasma  $P_4$  concentrations for several days after treatment, especially in mares of Group IV (that received a higher dose of PGF<sub>2α</sub> than those in Group III). Future adjustments in PGF<sub>2α</sub> treatment (frequency and dosage) may increase the percentage of mares ovulating in Groups II and IV.

**Keywords:** Corpus luteum; PGF<sub>2α</sub>; Anti-luteogenic; Luteolysis; Horse

DOI: 10.1016/j.theriogenology.2008.05.005

### Comparison of three doses of reFSH for super-ovulation of mares

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Superovulation using purified equine follicle stimulating hormone (eFSH) increased the efficiency of embryo recovery in mares. In preliminary studies, recombinant equine FSH (reFSH) stimulated ovarian follicular development in transitional mares and increased ovulation rates of cycling mares. The objective of this study was to compare ovulation and embryo recovery rates among three doses of reFSH. Our hypothesis was that reFSH would have a dose-dependent increase in ovulation and embryo recovery rates.

Twenty-eight mares were randomly assigned to one of five treatment groups (total of 67 estrous cycles). Mares in Group 1 served as untreated controls. Mares in Group 2 received 12.5 mg eFSH twice daily IM, whereas those in Groups 3, 4, and 5 received 0.35, 0.5, or 0.65 mg reFSH, twice daily IM, respectively. Mares were allowed to go through one estrous cycle (to determine day of ovulation) and treatment was initiated when a follicle 22–25 mm in diameter was detected. Mares received cloprostenol sodium (250  $\mu\text{g}$  IM) on the second day of treatment; eFSH or reFSH was given until  $\geq 50\%$  of the developing follicles reached 35 mm in diameter. Mares were allowed to ‘coast’ for 36 h before

receiving hCG (2500 units IV). Mares were inseminated 12 h later with 500 million progressively motile sperm, and rebred with cooled semen the following day. Ovulation was confirmed via daily transrectal ultrasonography and embryo recovery was attempted 7 or 8 d post-ovulation. Data were analyzed with Fisher's Exact Test and ANOVA, and results are tabulated below:

| Group          | No. of cycles | Ovulated (%) | Ovulation rate*            | Embryos recovered per flush** |
|----------------|---------------|--------------|----------------------------|-------------------------------|
| Control        | 19            | 100          | 1.31 ± 0.51 <sup>a</sup>   | 0.77 ± 0.38 <sup>a</sup>      |
| eFSH, 12.5 mg  | 11            | 81.8         | 3.04 ± 0.64 <sup>b,c</sup> | 2.38 ± 0.57 <sup>b</sup>      |
| reFSH, 0.35 mg | 14            | 78.6         | 2.11 ± 0.59 <sup>a,c</sup> | 1.41 ± 0.49 <sup>a,b</sup>    |
| reFSH, 0.5 mg  | 11            | 100          | 4.59 ± 0.64 <sup>b</sup>   | 1.48 ± 0.48 <sup>a,b</sup>    |
| reFSH, 0.65 mg | 12            | 91.7         | 3.34 ± 0.62 <sup>b,c</sup> | 2.69 ± 0.48 <sup>b</sup>      |

Within a column, values without a common superscript (a, b, c) differed ( $P < 0.05$ ).

\* Includes data from all mares treated.

\*\* Only mares that ovulated were flushed.

In summary, for the three reFSH doses evaluated, ovulation rates per cycle were highest in mares given 0.5 or 0.65 mg twice daily. However, there was no significant difference among doses in embryo recovery rates per flush.

**Keywords:** Superovulation; FSH; Embryo; Equine; Horse

DOI: 10.1016/j.theriogenology.2008.05.006

### Efficacy of medroxyprogesterone acetate in suppression of estrous behavior and follicular activity in cycling mares

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Various progestins are used in performance mares to pharmacologically suppress estrous behavior, including injectable medroxyprogesterone acetate (MPA). However, there have been no scientific studies to evaluate the efficacy of MPA in suppressing estrus in the mare. The purpose of our study was to evaluate the effects of MPA on ovarian follicular activity and estrous behavior. Eighteen cycling Quarter Horse-type mares were randomly assigned to one of three treatment groups: MPA (Wedgewood Pharmacy, Swedesboro, NJ, USA), saline, or altrenogest (Regu-Mate<sup>®</sup>, Intervet, Millsboro,

DE, USA). Treatments started 7 d after ovulation. Mares in the MPA treatment group ( $n = 6$ ) were treated with 1600 mg MPA IM initially, then 400 mg once weekly for 5 weeks. Saline-treated mares ( $n = 6$ ) were given saline IM once weekly for 6 weeks. Altrenogest-treated mares ( $n = 6$ ) received 10 mL altrenogest (22 mg) orally daily for 48 d. During treatment and 18 d after treatment ceased, mares were teased daily by an experienced stallion and were categorized as displaying behavior characteristic of estrus or diestrus. Transrectal ultrasonographic examinations were performed thrice weekly, or daily beginning when a 35 mm follicle was identified until ovulation. Blood samples were collected weekly and serum frozen for analysis of progesterone. Assessments of behavior, follicular activity, and serum progesterone concentrations were done in the blind. Data were analyzed by Chi-square and ANOVA, with pair-wise comparisons.

Mares given saline versus MPA had no significant differences in duration of diestrous behavior (mean ± S.D.,  $14 \pm 2$  and  $16 \pm 4$  d, respectively) or estrous behavior ( $8 \pm 2$  and  $7 \pm 1$  d, respectively) for the duration of the study. No altrenogest-treated mares displayed signs of estrous behavior during the treatment period, but four resumed estrous behavior 6–18 d after cessation of treatment. All mares in the saline and MPA treatment groups had normal follicular development and ovulations throughout the study. No mares given altrenogest ovulated during the treatment period; four resumed normal follicular development after treatment ceased. Least squares means showed significant differences in the interovulatory interval of mares given altrenogest versus saline and those given altrenogest versus MPA ( $P < 0.0001$  and  $P < 0.0001$ , respectively), with no differences in interovulatory interval between saline versus MPA mares ( $P = 0.7$ ). Serum progesterone concentrations were consistent with follicular and behavioral activity for all mares. In conclusion, MPA did not effectively suppress estrous behavior or follicular activity in normal cycling mares; therefore, it is not recommended for this purpose.

### Acknowledgement

Supported by the United States Equestrian Federation, Inc.

**Keywords:** Estrus suppression; Estrous behavior; Medroxyprogesterone acetate; Equine; Horse

DOI: 10.1016/j.theriogenology.2008.05.007