Short Communication

Comparison of efficacy of two dose rates of histrelin for inducing ovulation in broodmares

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Abstract

Between February 14 and April 26, 2012, 75 broodmares (7 maiden, 11 barren, and 57 foaling) maintained on pasture in southeast Texas were examined three times weekly (Tuesday, Thursday, Saturday) by transrectal palpation and ultrasonography. On Tuesday or Thursday, mares in estrus with uterine edema, a relaxed cervix, and a dominant follicle ≥ 30 mm diameter were alternately assigned to treatment with: Group 1) 0.5 mg BioRelease Histrelin (Biorelease Technologies, Lexington, KY) im, or Group 2) 0.25 mg BioRelease Histrelin im. Ovulation was confirmed by ultrasound examination. No difference in the proportion of maiden plus barren (96%) compared to foaling (86%) mares ovulating within 2 d was found ($P = 0.23$), so responses for all mares were totaled for analysis. A non-significant trend for higher ovulation rates within 2 d was noted for 0.5 mg histrelin compared to 0.25 mg histrelin treatment (42/46, 91%; 44/52 (85%) ($P = 0.31$). Ovulatory responses appeared similar for both dose rates of histrelin as the season progressed, yet no differences were detected between response rates to 0.5 or 0.25 mg histrelin for any month ($P \geq 0.32$). The use of 0.5 or 0.25 mg BioRelease Histrelin was found to be equally effective treatments for inducing ovulation within 2 d of administration throughout the early breeding season.

Keywords: equine, histrelin, ovulation

1. Introduction

GnRH analogues have been routinely administered to broodmares to ensure ovulation occurs within a predictable time span, typically within 2 d of administration [Squires 2011; McKinnon and McCue 2011]. A variety of formulations containing the GnRH analogue deslorelin have been widely used for this purpose [Squires 2011]. Histrelin is a more potent GnRH agonist than deslorelin or buserelin [Kiesel et al 2002]. A sustained release formulation of that GnRH analogue (BioRelease Histrelin; Biorelease Technologies, Lexington, KY) has recently been prepared. Similar efficacy in promoting ovulation in mares within 2 d of treatment was described for 1.0 and 0.5 mg histrelin and 1.5 mg deslorelin [Lindholm et al 2011]. Others reported similar efficacy in promoting ovulation in mares within 2 d of treatment with 1.0 and 0.5 mg histrelin and human chorionic gonadotropin (hCG; 2500 units) [Voge et al 2012]. In that study, performed in pastured mares in southeast Texas during February – May, a non-significant trend for increasing ovulation within 2 d of treatment (with both dose rates for histrelin as well as for hCG) was noted as the breeding season progressed. Others have reported that ovulation responses (within 2 d) following hCG or GnRH agonist (deslorelin) treatment may be reduced when used early in the breeding season, particularly in mares in late transition [Webel et al 1977, Farquhar et al 2000, Cuervo-Arango and Clark 2010].

The goal of this study was to compare the efficacy of two reduced dose rates of histrelin (0.5 and 0.25 mg im) during the early breeding season in one herd of pastured mares under ambient light conditions.

2. Materials and Methods

2.1. Mares, examinations, and treatments

Barren, maiden and foaling Quarter Horse and Quarter Horse-cross mares on one farm in southeast Texas during 2012 were used in this study. Mares were maintained on pasture and fed additional hay and grain to maintain good body condition. Foaling mares delivered their foals between January and April. Mares were penned and exposed to a stallion on a lead along one side of the fence line 4 times weekly (Monday, Wednesday, Friday, and Sunday). Between February 14 and April 26, mares detected in behavioral estrus, or expected in estrus based on previous examination findings, were brought into stocks for transrectal palpation and ultrasound examination on Tuesday, Thursday, and/or Saturday. Foaling mares were first examined 5-7 days after parturition.

On Tuesdays and Thursdays, mares in estrus with uterine edema, a relaxed cervix, and a dominant follicle ≥ 30 mm diameter were alternately assigned to treatment with: Group 1) 0.5 mg BioRelease Histrelin (Biorelease Technologies, Lexington, KY) im, or Group 2) 0.25 mg BioRelease Histrelin im. Mares were bred at 1-2 d intervals to one of nine stallions by either natural service, or artificial insemination with fresh or cooled, transported semen. Ovulation was confirmed by ultrasound examination, and mares were examined for pregnancy approximately 2 wk after detection of ovulation. If more than one ovulation occurred, the interval to the first ovulation was used for assessing response in two days. If a mare was not pregnant, she was re-entered into the treatment rotation, and assigned to the same treatment that the mare had previously received..

2.2. Data analysis

Difference in mean follicle size (diameter) on day of treatment among groups were evaluated by ANOVA. The proportion of ovulations occurring within 2 d among groups, and the proportion of ovulations occurring within 2 d during each month of treatment among groups was evaluated by Chi-square or Fishers exact test.

2.3. Animal use

All experimental procedures were performed according to the United States Government Principles for the Utilization and Care of Vertebrate Animals Used in Testing, Research and Training (http://history.nih.gov/research/downloads/US_Principles.pdf).

3. Results and Discussion

During the season, 75 mares (7 maiden, 11 barren, and 57 foaling) were treated over 98 estrous cycles on Tuesdays or Thursdays to induce ovulation. The number of cycles of treatment for each treatment group was: Group 1) 46, and Group 2) 52. Mean (± sd) follicle size on day of treatment did not differ among groups (38.7 ± 4.9 mm and 38.7 ± 4.9 mm) for Groups 1 and 2, respectively; P = 0.__).

The proportion of mares ovulating within 2 d of treatment with both dose rates of histrelin did not differ between maiden plus barren (22/23, 96%) and foaling (65/75, 87%) ($\mathcal{X}^2$ = 1.426, P=0.23); therefore, responses for all mares were totaled for analysis (Table 1). While there was a trend for higher ovulation responses with 0.5 mg than 0.25 mg histrelin treatment, ovulation responses within 2 d of treatment did not differ between treatment groups (42/46, 91%; and 44/52, 85% for Groups 1 and 2, respectively) ($\mathcal{X}^2$ = 1.016; P = 0.31). The ovulation rate within 2 d obtained with 0.5 mg histrelin was similar to that obtained in the same herd with 1.0

and 0.5 mg histrelin during the 2011 breeding season (67/73, 92%), and similar to that obtained in the same herd in 2010 when 1.5 mg BioRelease Deslorelin was administered (113/128, 88%).

Ovulations within 2 d of treatment were 91%, 89%, and 94% for 0.5 mg histrelin, compared to 86%, 86%, and 82% for 0.25 mg histrelin, during the months of February, March, and April, respectively (Figure 1). No differences were detected between response rates to 0.5 or 0.25 mg histrelin for any month ($P \geq 0.32$). Interestingly, ovulatory response appeared similar among months for each dose rate of histrelin as the season progressed. In the previous year, a non-significant trend for improved ovulatory response within 2 d of treatment with 1.0 or 0.5 mg histrelin occurred in this herd [Voge et al 2012]. Farquhar et al [2000] reported both age and season affected mean interval to ovulation after treatment with deslorelin acetate. They noted higher ovulation rates within 3 days for mares treated during summer (95.4%, July and August) and fall (95.7%, September and October) compared to spring (81.1%, March and April). The failure to detect a significant improvement in ovulatory responses in mares treated with histrelin early in the season may have been due to small numbers of mares available each month for comparison. Additionally, pastured mares in southeast Texas are not exposed to the more severe environmental conditions that exist in the Colorado foothills.

In summary, we concluded satisfactory ovulation rates occurred within 2 d of treatment were achieved with both 0.5 and 0.25 mg histrelin during the early (February – April) breeding season in this group of mares. Further studies with larger groups of mares in more severe climates would be required to determine whether treatment with higher dose rates of histrelin are required to induce ovulation within 2 d early in the breeding season.

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4. References

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