ORIGINAL RESEARCH

Pregnancy Rates in Tranquilized Maiden Thoroughbred Mares

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ABSTRACT

In Thoroughbred breeding, it is sometimes necessary to tranquilize a maiden mare to accomplish safe breeding by natural service. To determine whether tranquilization adversely affected fertility of maiden mares, pregnancy rates achieved in 792 matings of 531 maiden Thoroughbred mares were evaluated. One hundred sixty-three matings were accomplished after administration of a tranquilizer cocktail (20 mg acepromazine, 100 mg xylazine, and 10 mg butorphanol tartrate, injected intravenously), whereas 598 matings were accomplished without tranquilization. Pregnancy rate/cycle did not differ between maiden mares tranquilized before (64%; 105/163) and mares not tranquilized before mating (69%; 434/629) ($\chi^2 = 1.048$; $P > .05$). We concluded that tranquilization of maiden Thoroughbred mares immediately before mating did not adversely affect fertility.

Keywords: Equine; Maiden mare; Thoroughbred; Tranquilization; Fertility

INTRODUCTION

Only foals conceived by natural service can be registered by the Jockey Club (Thoroughbreds). This requires that each mare in estrus stands safely for mating. It is a common management practice to use a teaser stallion, with a breeding shield, to first mount the mare in the breeding shed to determine whether she will stand safely for mating. If the mare allows mounting by the teaser stallion, mating with the stallion to which the mare is booked is then allowed.

If there is a doubt whether the mare will stand safely for mating (such as with a nervous maiden mare), tranquilizing agent(s) may be administered to the mare before exposure to the teaser stallion. In some cases, the mare is tranquilized after rejecting mounting by the teaser stallion. Tranquilization of a nervous maiden mare will often quiet her sufficiently to allow mounting by the teaser, and then the intended breeding can be safely accomplished. Although experience over many years would suggest that fertility of tranquilized Thoroughbred maiden mares is acceptable, information on effects of tranquilizers on fertility in the horse is lacking. If administration of tranquilizing agent(s) interferes with sperm transport and colonization of the uterotubal junction (UTJ), or with timing of ovulation, fertility could be adversely affected.

Scintigraphic study using radiolabeled equine sperm revealed that sperm initially inseminated into the uterine body moved into the uterine horns within 8 to 20 minutes, and then moved into the periovarian area (presumably in the oviducts) by 13 to 29 minutes.[1] Within 4 hours of breeding, many sperm are found within the oviduct and attached to the UTJ.[2] Although the critical amount of time required for sufficient colonization of the oviducts or UTJ with sperm to optimize the chance of fertilization in the horse is not known, Brinsko et al[3] found that removing sperm by lavaging the uterus within 2 hours after breeding resulted in lowered pregnancy rates. Therefore, the use of any product or procedure that would alter (eg, premature expulsion from the uterus) the ability of sperm to colonize the oviducts could be deleterious to fertility.

Induction of anesthesia in cows using acepromazine and barbiturate delayed or ablated the luteininizing hormone (LH) surge, and interfered with subsequent corpus luteum (CL) formation.[4] Recent investigation confirmed that Thoroughbred mares ovulating more than 2 days after mating experienced lowered pregnancy rates.[5] Therefore, the use of any product that would delay ovulation in the mare could be deleterious to fertility.

This study was performed to investigate whether administration of a tranquilizer cocktail to maiden mares just before breeding altered fertility. The null hypothesis was that tranquilization would not alter pregnancy rates in maiden Thoroughbred mares.

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MATERIALS AND METHODS

Breeding shed records available from one Thoroughbred breeding farm in central Kentucky for the years 2005–2007 were retrospectively examined. On this farm, mares presented for breeding were first identified and tagged, then placed in a stall next to a teaser stallion. A window was opened that allowed the mare exposure to the teaser stallion, thus encouraging the mare to exhibit behavioral signs of estrus. The mare was taken to a preparation area where the tail was wrapped and the perineum cleaned. If necessary, vulvar sutures were removed to permit safe penile intromission. The mare was taken to the breeding shed where padded leather boots were placed on the hind feet before moving the mare to the location for mating. The teaser stallion, with a breeding shield attached to prevent inadvertent intromission, was brought to the shed and allowed to mount the mare to determine whether the mare would stand safely for mating. If there is a doubt regarding whether the mare would stand safely for mating, a tranquilizer cocktail (20 mg acepromazine, 100 mg xylazine, and 10 mg butorphanol) was administered intravenously to the mare. In some cases, the tranquilizer cocktail was administered after the mare initially rejected mounting by the teaser stallion. After allowing the tranquilizing agents to have effect, mounting with the teaser stallion was attempted. If the tranquilized mare allowed mounting by the teaser stallion, mating to the intended stallion to which the mare was booked was then permitted.

Data tabulated for analysis included date of mating, stallion used for mating, session of the day for the stallion (first, second, third mating, etc.), mare identification, mare age, beginning mare status (maiden, foaling, barren, not bred, slipped), boarding farm for the mare, cycle of breeding (first, second, third cycle, etc), whether the mare was mated twice during the same estrus (double), whether the mare was administered a tranquilizer cocktail before breeding, whether the mare was reinforcement bred on that cycle, and pregnancy outcome for that cycle of mating.

To evaluate the effect of tranquilization of maiden mares on pregnancy outcome, the statistical model used to adjust for potential confounding variables (stallion, mare age, month of breeding, breeding session of the day, tranquilization, and reinforcement breeding) was relatively complex and used recently developed estimation methods. Briefly, the model used Bayesian inference, with vague prior beliefs and a Markov Chain Monte Carlo implementation.[6] The Markov Chain Monte Carlo implementation was performed using WinBUGS version 1.4.3. The initial 1,000 iterations were discarded to allow for convergence and the next 100,000 iterations were sampled for the posterior distribution. For the purpose of reporting '*P*' values, *P* was reported as $< .05\%$ when the 95% Bayesian credibility interval for the odds ratio excluded one.

Table 1. Influence of administration of a tranquilizer cocktail[a] to maiden mares prior to breeding on unadjusted pregnancy rates per cycle (PR/cycle) in 792 matings to 1 of 15 stallions on one Thoroughbred breeding farm in central Kentucky during 2005–2007

Tranquilization Status	Number of Mares	Number of Estrous Cycles Bred	PR/Cycle
Tranquilized	147	163	63.8%
Not tranquilized	515	629	69.0%

Pregnancy outcome achieved in all mares (maiden, foaling, barren, not bred, and slipped) was used as baseline risk for calculating odds ratios. $P > .05$ when the 95% Bayesian credibility interval for the odds ratio excludes 1.00. Mean odds ratio for influence of tranquilization on pregnancy outcome in maiden mares was 0.805 (95% CI = 0.534–1.172).

[a] 20 mg acepromazine, 100 mg xylazine, and 10 mg butorphanol tartrate injected intravenously.

RESULTS

Pregnancy data were available from a total of 792 matings of 531 maiden mares, using one of 15 stallions. One hundred sixty-three matings were accomplished after tranquilization, whereas 629 matings were accomplished without tranquilization. Mean odds ratio (OR) for influence of tranquilization on pregnancy outcome in maiden mares was 0.805 (2.5% CI = 0.534; 97.5% CI = 1.172′ $P > .05$). Effects of tranquilization on pregnancy rates per cycle in maiden mares is presented in Table 1.

DISCUSSION

Both xylazine and acepromazine have been shown to affect uterine contractility. Xylazine (an α-adrenergic receptor agonist with both α_1 and α_2 effects) has an oxytocin-like effect on the ruminant uterus.[7-10] Xylazine administration resulted in similar increases in intrauterine pressure of nonpregnant cows in the periovulatory period as oxytocin administration did, with the greatest increase in pressure occurring in proestrus.[11] In the mare, xylazine increases myoelectrical activity of the uterus[12] and causes a tetanic increase in intrauterine pressure when administered during estrus.[13] Detomidine (also an α-adrenergic receptor agonist with a more potent α_2 effect than xylazine) administration has also been shown to increase uterine contractions in the normal nonpregnant mare.[14] By contrast, acepromazine (an α_1 antagonist) decreases myoelectrical activity of the uterus of normal mares[12] and decreases the number of uterine contractions in mares with delayed uterine clearance.[13] It is possible that administration of tranquilizing agents just before breeding could interfere with uterine contractions necessary to propel sperm toward the