INTRODUCTION

Elimination of a twin pregnancy before fixation at 17 days of gestation in unilateral twins and by day 25 in bilateral twins is a widely accepted procedure in the mare given the complications associated with delivering twins. Mares carrying twins are more likely to abort, deliver nonviable or severely compromised foals or experience dystocia if a twin pregnancy is allowed to continue to term (Macpherson and Reimer 2000; McKinnon 2007). In addition, the future reproductive function of the mare can be impacted negatively (Pascoe et al. 1987). In 1982, Ginther (Ginther et al. 1982) proposed a natural reduction hypothesis for twinning mares. Natural twin reduction was more likely if twins were adjacent than if twins were located in opposite horns. Eighteen of 28 (64%) twins reduced to a singleton pregnancy naturally by 40 days of gestation with 17 of 19 (89%) adjacent twins reducing to singleton versus 1 of 9 (11%) bilateral twins (Ginther et al. 1982). In twin studies with an endpoint of 42-45 days of gestation, twin pregnancies were reduced successfully to a viable singleton pregnancy in over 90% of attempts (McKinnon 2007; Pascoe et al. 1987). Data on live foal rate, however, is limited to only 10 mares (Veronesi et al. 2005). Because of the paucity of information on this important procedure, two studies were conducted at Rood and Riddle Equine Hospital to determine factors associated with twin reduction that may affect live foal rate. Parameters evaluated included the effect of embryo location, adjacent versus non-adjacent at time of reduction, mare age, parity, mare status, operator and bacterial infection.

STUDY 1 (Schnobrich et al. 2010)

The study was conducted to determine if embryo location, adjacent versus non-adjacent, parity, progesterone concentration or age affected live foal rate after twin reduction. Breeding records from five Thoroughbred farms in Central Kentucky were evaluated to identify mares with twin pregnancies. Foaling and pregnancy loss rates were recorded for all mares undergoing manual twin reduction between 13 and 17 days of gestation (n= 129 mares; twinning group) and were compared to those of mares diagnosed with one vesicle (n=126 mares; control group) residing on the same farm. Twinning mares were matched to control mares by age (mean age difference was 1.21 years), breeding date (within 35 days), parity (difference of 0.48 foals), and farm. Mares with a history of colic, severe lameness, past reproductive surgeries (cervical repairs, urethral extensions) or medical issues requiring hospitalization during the study period were excluded. Parity was determined by evaluation of the Jockey Club’s records of reported registered foals. Mares were divided by age into 5 groups: young (3 – 7), young middle age (8 – 12), mid-teens (13 – 16), older teens (17 – 20), and over 20 years. Twins were identified by transrectal ultrasonography using an Aloka SSD-550V (Aloka) 1, with a 5
MHz linear probe, and the size and location of the embryos within the uterus at time of pregnancy diagnosis between 13 and 17 days post-ovulation were noted. Location of vesicles were recorded as being in either the left horn, right horn or uterine body and were further described as being adjacent (in contact with one another) or non-adjacent (not in contact). All twin eliminations were performed by one veterinarian. A blood sample was obtained from the jugular vein at time of manual twin reduction to measure progesterone.

Forty-six twinning mares (36%) had adjacent vesicles while 83 (64%) had non-adjacent vesicles. Live foal rates did not differ for adjacent and non-adjacent embryos (adjacent embryos: 38/46, 82.6%; non-adjacent embryos: 61/83, 73.5%, or between twinning mares (99/129, 76.7%) and control mares (104/126, 82.5%). Size of vesicle at time of manual reduction did not affect foaling rate. However, age affected foaling rate with twinning mares > 9 yr having a lower foaling rate (45/69, 65.2%) than younger twinning mares (54/60, 90%; p < 0.005). Age did not affect foaling rates for control mares (43/54 = 79.6% for older mares and 61/72 = 84.7% for younger mares). More barren mares twinned (42/65, 64.6%) compared to maiden (14/37, 37.8%) and foaling mares (72/153, 47.1%) (p=0.016).

Plasma progesterone concentrations were not associated with pregnancy loss or live foal rate in mares. Mean plasma progesterone concentration of twinning mares (15.03±0.46 ng/ml) was higher than that of control mares (10.67±0.47 ng/ml) when compared across the same day of ovulation (p<0.0001).

STUDY 2 (Sheerin et al. 2010)

Study 2 was conducted to determine if pregnancy loss after manual twin reduction to a singleton between 13 and 20 days of gestation was affected by veterinarian performing the procedure, drug treatment or mare age. Mares that underwent manual reduction of a twin pregnancy were compared to mares diagnosed with a single embryonic vesicle from the same farm during the same breeding season. Data collected included age, breed, operator, gestational age at twin reduction, birth of a live foal, gestational age at pregnancy loss, treatments and health status during pregnancy.

Fourteen operators were included in the study. Only those operators that reduced at least 20 twin embryos were included in the statistical analysis for determining effect of operator on live foal rates.

A total of 1493 twin reductions and 1378 mares with single embryonic vesicles were included in the study. Ninety seven percent of mares were Thoroughbreds. Age of mares ranged from 2 to 24 years of age. Live foal rate of mares that underwent a twin reduction was lower (1199/1493; 80.3%) than that of controls (1195/1378; 86.7%; p < 0.05). Operator did affect outcome. Live foal rate was lower for 2 of the 14 operators evaluated and an additional two operators tended to have lower pregnancy rates. Years in practice was not associated with loss rates. Twinning mares older than 15 years had a lower foaling rate (66.2%; 139/210) than younger mares (83.2%; 1037/1246; p < 0.01) or control mares. Control mares older than 15 years and carrying singletons also had a lower foaling rate (77.6%; 149/192) than younger mares carrying singleton pregnancies (89%; 1012/1139; p < 0.001). Mares that experienced a significant health issue during pregnancy were more likely to lose their pregnancy (p < 0.001).

Bacteria were isolated from 38 of 102 (37%) endometrial swabs collected after pregnancy loss in twinning mares and from 8 of 33 (24%) swabs collected after pregnancy loss in control mares. Beta hemolytic *Streptococcus* was isolated most frequently (13/38, 34%) in twinning mares and a non-pathogenic organism (8/33, 24%) in control mares.

Mares treated at time of manual reduction with flunixin meglumine and progesterone had higher foaling rates than mares treated differently or not at all (82% vs 80.7% and 77%, respectively; p= 0.02).
DISCUSSION

Mare age, reproductive status, operator and treatment affected live foaling rates in mares undergoing manual twin reduction whereas, parity and vesicle location –adjacent versus non-adjacent or maternal serum progesterone concentrations did not. Mares > 9 years of age in study 1 and mares > 15 years of age had lower pregnancy rates than younger mares and control mares. The difference between the two studies may be due to a lower number of mares in study 1, a single operator reducing twin pregnancies versus many operators in study 2 or a lower number of mares diagnosed with endometritis after manual reduction of a twin. Pregnancy loss may be related to a higher embryonic mortality seen in older mares and possibly subclinical endometritis as bacteria were isolated from 37% of mares that underwent twin reduction. In study one, barren mares twinned more frequently than maiden and foaling mares, which is in agreement with Allen (Allen et al. 2007) in a retrospective review of reproductive records on English Thoroughbred mares. Ginther has shown a higher incidence of double ovulations and twin embryos in barren mares (80/680 mares, 11%; 20/315 mares, 6%, respectively) relative to lactating mares (60/1099 mares, 5% and 8/555 mares, 1.4%, respectively). Treatment with an anti-inflammatory drug and progestin was associated with increased live foal rates in study 2. This conflicts with data from Pascoe et al (1987) who did find differences between treatments.

REFERENCES


