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Does Doppler ultrasonography for recipient selection improves the pregnancy success in equine embryo transfer programs?

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Resumo

Doppler ultrasonography is an emerging technology in equine reproduction and has the potential to assist in the challenge of selecting the best recipient in embryo transfer (ET) programs. We aimed with this study to test the hypothesis that corpus luteum (CL) and uterine blood perfusion determined by Doppler ultrasonography are characteristics more associated with pregnancy success than B-mode accessed characteristics in the CL and uterus of recipient mares. The study was carried out from November/2021 to April/2022 in a commercial farm of Mangalarga Marchador breed in Itaperuna-RJ, Brazil. Recipient mares (n=101), aging from 3 to 16 years old, and on days 4 to 8 after ovulation received a single fresh grade I or II blastocyst (7-10 days after fertilization), recovered by uterine flush from Mangalarga Marchador donors. Before ET, the reproductive system was evaluated by transrectal palpation (uterine tone [0 to 3]), B-mode ultrasonography (CL echogenicity [0 to 6], type of CL [homogenous, trabeculated or with an anechoic center], luteal area [cm²], and uterine echogenicity [0 to 3], edema [0 to 3] and echotexture [0 to 3]) and Color Doppler ultrasonography (CL signals of blood perfusion [0 to 100%], and endometrial and myometrial blood perfusion [1 to 4]). Recipients were split retrospectively in two subgroups according to the mean of CL area [small (≤6 cm²) or large (>6 cm²)], two subgroups according to CL blood perfusion [low (≤55%) or high (>55%)] and five subgroups according to the day related to recipient's ovulation at ET [4 to 8 days]. Pregnancy diagnosis was performed by transrectal ultrasonography based on visualization of a 14- to 16-days embryonic vesicle and Pregnancy/ET (P/ET) was analyzed by logistic regression or GLIMMIX procedure of SAS, considering the effects of all CL and uterine characteristics and recipient's day of ovulation. When CL and uterine characteristics were evaluated according to pregnancy status, a tendency of greater (P=0.09) CL blood perfusion was observed in pregnant (n= 76) than non-pregnant (n= 25) recipients. Among all factors evaluated, P/ET was only significantly (P=0.007) affected by the class of CL blood perfusion (low: 65.5% [38/58] vs. high: 88.4% [38/43]). Also, P/ET tended to be greater (P=0.1) in recipients with high than low endometrial blood perfusion (83.5% [26/31] vs. 71.4% [50/70]). When evaluated as a continuous variable, the CL area did not (P>0.1) affect the P/ET, but for CL blood perfusion, a cubic effect (P=0.005) indicated that P/ET is negatively associated to the CL blood perfusion until it reaches 45%, followed by a positive relationship until 75% and then a negative relationship up to 90%. In conclusion, Doppler-US is an innovative tool that has the potential to be used for selection of suitable embryo recipients based on luteal blood perfusion. Selection of recipients that have a greater chance of maintaining pregnancy will increase the success of ET programs in horses.