Effects of embryo size at transfer (whole versus demi) and early pregnancy progesterone supplementation on embryo growth and pregnancy-specific protein bovine concentrations in recipient dairy heifers

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Abstract

The objectives of this study were to evaluate embryonic size and survival, plasma progesterone (P4) and pregnancy-specific protein bovine (PSPB) concentrations in early pregnancies (n = 99) following the transfer of one whole (n = 66) or one demi (n = 33) embryo to recipient virgin dairy heifers. The experiment was designed to evaluate the fixed effects of embryo size at transfer (whole or demi embryo) on Day 7 of the estrous cycle (Day 0 = estrus) and P4 supplementation between Days 7 to 19 through an intravaginal device (yes or no) on plasma P4 and PSPB concentrations and on embryo measurements. Plasma P4 concentrations were measured by RIA on Days 0, 7, 14, 19, 21, 25, 35, 42, 49, 56 and 63 of pregnancy and, PSPB concentrations were measured by ELISA on Days 7, 21, 25, 35, 42, 49, 56 and 63. The presence of an embryonic vesicle was detected on Day 25, embryonic (fetal) movements and heartbeat were evaluated on Days 42 and 63 and embryo measurements [crown-rump length (CRL) and width at mid body] were obtained on Day 42 through ultrasonography.

In non-supplemented pregnancies, Day 42 whole embryos had higher (P < 0.05) CRL and width than demi embryos, but the difference averaged only 1 to 2 mm. In P4 supplemented pregnancies, whole and demi embryos attained a similar size on Day 42 of pregnancy. Embryo size at transfer, early exogenous P4 supplementation and their interactions had no effects (P > 0.05) on plasma P4 concentrations. However, the post-hoc LSD evaluation showed that plasma P4 concentrations on Day 25 were higher (P < 0.001) in whole than in demi embryo derived pregnancies and, that exogenous P4 supplementation increased (P < 0.05) plasma P4 concentrations on Day 19 of pregnancy. The plasma PSPB detection rate on Days 7 to 63 of pregnancy was similar in pregnancies resulting from the transfer of whole and demi embryos. From a total of 93 recipients remaining pregnant until Day 63, plasma PSPB was constantly undetectable on Day 7, was detected in 4% of Day 21 samples, 41% of Day 25, 95% of Day 35, 96% of Day 42, 99% of Day 49 and in 100% of samples of Days 56 and 63. Concentrations of PSPB increased (P < 0.05) from Days 21 to 42 and from Days 56 to 63, with a plateau between Days 42 to 56. Demi embryo pregnancies had higher (P < 0.05) plasma PSPB concentrations on Days 35 and 42 than whole embryo pregnancies. Progestrone supplementation had a positive effect (P < 0.01) on PSPB concentrations from Days 35 to 63. Concentrations of PSPB were similar in non-supplemented pregnancies.

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