Assessing Epidemiologic Risk of the Quantity of Bovine Viral Diarrhea Virus found to be Associated with in vivo-derived Bovine Embryos

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Introduction

Bovine viral diarrhea virus (BVDV) has been shown to be associated with single transferable in vivo-derived and in vitro-produced bovine embryos despite washing. However, a thorough risk assessment of the potential for transmission of BVDV via transfer of in vivo-derived embryos has not been undertaken. Hence, the primary objective of this study was to evaluate the potential of BVDV to be transmitted during the transfer of in vivo-derived embryos.

Materials and Methods

A total of ten in vivo-derived day 7 bovine embryos were non-surgically collected from a BVDV virus negative and seronegative donor cow. After collection, embryos where washed in accordance with the International Embryo Transfer Society (IETS) standards for in vivo-derived bovine embryos. Following washing, embryos where then placed into transfer media with a dilution of strain SD-1, type 1a, BVDV calculated to be at a concentration of approximately 3,200 cell culture infected doses (50 % endpoint: CCID50)/mL. The embryos were immediately aspirated into quarter mL straws and transfered into seronegative recipients. The total quantity of virus transferred into the uterus of each recipient was approximately 750-800 CCID50. This amount of virus was consistent with the average amount of BVDV associated with in vivo-derived and intro-produced embryos following standard IETS washing procedures after in vitro exposure to virus. The positive control heifer was inoculated with 2.3 x105 CCID50 of BVDV via the intrauterine route. The negative control heifer was inoculated with 2.3 x105 CCID50 of heat inactivated BVDV via the intrauterine route. Blood was drawn from all heifers on days 0, 3, 4, 6, 7, 8, 9, 10, 12, 15 and 30 after inoculation. Serum and buffy coat samples were analyzed for serum neutralizing antibodies and virus, respectively.

Results

The positive control heifer and all recipients of embryos and 800 CCID50 of virus exhibited viremia by day 8 post-transfer and seroconverted by day 15. The negative control heifer did not exhibit a viremia or seroconvert. All recipients receiving embryos were assessed for pregnancy using transrectal ultrasonography on d 30 post-transfer. Six of ten heifers were pregnant. These animals are continuing to be monitored and fetal tissues will be examined for virus at a later date.

Significance

Results demonstrate that the average quantity of BVDV associated with bovine embryos after in vitro exposure and washing can result in viremia and seroconversion after transfer into the uterus of seronegative recipients during diestrus. The potential for these embryos to result in persistently infected calves remains to be determined.