83 Pregnancy losses after transfer of bovine embryos produced by assisted reproductive Technologies

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The aim of this study was to evaluate risk factors for pregnancy loss in embryo recipients. We evaluated data from 31,792 embryo transfers (ET),including 859 embryos derived *in vivo* (IVD), 28,814 produced *in vitro* (IVP), and 2,119 produced by somatic cell nuclear transfer (SCNT), recorded from 2008 to 2012 on a single commercial farm. Embryos were produced by different *in vitro* embryo production laboratories, but ET was performed by the same team and within the same herd. Recipients were checked for pregnancy (PR) by ultrasonography 23 days after ET and re-examined on Days 60, 90, and 120 of gestation to identify pregnancy losses (PL). Data were analysed for the main effect of embryo production technique upon PL. For IVD and IVP embryos only, additional risk factors were included in the statistical model, including cryopreservation, type of sêmen (conventional, sex-sorted, reverse sex-sorted), embryo developmental stage, recipient corpus luteum quality score, use of natural oestrus or synchronization protocol, embryo-recipient synchrony, embryo genetics (taurine *v.* zebu, dairy *v.* beef), season (summer *v.* winter), and fetal sex. Data were analysed using the GLIMMIX procedure of the SAS Software (v 9.3, SAS Institute Inc., Cary, NC, USA). Overall PR was 42.1% (13,395 of 31,792) and PL between days 30 and 60, 60 and 90, and .90 were 8.7, 5.3, and 3.5%, respectively (cumulative PL ¼ 17.4%). The SCNT embryos had lower PR compared to IVP and IVD embryos (36.6, 42.5, and 44.2%, respectively; *P* , 0.001) as well as a greater PL in all periods (30-60 ¼ 45.2, 6.4, and 8.2%; 60-90 ¼ 3.5, 1.4, and 1.8%; and .90 ¼ 21.4, 6.3, and 7.1%, respectively; *P* , 0.0001). The PR was similar between fresh and frozen embryos, but lower for vitrified ones (42.9, 43.1, and 39.1%, respectively, *P* , 0.05). Slow freezing resulted in a greater total PL compared to fresh embryos (18.0 *v.* 13.9%, respectively; *P* , 0.05). We observed an interaction between embryo genetics and season. The taurine dairy subgroup had the lowest PR during summer (37.7 *v.* .41.7% in all other groups; *P* , 0.01), but within this group PR increased during winter (37.7 *v.* 44.6%, *P* , 0.05). The PL was greater for taurine than zebu during summer (17.8 *v.* 14.0%; *P* , 0.001), but did not differ during winter (*P* . 0.05). The type of semen, embryo developmental stage, corpus luteum quality score, and embryo recipient synchrony affected pregnancy rates (*P* , 0.05) but not pregnancy losses (*P* . 0.05). Interestingly, the use of ovulation synchronization protocols resulted in similar pregnancy rates but greater pregnancy losses compared to natural oestrus (41.8 *v.* 43.2%, *P* . 0.05; and 15.9 *v.* 22.1%, *P* , 0.05, respectively). Pregnancy loss after 60 days was similar between female and male fetuses (5.0 *v.* 4.9%, respectively; *P* . 0.05). In summary, the assisted technology used to produce and freeze embryos was the main cause of variation in pregnancy losses, which were also affected by the interplay of season by genetic background and by the use of synchronization protocols. Conversely, factors known to affect pregnancy rates, such as embryo developmental stage, corpus luteum quality, and embryo-recipient synchrony, had no effect upon pregnancy loss.

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