

## **Incidence and timing of pregnancy loss following timed artificial insemination or timed embryo transfer with a fresh or frozen in vitro produced embryo**

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### **ABSTRACT**

The aim of this study was to characterize the incidence and timing of pregnancy loss from service event (timed artificial insemination, AI or timed embryo transfer, ET) to parturition. Lactating Holstein Friesian cows received either AI (n = 243) or ET (n = 863) with a fresh or frozen in vitro produced (IVP) blastocyst produced using oocytes collected from the ovaries of elite dairy donors (n = 14 Holstein Friesian and n = 8 Jersey; ET-DAIRY) and elite beef donors (n = 21 Angus; ET-BEEF) using transvaginal ovum pick-up. Blood samples were collected on d 7 from all cows to determine progesterone concentration and from subsets of cows on d 18 (n = 524) and d 25 (n = 378) to determine mRNA abundance of interferon-stimulated gene-15 (*ISG15*) and pregnancy-specific protein B concentration (PSPB),

respectively, to provide an early pregnancy diagnosis. Transrectal ultrasonography was conducted to determine pregnancy status on d 32, d 62 and d 125 after synchronized ovulation. Parturition date was recorded for all cows that reached a term delivery. Probability of pregnancy (%) varied at each time point depending on treatment (AI: 70.9, 67.3, 57.3, 48.8, 47.0, 44.8, 44.3; Fresh ET: 100.0, 73.2, 60.1, 56.1, 48.4, 46.0, 44.6; Frozen ET: 100.0, 67.6, 52.9, 41.6, 32.9, 31.3, 29.7). Irrespective of treatment, the largest proportion of pregnancy loss occurred in the period from service event (AI on d 0 or ET on d 7) to d 18, with minimal loss occurring between d 62 and parturition (AI: 1.8%, ET fresh: 1.9%, ET frozen: 3.5%). Differences in P/S were detected between fresh vs frozen ET on d 32 ( $P = 0.0001$ ) and both AI and Fresh ET vs Frozen on d 62, 125 and at parturition ( $P < 0.05$ ). There was greater probability of pregnancy loss ( $P = 0.002$ ) between d 32 and 62 following ET (Fresh: 11.3%, Frozen: 18.0%) than AI (4.0%). The percentage of cows that calved following transfer of a fresh embryo was similar to AI. In conclusion, AI and fresh ET led to a greater probability of a cow becoming pregnant and maintaining the pregnancy to term than frozen ET. Cows that were still pregnant on d 62 had a very high likelihood of maintaining the pregnancy to parturition. Further work is required to improve probability of pregnancy and reduce embryonic and fetal mortality following transfer of a cryopreserved IVP embryo.

**Keywords:** In vitro fertilization, embryonic mortality, assisted reproductive technology, bovine