

## Imprinted gene expression in *in vivo*- and *in vitro*-produced bovine embryos and chorio-allantoic membranes

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**ABSTRACT.** Cloning by nuclear transfer is often associated with poor results due to abnormal nuclear reprogramming of somatic donor cells and altered gene expression patterns. We investigated the expression patterns of imprinted genes *IGF2* and *IGF2R* in 33- to 36-day bovine embryos and chorio-allantoic membranes derived from *in vivo*- and *in vitro*-produced embryos by somatic cell nuclear transfer (SCNT), parthenogenetic activation, and *in vitro* fertilization (IVF). There was a lower *IGF2* expression rate in the SCNT (0.19) and parthenogenetic (0.02) groups when compared to *in vivo* and IVF embryos (2.01;  $P < 0.05$ ). In the chorio-allantoic membranes, *IGF2* showed a baseline expression pattern ( $P < 0.05$ ) in parthenotes (0.001) when compared to *in vivo*, IVF (3.13), and SCNT (0.98) groups. *IGF2R* was less expressed ( $P < 0.05$ ) in SCNT chorio-allantoic membranes (0.25) when compared to the *in vivo* group. The low expression of *IGF2* in parthenogenetic embryos and

chorio-allantoic membranes confirms its imprinted status in cattle. Alterations in the relative frequency of *IGF2* and *IGF2R* transcripts were observed in SCNT-derived bovine embryos and chorio-allantoic membranes, respectively, supporting the hypothesis that abnormalities in the expression of imprinted genes are causes of the low efficiency of SCNT procedures in this species.

**Key words:** Cattle; Epigenetics; Genomic imprinting; *IGF2*; *IGF2R*; Nuclear transfer