

BOVINE MODEL TO STUDY AGE-ASSOCIATED INFERTILITY IN WOMEN: DEVELOPMENTAL COMPETENCE OF OOCYTES

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At present, there is no well-characterized animal model to study reproductive aging in women. This experiment was designed to study the effect of age on oocyte developmental competence in cattle, and to validate a bovine model for the study of reproductive aging in women. We hypothesize that maternal aging in cattle is associated with reduced oocyte developmental competence. In year 1, 13–15 years old cows ($n = 6$) and their 3–5 years old young daughters ($n = 68$) were superstimulated with exogenous FSH and LH. The cows in both age groups were artificially inseminated. Embryos were collected non-surgically, evaluated and transferred in pairs into synchronized 2–5 years old recipient cows ($n = 632$). The experiment was repeated in year 2 with same group of old cows ($n = 69$; 14–16 years old) and their daughters ($n = 69$; 3–6 years old), but the embryos were transferred both as singletons and pairs (67 recipient cows; age, 2–5 years). Ultrasonically detected ovulations, recovery of ova/embryos, and embryo survival were compared by Student's *t*-test and Fisher's exact test. The mean number of ovulations per donor (31 ± 4 versus 38 ± 3 ; $p = 0.15$) and mean ova/embryos recovered (21 ± 4 versus 20 ± 3 ; $p = 0.8$) did not differ between old cows and their daughters, respectively. However, fewer embryos ($p = 0.04$) were recovered from old cows (6 ± 2) than their daughters (12 ± 2). Similarly, the proportion of oocytes/uncleaved zygotes collected from old cows was higher ($p < 0.0001$) than their daughters (222/312, 71% versus 119/316, 38%, respectively). The proportion of IETS grades 1–2 embryos (59/90, 66% versus 133/197, 68%; $p = 0.9$) did not differ between age groups. Survival of embryos in recipients on day 45 of gestation did not differ between old and young cows (24/57, 42% versus 46/96, 48%; $p = 0.5$). The reduced recovery of embryos and higher proportion of oocytes/uncleaved zygotes in old cows than their daughters supports the hypothesis that aging is associated with reduced developmental competence of oocytes.

Keywords: Aging; Bovine model; Oocyte