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The effect of sperm–oocyte incubation time on in vitro embryo development using sperm from a tetraparental chimeric bull

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Abstract

The present study was designed as 5 × 4 factorial to investigate the effects of using sperm from 5 bulls, and varied sperm–oocyte incubation times (5, 10, 15 and 20 h) on the fertilization, cleavage rates and blastocyst formation on an in vitro bovine embryo production system. The bulls included a tetraparental Chimera, its sires (Japanese Black and Limousin), its maternal grand-sires (Japanese Brown and Holstein). The proportion of polyspermy, 2-pronuclei formation, fertilization, cleavage and development to blastocyst were affected ($p < 0.01$) by the duration of sperm–oocyte incubation, as well as by the interaction between bulls and their corresponding sperm–oocyte incubation time. Blastocyst rate observed after 5 h in oocytes inseminated with Chimera, Japanese Black and Limousin were higher ($p < 0.05$) than those observed at 20 h incubation. The proportion of blastocysts from oocytes inseminated with Japanese Black observed at 10 h of incubation did not differ from that of Chimera, but both were higher ($p < 0.05$) than those observed for the Limousin, Japanese Brown and Holstein sires. The present study showed that there was an effect by the duration of sperm–oocyte incubation on in vitro embryo development. The optimal time of sperm–oocyte incubation for the Chimera was similar to that of its sires (Japanese Black and Limousin) but differed from its maternal grand-sires (Japanese Brown and Holstein). The fertilization rates for the sperm from the Holstein bull increased up to 15 h suggesting that this might be the only bull that would benefit from a long incubation period for insemination. © 1997 Elsevier Science B.V.

Keywords: Sperm–oocyte incubation time; Tetraparental; Embryology; In vitro fertilization

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