Effect of Polyunsaturated Fatty Acids (PUFA) on Bovine Oocyte In Vitro Maturation and Subsequent Embryo Development and Freezability

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Previous studies indicate that fatty acid composition in bovine oocytes might interfere in its maturation and developmental capacity. Furthermore, oocyte membranes integrity after chilling was improved by PUFA supplementation. We aimed to investigate the effects of PUFA, arachidonic acid (C20:4n-6) and eicosapentaenoic acid (C20:5n-3), on oocyte maturation and subsequent embryo development and freezability. Abattoir-derived oocytes (n = 4827) were matured in TCM199+10% serum+10 µg/ml FSH+ 100 µM GSH supplemented or not with different doses (10 and 100 µM) of C20:4n-6 and C20:5n-3. After in vitro fertilization (IVF = D0), putative zygotes (n = 2414) were cultured (5% CO2; TCM199+10% serum+granulosa cell monolayers) to the blastocyst stage. Some blastocysts (n = 138) were vitrified and thawed for viability assessment. Data from embryo production (15 sessions) and post-thawing survival (six sessions) were analysed using ANOVA. Mann-Whitney U test was used for embryo quality. PUFA supplementation did not influence either on oocyte maturation, as confirmed by morphological evaluation and nuclear staining, or on embryo production. D7-8 embryo quality was better (p = 0.02) than control when using 10 µM C20:4n-6. Post-thawing embryo survival improved (p < 0.01) following oocyte maturation with 10 (92.5 ± 4.8%) and 100 (96.7 ± 4.8%) µM of C20:4n-6 or 100 µM C20:5n-3 (95.8 ± 4.2%) when compared to control (70.3 ± 8.9%). Results show that PUFA supplementation during oocyte maturation can improve embryo quality and the resistance to cryopreservation.