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Simulated Physiological Oocyte Maturation (SPOM) system application in cattle: A Systematic Review

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Resumo

The Simulated Physiological Oocyte Maturation (SPOM) mimics *in vitro* the physiological events of oocyte maturation. The system uses cAMP modulators in two steps (pre IVM and IVM) and presented promising results for IVF in livestock, generating great interest, many adaptations, and controversies. Thus, this study aimed to systematically analyze the data available in the literature using SPOM in cattle and compared those to the original paper (Albuz et al., Hum. Rep., 25: 2999–3011 2010), classifying them into successful or failed. The PubMed, Scopus, and Google Scholar databases were consulted, and 15 studies were included. Out of those, data from 18 experiments were extracted and evaluated by descriptive statistical analysis. Just experiments that assessed blastocyst rate (BR) were considered for the success parameter, as successful (increase in BR) or failed (neither difference nor reduction in BR). Twenty-five percent (4/16) of the experiments succeeded to improve blastocyst production. From the experiments that used the original base medium (n=3), 33% were successful. Most experiments used TCM-199 as a base medium (13/18) and 27% of them were successful. Considering pre IVM, experiments using either original (14/18), or adapted (4/18) conditions had the same chance of success (about 25%). Regarding IVM, most experiments used cilostamide and, of those, 30% (3/10) had success. All the four successful experiments changed the IVM duration, three of them reduced the duration to 20 h or 24 h, whilst one study increased the duration to 30 h. Four experiments (4/18; 22%) used BSA as the original study concentration (4mg/mL) and only one of them succeeded. Seven experiments (7/18; 38%) used lower concentrations of BSA (0.2 to 1 mg/mL) and 3 of them succeeded. All studies that replaced BSA by FCS failed to increase blastocyst production (n=2). The studies applying the original type and dose of FSH (n=5) had 20% of success, while those promoting adaptations (n=8) reached about 28% of success. Six experiments conducted IVC under high tension of oxygen and most of them (83%, 5/6) failed. The only successful experiment under high oxygen tension also reduced the IVM duration from 28 h to 24 h. Considering oocyte and embryo assessments, two experiments measured cAMP levels and showed an increase; one of them could not be evaluated for BR and the other succeeded. Six experiments assessed nuclear maturation, most of them (83%, 5/6) observed the arrest of meiosis and of those that assessed maturation, 33% (2/6) succeeded to improve blastocyst production. Nine experiments assessed the blastocyst total number of cells and two (29%) showed an increase. Our findings clearly indicate a difficulty in reproducing the SPOM system worldwide and suggest that different supplements used in IVM medium and/or their interaction with modulators for a different time duration, may represent a great bias on the experimental success.