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Author(s)	ARASHIMA, Chie
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EFFECTS OF OXYGEN TENSION AND GLUCOSE CONCENTRATIONS
ON *IN VITRO* FERTILIZATION OF BOVINE OOCYTES

Chie ARASHIMA

*Department of Theriogenology
Faculty of Veterinary Medicine,
Hokkaido University, Sapporo 060, Japan*

To determine the effects of oxygen tension and concentrations of glucose in the insemination medium in the process of *in vitro* fertilization of bovine oocytes, fertilization rates (Exp. 1), sperm motility (Exp. 2) and the development of embryos after *in vitro* fertilization (Exp. 3) were examined. *In vitro* matured bovine oocytes were co-incubated with frozen-thawed sperm (5×10^6 cell/ml) in modified Brackett and Oliphant isotonic medium (mBO) supplemented with 2.5 mM theophylline and 0, 1.39 or 13.9 mM glucose under 5 or 20% O₂. In experiment 1, insemination in 5% O₂ improved total and normal fertilization rates compared with 20% O₂ ($p < 0.05$). Total and normal fertilization rates of oocytes fertilized in mBO supplemented with 1.39 or 13.9 mM glucose were higher than those fertilized in mBO without glucose ($p < 0.05$). In experiment 2, there was no significant difference in the sperm motility between 5 and 20% O₂ after incubation for 1 hr. After incubation for 3 and 6 hrs, the percentage of motile sperm in 20% O₂ was higher than in 5% O₂ ($p < 0.05$). As the concentration of glucose increased, the percentage of motile sperm was higher in either 1-, 3- or 6-hr incubation periods. That is, total and normal fertilization rates were higher under 5% O₂ regardless of the lower sperm motility. In experiment 3, presumptive zygotes were cultured in modified synthetic oviduct fluid medium (mSOF) supplemented with 20 kinds of amino acids, polyvinylalcohol (1 mg/ml), gentamicin sulfate (50 μ g/ml) and insulin (10 μ g/ml), without glucose and bovine serum albumin. Cleavage rates were determined after 2 days of *in vitro* culture and all of the blastocysts were obtained after 6 days of *in vitro* culture. The percentage and total cell numbers of blastocysts were not different among the conditions in which the oocytes were inseminated under 5 or 20% O₂ and 1.39 or 13.9 mM glucose. However, the cleavage rate in 5% O₂ tended to be higher than that in 20% O₂ ($p = 0.067$). In conclusion, it was shown that the addition of glucose to the modified BO medium used for *in vitro* fertilization and incubation in 5% O₂ can improve fertilization rates.