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In the last decades, reproductive biotechnologies in animal breeding have experienced a wide distribution and economic implementation. The individual methods are most developed in cattle. Reproductive biotechnologies have manifold applications and contain a great innovation potential in livestock. Due to the global changes, the new findings and techniques can aid to meet the future challenges. In particular, in vitro production (IVP) of bovine embryos is now widely applied under field conditions. This in vitro technique provides new opportunities for cattle producers, particularly in the dairy industry, to overcome infertility and to increase dissemination of animals with high genetic merit. Improvements in OPU/IVP resulted in large-scale international commercialization. More than a million IVP embryos are generated on the yearly basis demonstrating the enormous potential of this technology. These advances and the fact that bovine and human early development is remarkably similar have further prompted the use of bovine embryos as a model system to study early mammalian embryogenesis including humans. Despite all the improvements, embryos generated in vitro still differ from their in vivo derived counterparts. Embryos must adjust to multiple microenvironments at preimplantation stages. Consequently, maintaining or mimicking the in vivo situation in vitro will aid to improving the quality and developmental competence of the resulting embryo. The successful clinical application of the techniques in reproductive biotechnology requires both specific clinical skills and extensive laboratory experience.

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