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A retrospective study on the evolution and outcomes of oocyte pick-up (OPU) procedures in dairy cows

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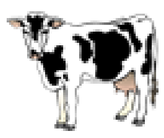
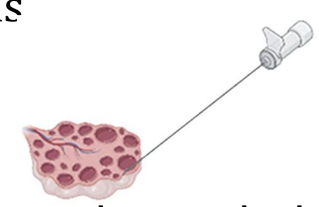
Abstract: *Oocyte pick-up (OPU), also called ovum pick-up, is now widely recognized as a key technique in bovine reproductive biotechnology, allowing the efficient collection of oocytes from live donors for in vitro embryo production (IVEP). Since its introduction in the late 1980s as a transvaginal ultrasound-guided aspiration method, the technique has undergone continuous technical and biological refinements. However, variability in oocyte quality and embryo outcomes remains an important limitation. Overall, OPU has evolved from an experimental approach into a routine and essential tool in bovine reproduction, with ongoing research aimed at further improving its consistency, efficiency, and integration with emerging technologies.*

• Introduction

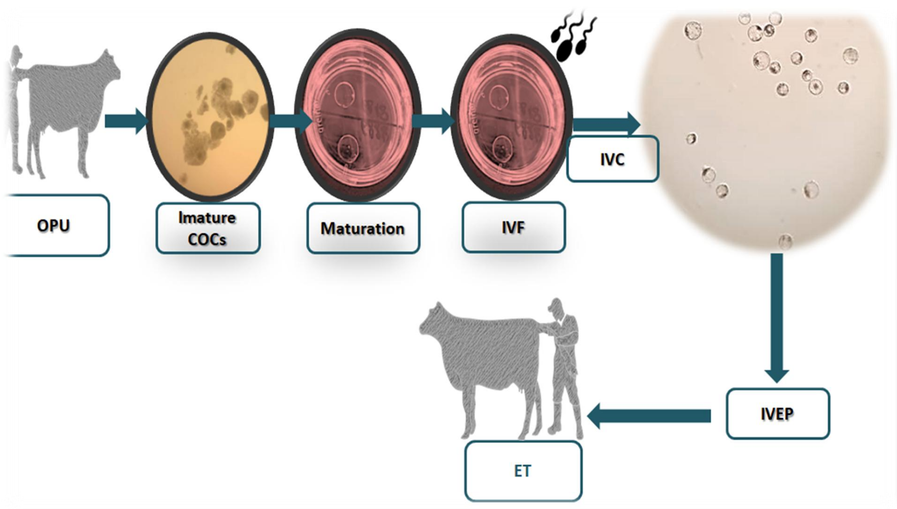


The present review aims to provide a comprehensive synthesis of the evolution of OPU methodology in dairy cattle, examining the technical refinements that have shaped current practice, the biological and managerial factors governing procedural outcomes, and the role of OPU within contemporary large-scale IVEP programs. This article aims to serve as a reference for veterinary practitioners, reproductive scientists, and cattle breeders by integrating fundamental principles with current clinical and commercial applications

• Evolution of OPU in cattle



As documented in a 25-year retrospective analysis, OPU has emerged as both an alternative and a competitive approach to superovulation-based embryo transfer, distinguished by its applicability regardless of donor reproductive status and its capacity to yield a greater number of transferable embryos per donor on a monthly basis.
The number of transferable embryos produced through OPU has increased significantly over time, driven primarily by technological improvements in IVEP. The global IVEP embryo market reached 2,011,480 transferable embryos in 2022, of which 80.4% were produced *in vitro*, a figure that was 31.5% higher than in 2020.



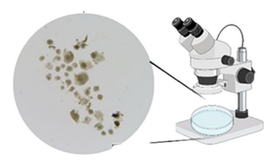
• Factors affecting OPU efficiency

✓ Donor-Related Factors
✓ Technical and Management Factors
✓ Seasonal Influence

Salek et al. (2025) identified oocyte quality, donor parity, lactational and mutritional status, age, and management practices as key determinants of outcomes.

In high-yielding lactating dairy cows, metabolic challenges are often associated with hormonal imbalances, including reduced progesterone and estrogen concentrations, which may impair follicular dynamics, promote the development of larger follicles, compromise oocyte quality, and reduce the number of viable oocytes retrieved during OPU.

• OPU integration with large-scale IVEP programs



The convergence of OPU-IVEP with genomic selection and precision livestock farming is expected to further accelerate genetic progress, while the adaptation of OPU protocols to indigenous and dual-purpose breeds represents a growing opportunity to extend the benefits of the technology beyond elite dairy programs.

• Conclusions

OPU has evolved from an experimental approach into a routine and essential tool in bovine reproduction.
As documented in a 25-year retrospective analysis, OPU has become both an alternative and a competitive approach to superovulation-based embryo transfer, distinguished by its applicability irrespective of donor reproductive status and its capacity to yield more transferable embryos per donor on a monthly basis. The number of transferable embryos provided by OPU has increased significantly over the years, driven primarily by technological improvements in IVEP.