Unidirectional gas flow technique for cryopreservation of bovine semen

Minitüb GmbH, Germany; Genostar Rinderbesamung GmbH, Austria

Introduction:
Research on semen cryopreservation over the last several decades has focused mainly on the development and improvement of semen extenders, while little attention has been paid to the technology itself. This study compared the effect of two different cryopreservation techniques: a conventional programmable freezer using standard non-directed nitrogen gas circulation in the freezing chamber and a novel unidirectional gas flow technology (TurboFreezer®, Minitüb GmbH), which results in a more uniform semen freezing rate and improved post-thaw semen quality.

Material and Methods:
Over a period of 3 months, in a commercial bull stud in Austria, semen was collected, processed, frozen, and analysed after thawing. Ejaculates were collected once or twice per week from 26 bulls (primarily Simmental). Ejaculates meeting minimum standard requirements (total motility >70%) were processed (extender used: Steridyl®, Minitüb GmbH) and frozen by the laboratory’s standard procedure. For cryopreservation, two different freezing technologies were used. The effect of freezing technology on post-thaw semen quality (total motility, progressive motility and membrane integrity) was analysed using a CASA system (AndroVision®, Minitüb GmbH).

Results:
Sperm motility parameters as well as membrane integrity were significantly higher for samples cryopreserved with the unidirectional freezer than with the conventional freezer (p ≤ 0.05). Post-thaw total motility increased by 8.7%, progressive motility by 6.9% and percentage of intact membranes by 7.5%, using the TurboFreezer® versus the conventional freezer, respectively. Furthermore, the number of ejaculates fulfilling minimum standards for progressive motility after thawing (≥50%) was 16% higher when frozen with the unidirectional freezer.

Conclusion:
Post-thaw quality of bull semen is improved when cryopreservation is performed using a liquid nitrogen freezer with unidirectional gas flow, in comparison to conventional non-directional freezers. And therefore, in a commercial stud, fewer collections are discarded post-thaw and efficiency is increased.