Digitcool α : a new performant and ergonomic controlled-rate freezer

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CONTEXT

Cryopreservation is an integral part of Assisted Reproduction Technologies in dairy farming. Cryopreservation must be optimized in order to preserve the spermatozoa integrity. IMV Technologies developed a new cryogenic freezer: **Digitcool α**.

OBJECTIVE

This study aimed to compare the quality of bovine semen cryo-frozen in Digitcool α and Digitcool 5300.

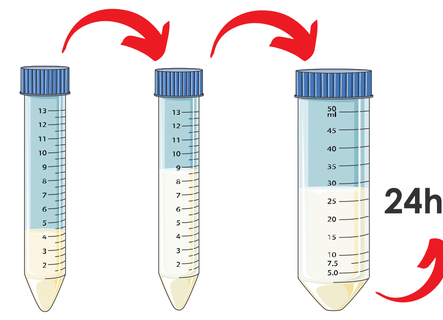
1 MATERIALS & METHODS

Experimental design study

6 bulls Prim'Holstein

2 pools of 3 ejaculates

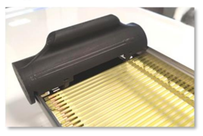
2 replicates



24h equilibration at +4°C

Cryo-freezing

Collecting on racks with Straw Collector



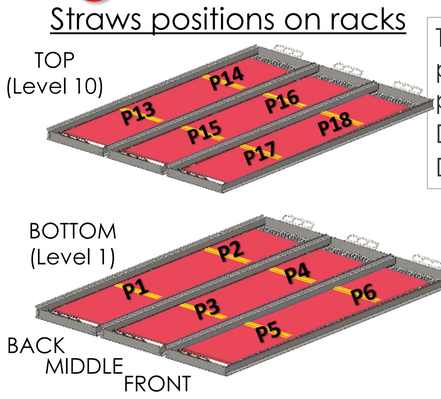
Thawing (+37°C for 30 sec)

Motilty analysis

Viability analysis

Cryo-freezing

Straws positions on racks

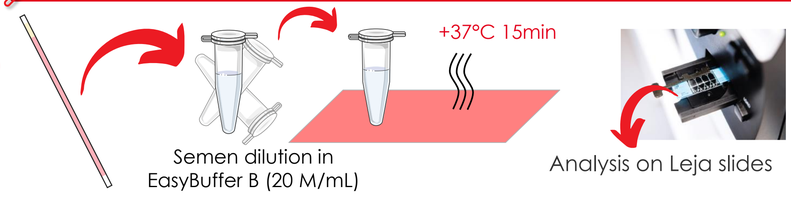


The cryofreezing process was performed with Digitcool α and Digitcool 5300

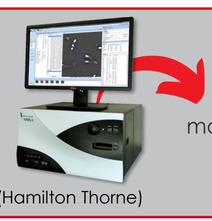
Total Cryofreezing:

- 12 cycles/freezer
- 576 straws/freezer
- 2 pools of 3 ejaculates

Motility assessment

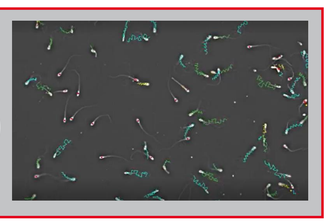


Variable assessed:

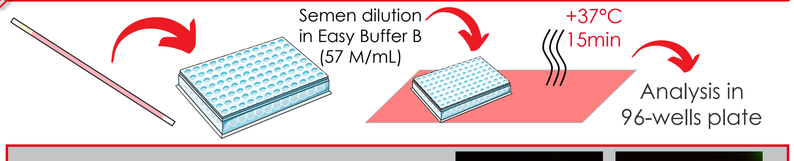


IVOS II™ (Hamilton Thorne)

Total motility (%)



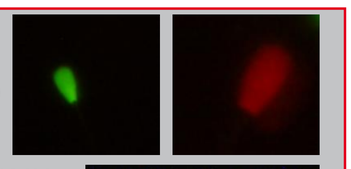
Viability assessment



Variables assessed:

Guava® easyCyte™ (Luminex)

Membrane integrity (%) (Easykit 1)



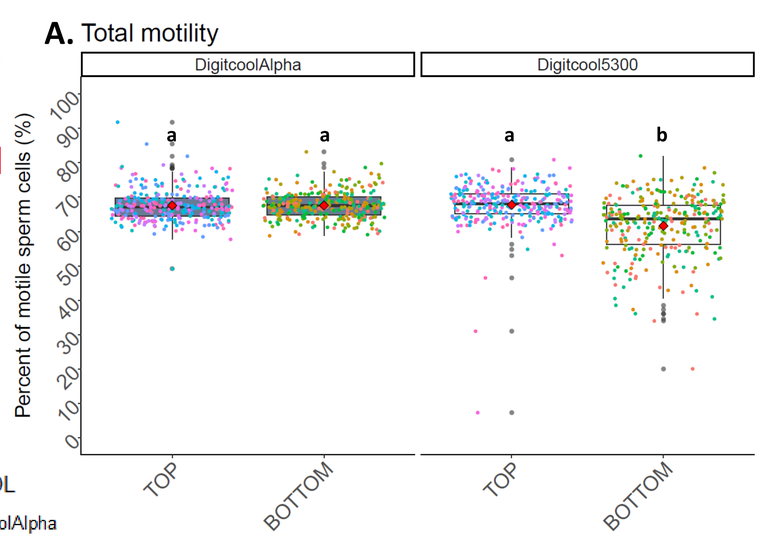
Acrosome integrity (%) (Easykit 5)

Statistical Analyses

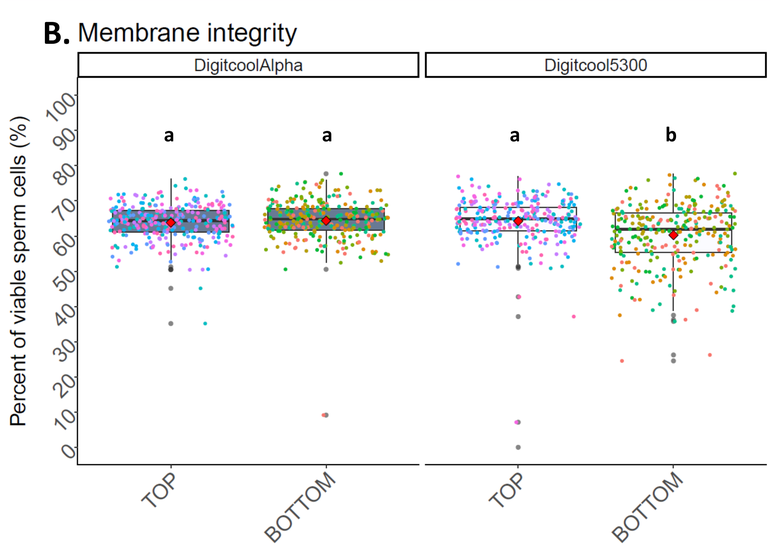
- R software (Version 1.3.1093.)
- Response variables were analysed with linear models including the DIGITCOOL and the LEVEL as fixed effects.
- The results are presented as mean ± standard error and/or median ± interquartile range.
- Differences with $p<0.05$ were considered statistically significant.

2 RESULTS

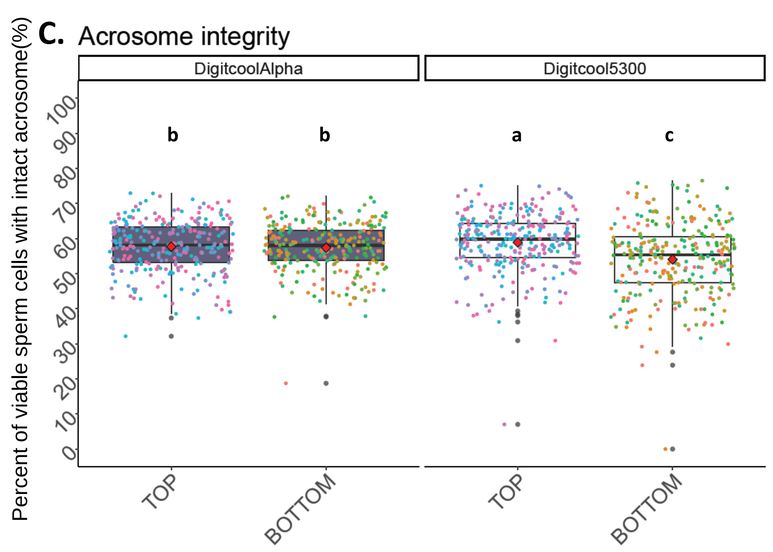
Motility analysis



Membrane integrity analysis



Acrosome integrity analysis



DIGITCOOL
- DigitcoolAlpha
- Digitcool5300

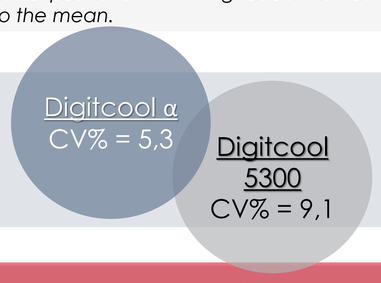
POSITION
- P01
- P02
- P03
- P04
- P05
- P06
- P07
- P08
- P09
- P10
- P11
- P12

Figure A.: Percentage of motile sperm cells according to the level position and the Digitcool used. Letters indicate statistical significance between Digitcool and positions within Digitcool. The red diamonds-shape correspond to the mean.

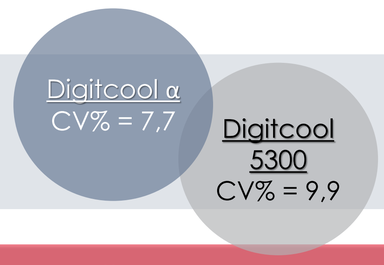
Figure B.: Percentage viable sperm cells according to the level position and the Digitcool used. Letters indicate statistical significance between Digitcool and positions within Digitcool. The red diamonds-shape correspond to the mean.

Figure C.: Percentage of viable sperm cells with intact acrosome according to the level position and the Digitcool used. Letters indicate statistical significance between Digitcool and positions within Digitcool. The red diamonds-shape correspond to the mean.

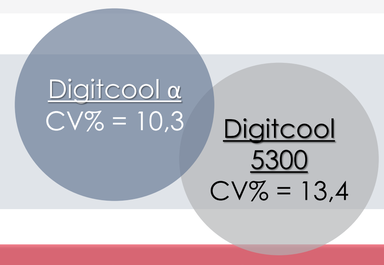
Coefficient of variation of motility



Coefficient of variation of membrane integrity



Coefficient of variation of acrosome integrity



Digitcool α showed a significant higher post-thaw motility (67,6 *vs.* 64,7%) , membrane integrity (64,1 *vs.* 62,3%) and acrosome integrity (57,2 *vs.* 56,5%) compared to Digitcool 5300, respectively.

3 CONCLUSION

Semen quality was significantly better preserved in Digitcool α. This improvement was observed for all freezing cycles, showing the lowest coefficient of variation.

Digitcool α showed significantly less variability in semen quality between positions. This could be explained by a better thermal exchange homogeneity in the chamber of Digitcool α. Further analyses such as thermal recording in the whole chamber should be performed in order to confirm the better performance of Digitcool α.