



Interbreed differences in *Bovine* semen quality characteristics before and after cryopreservation

Sara Ataei-Nazari¹, Filip Benko¹, Michal Ďuračka², Peter Ivanič³, Eva Tvrďá^{1,4}

¹ Institute of Biotechnology, Slovak University of Agriculture in Nitra, Tr. A. Hlinku 2 – 94976 - Nitra, Slovakia

² AgroBioTech Research Center, Slovak University of Agriculture in Nitra, Tr. A. Hlinku 2 – 94976 - Nitra, Slovakia

³ Slovak Biological Services a.s., Breeding station in Lužianky - 951 41 - Lužianky, Slovakia

⁴ Institute of Veterinary Medicine and Animal Sciences, Estonian University of Life Sciences, Kreutzwaldi 62 – 51006 - Tartu, Estonia

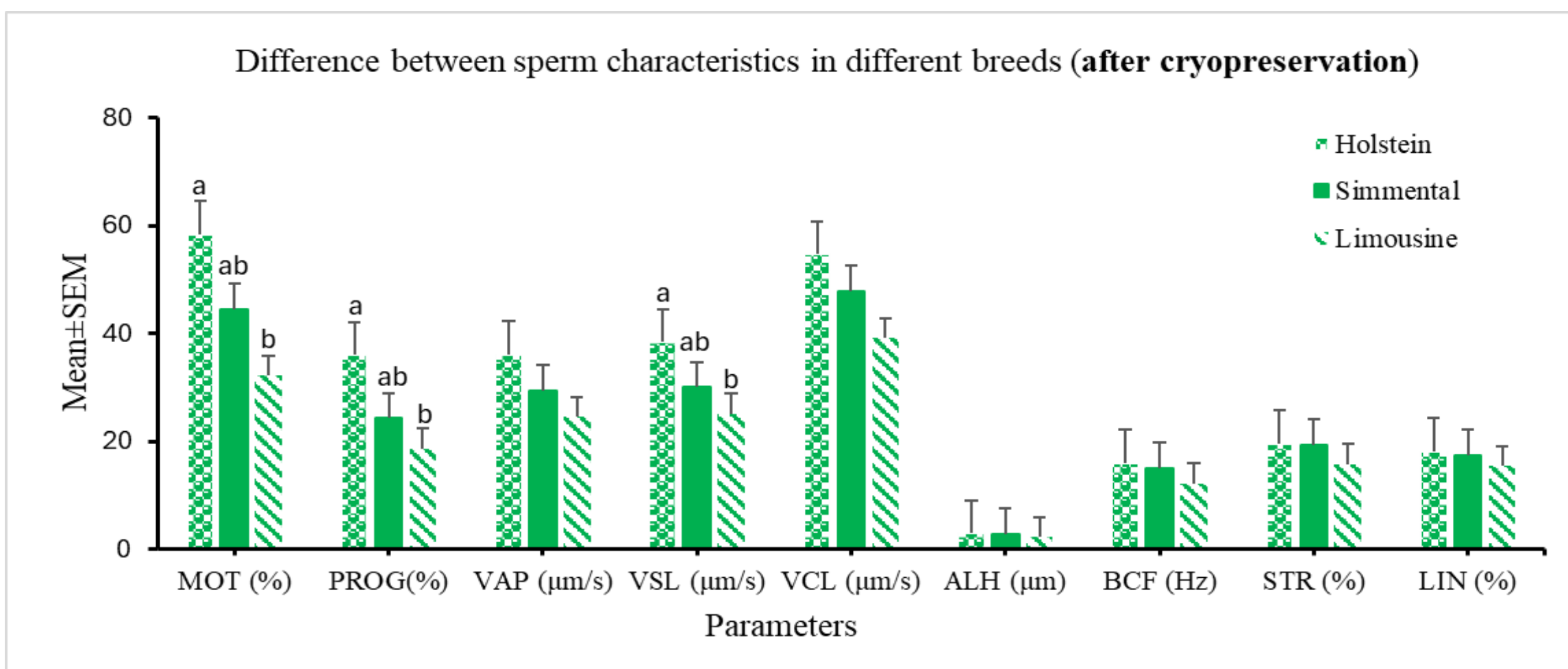
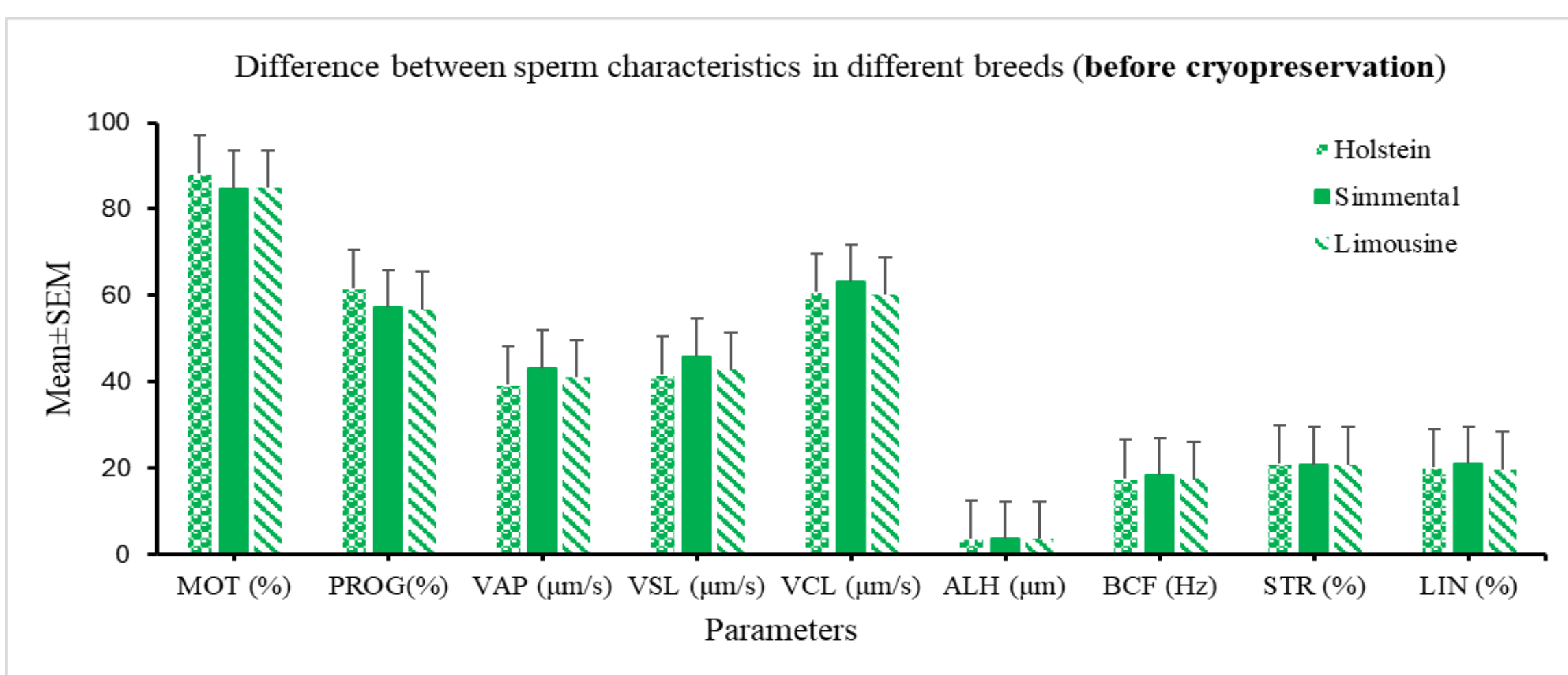
Abstract: Semen from different Bovine breeds and individuals in a special Bovine breed was shown to vary in sperm quality characteristics and subsequently cryo-resistance. Defining these differences to further explore the underlying mechanisms can be acquired as a strategy to improve semen parameters responsible for cryopreservation resistance. The current experiment was conducted to evaluate the semen parameters in Holstein, Simmental, and Limousin breeds before and after cryopreservation. Semen samples were collected from 5 bulls from each breed. The computer-assisted sperm analysis (CASA) was used to evaluate the motility parameters, including total and progressive motilities and secondary kinematic parameters in fresh and post-thawing semen samples. Data were analyzed by the general linear model (GLM) procedure of SAS software in a complete randomized design. The difference between the least-squares means was significant at $P < 0.05$. Fresh semen parameters were not affected by the type of species, whereas there were some post-thawing differences in semen quality characteristics. Post-thawing total and progressive motilities were highest in Holstein semen, followed by Simmental and Limousine breeds. Moreover, progressive velocity was highest, medium, and lowest, respectively, in Holstein, Simmental, and Limousine breeds. The results from the current study demonstrate that the semen from Holstein as a dairy breed has more satisfactory quality characteristics compared to the other two breeds, which can be critical in fertility and conception rate, and the sperm cells of this breed are more resistant to cryopreservation compared to the Simmental and Limousine breeds. Further research would be warranted to explore the underlying mechanisms responsible for these superior quality parameters to improve the strengths and mitigate the weaknesses.

• Introduction

The quality of the bull's semen has an undeniable importance on the reproductive success of *Bovine* breeds in either natural or artificial inseminations. The concentration, morphology, and motility of the sperm cells are the key important factors involved in the selection of a semen sample for cryopreservation, which are used as a predictor of fertility in *in vitro* and *in vivo* conditions. The objective of the current study was to investigate if there are any breed-specific differences in sperm cell characteristics, including motility and secondary kinematic parameters, in fresh semen samples of Holstein, Simmental, and Limousine.

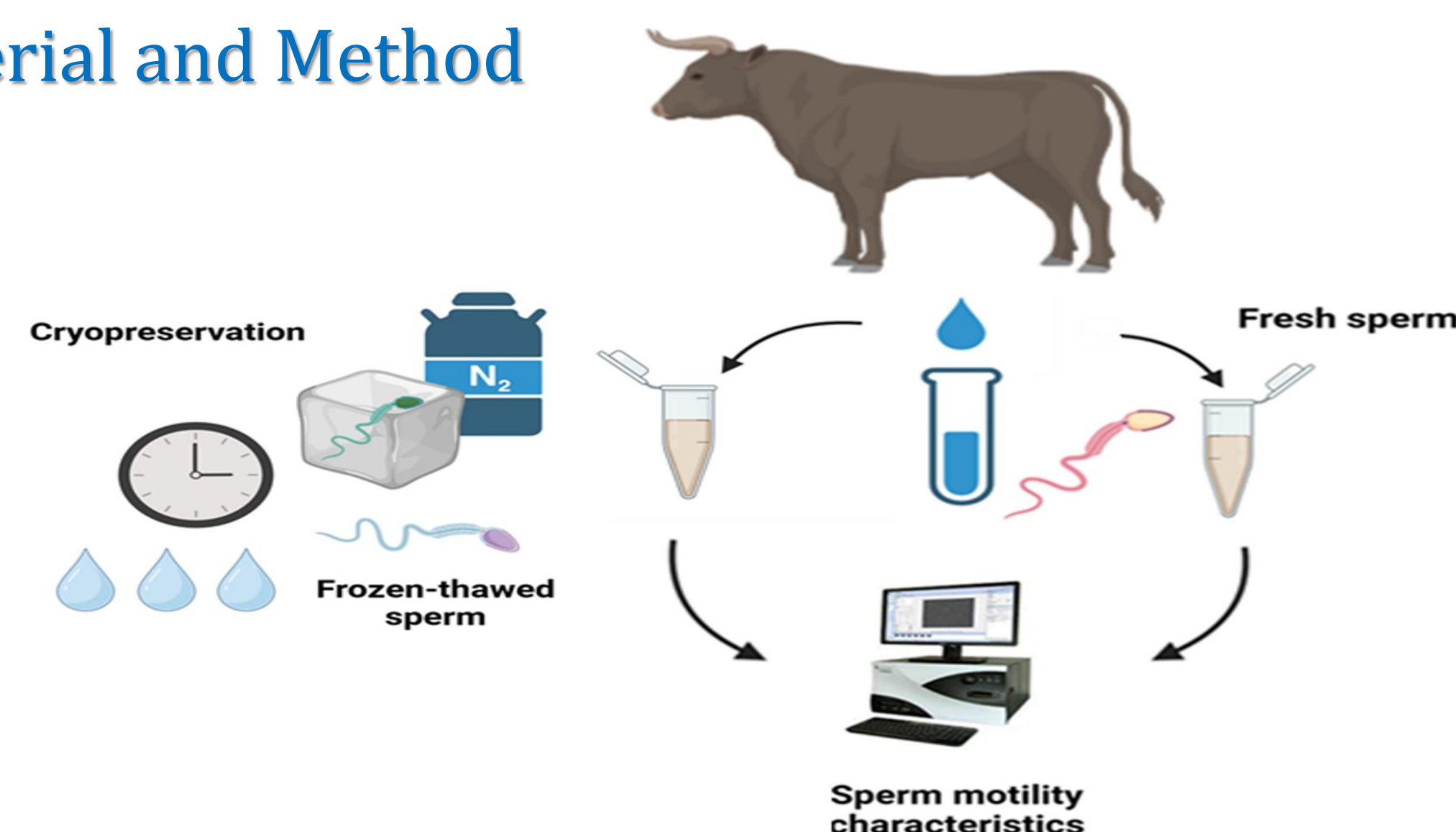
• Results and discussions

Fresh semen parameters were not affected by the type of species, whereas there were some post-thawing differences in semen quality characteristics. Post-thawing total and progressive motilities were highest in Holstein semen followed by Simmental and Limousine breeds. Moreover, progressive velocity was highest, medium and lowest respectively in Holstein, Simmental and Limousine breeds.

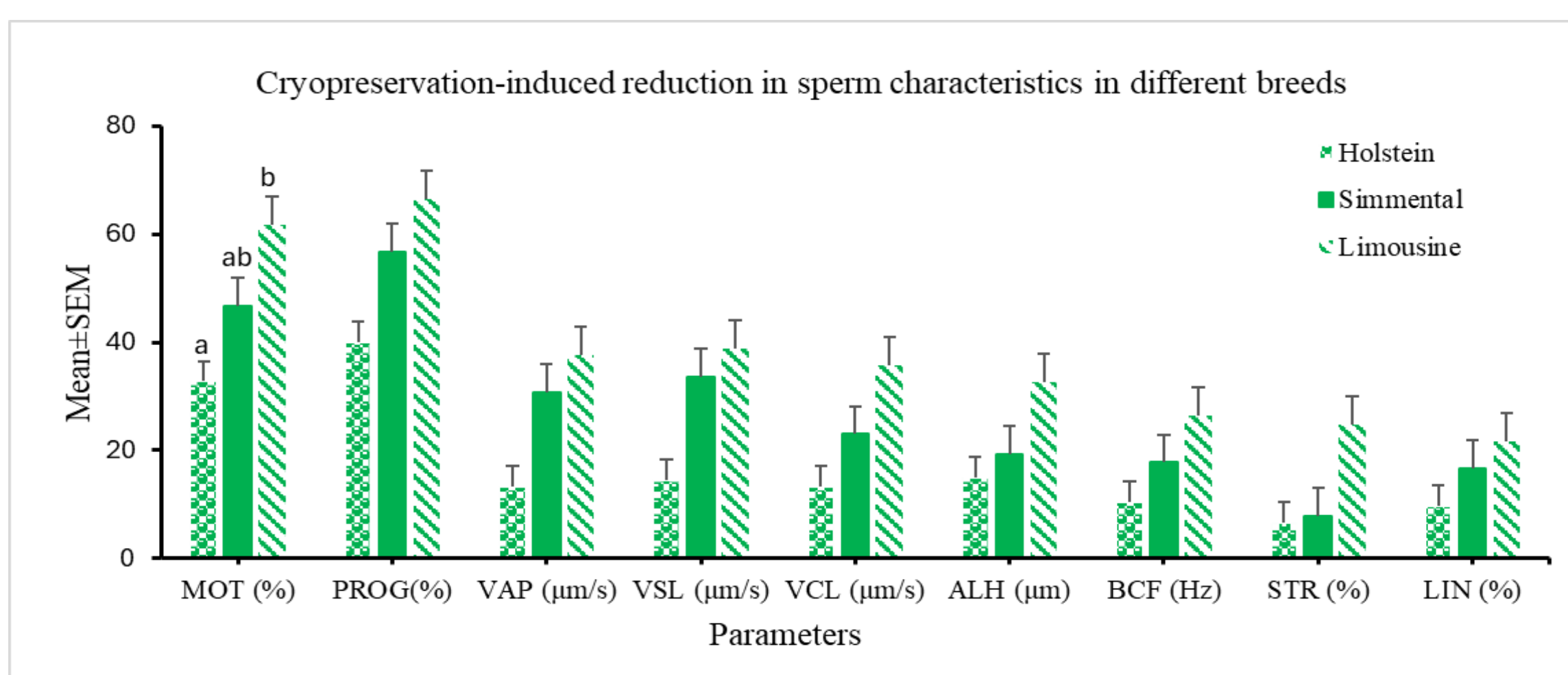


a, b – values in columns with different letters differ significantly ($P \leq 0.05$).

• Material and Method



Data were analyzed by one-way ANOVA through Tukey's test.



a, b – values in columns with different letters differ significantly ($P \leq 0.05$).

• Conclusions

The results demonstrate that compared to Simmental and Limousine breeds, Holstein bulls have semen with higher motility and secondary kinematic parameters. There might be some underlying mechanisms that not only cause higher sperm quality characteristics in fresh semen samples of Holstein bulls but also can exert more cryopreservation and cryo-resistance compared to Simmental and Limousine bulls. Further research to explore these underlying mechanisms is warranted.



Acknowledgments: This study was supported by the EU Next Generation EU through the Recovery and Resilience Plan for Slovakia under the project no. 09I03-03-V04-00483.

Contact address: Sara Ataei-Nazari, PhD. Institute of Biotechnology, FBFS, SUA in Nitra, Tr. A. Hlinku 2, 94976 Nitra, Slovakia, e-mail address: sara.Ataeinazari@uniag.sk