Effectiveness of Cervical Mucus from Cows in Estrus as a Novel Sperm Selection Method: Comparison with Silica Gel.

UAB Universitat Autònoma de Barcelona
FACULTAT DE VETERINÀRIA

Conducted by Pau Sabrià Liaño. Final Degree Project, June 2025.

Introduction

Estrous cervical mucus is well recognized for its role as **a natural sperm filter in vivo.** However, its potential application as an in vitro sperm selection method remains unexplored, with no studies published to date addressing this possibility.

To bridge this gap, we aim to **investigate its effectiveness in vitro** and compare it to the currently most widely used technique, silica gel-based separation (BoviPure®).

Materials and methods

3 experimental groups

- Treatment 1 (Control): only semen (2 µL).
- Treatment 2 (BoviPure®): 248 µL semen + 220 µL BP.
- Treatment 3 (Cervical Mucus): 248 µL semen + 220 µL CM.

Each group included n = 10 independent experiments

Fieldwork:

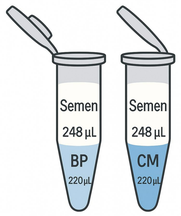


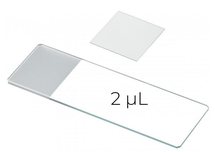

Sample Handling Protocol

Semen: 60s. *2 straws of 0,25ml/experiment.*

BoviPure®: 20 min.

Cervical Mucus: 2h.

Results and Discussion

- General Data (**Table 1**).
- General Motility Parameters (**Figure 1** and **Figure 2**).
- Specific Motility Parameters (**Table 2**).

Note. All figures and tables are the author's own work. Treatment 1 (Control) is abbreviated as T1, Treatment 2 (BoviPure®) as T2, and Treatment 3 (Cervical Mucus) as T3. Superscript letters a, b, and c denote statistically significant differences between group means (p < 0.05).

Table 1: Average total number of spermatozoa across treatments T1, T2 and T3.

Treatment	Mean ± SD
T1	256.3^{a} ± 102.51
T2	64.36^{b} ± 73.60
T3	58.7^{b} ± 71.53

Table 2. Mean and SD of different motility descriptors (curvilinear velocity (VCL, µm/s), straight-line velocity (VSL, µm/s), average path velocity (VAP, µm/s), percentage of linearity (LIN, %), percentage of straightness (STR, %), percentage of oscillation (WOB, %), lateral head displacement (ALH, µm), frequency of head displacement (BCF, Hz), DANCE (VCL x ALH, µm²/s)), Absolute angular mean displacement (MDA-Abs, Angular degrees) and Algebraic angular mean displacement (MDA-Alg, Angular degrees)) in the identified motile sperm populations.

	T1	T2	T3
	Mean ± SD	Mean ± SD	Mean ± SD
VCL	86.70^{a} ± 42.70	95.03^{b} ± 36.22	92.80^{b} ± 36.97
VSL	46.42^{a} ± 28.41	57.75^{b} ± 29.40	53.75^{b} ± 26.38
VAP	57.46^{a} ± 29.65	74.18^{c} ± 32.39	67.33^{b} ± 29.17
LIN	53.17^{a} ± 21,50	60.41^{b} ± 20.22	58.14^{b} ± 19.43
STR	77.28^{a} ± 21.64	76.38^{a} ± 18.61	78.80^{a} ± 16.60
WOB	66.49^{a} ± 15.07	77.49^{c} ± 14.85	72.51^{b} ± 15.73
ALH	3.15^{a} ± 1.65	3.08^{a} ± 1.27	3.00^{a} ± 1.39
BCF	10.44^{b} ± 4.57	9.86^{a} ± 3.76	11.12^{c} ± 3.88
DANCE	331.56^{a} ± 315.95	332.37^{a} ± 228.37	326.82^{a} ± 248.60
MDAabs	112.49^{b} ± 45.03	94.10^{a} ± 48.05	111.02^{b} ± 51.23
MDAalg	0.13^{a} ± 8.86	0.10^{a} ± 9.57	-0.46^{a} ± 9,99

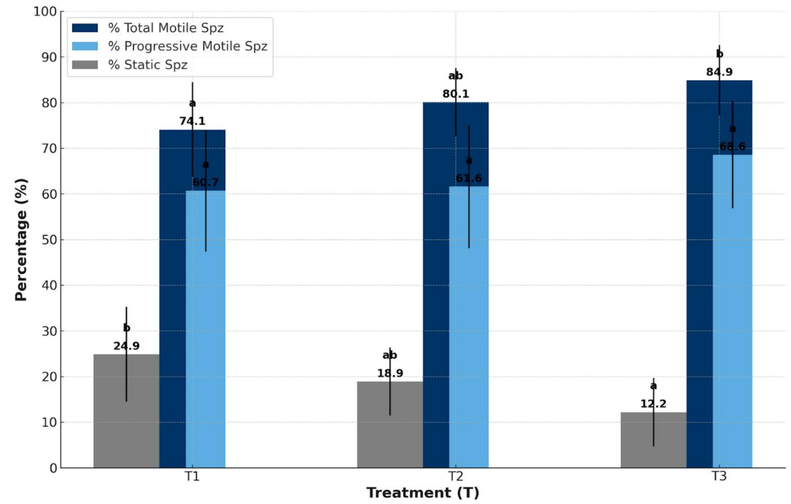


Figure 1: Comparison of the Percentage (%) of Static, Total Motile, and Progressive Motile Spermatozoa (Spz) Across Treatments T1, T2, and T3.

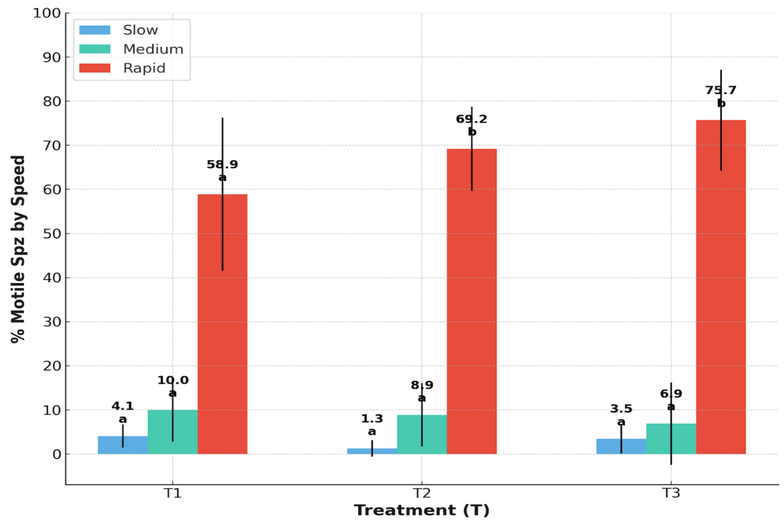


Figure 2: Comparison of the Percentage of Slow, Medium, and Rapid Spermatozoa (Spz) Across Treatments T1, T2, and T3.

Conclusions

This study has demonstrated, for the first time, that **cervical mucus** from cows in estrus may serve as **a novel and potentially effective method** for in vitro sperm selection. From a practical perspective, this approach could provide a **simple, accessible, and economically** viable alternative.

However, to establish the reliability and reproducibility of this approach, further studies are needed to strengthen its scientific foundation. If the filtering capacity of estrous cervical mucus is confirmed in vitro, the next step will be to develop **a standardized processing protocol** to minimize variability and ensure consistent selection efficiency.