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Tina Smith Graphics
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David Brown
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Logo Design

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Semen backflow in sows after cervical and post-cervical artificial insemination

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Introduction

In the current procedures for artificial insemination (AI) approximately 90% of the spermatozoa inseminated don't reach the oviduct. Main mechanisms of loss spermatozoa are due to backflow of the semen and polymorphonuclear leukocyte (PMN) phagocytosis. It has been demonstrated that in cervical AI approximately 70% of the volume and at least 25-45% of inseminated spermatozoa are lost in the backflow^{1,2}.

There are several technical methods to reduce the number of spermatozoa and volume used in insemination. The present study was performed to compare the backflow in cervical and post-cervical AI.

Material and methods

This study was conducted in a 4500-sow, commercial herd in Murcia, Spain. One hundred and fourteen multiparous sows were randomly divided into three groups. CAI group (n=36): sows were inseminated by using cervical AI with 3×10^9 spermatozoa in 80 ml extender. Post-CAI 1 (n=37): sows were inseminated by post-cervical AI using 1.5×10^9 spermatozoa in 40 ml extender. Post-CAI 2 (n=41): sows were inseminated by post-CAI using 1×10^9 spermatozoa in 26 ml extender.

Backflow was collected into human colostomy bags fixed around the vulva during AI and for 60 min after AI. Several backflow parameters were analyzed in the 3 groups: volume (% of initial dose), number of spermatozoa (% of initial dose), viability (%), motility (%), and progressive motility (0-5 scale).

Results

Data are expressed as the mean \pm SEM and analyzed by ANOVA one way. Differences were considered statistically significant at $p < 0.05$.

Backflow was observed in 105 sows (92.1%). The percentage of volume and semen backflow was higher in CAI group (CAI) than post-CAI groups (Table I).

In relation to backflow sperm quality, there was no difference ($p > 0.05$) in motility, viability and progressive motility among 3 experimental groups (Table II).

Table I. Volume (%) and spermatozoa (%) backflow in CAI and post-CAI groups. a, b letters in the same column indicate significant differences ($p < 0.05$).

Groups (n)	Backflow volume (%)	Range (min-max)	Sperm in backflow (%)	Range (min-max)
CAI (36)	54.28 \pm 3.85 ^a	21.87-97.50	25.15 \pm 3.02 ^a	2.91-77.05
Post-CAI 1 (37)	39.39 \pm 4.14 ^b	0-92.50	15.88 \pm 2.24 ^b	0-49.95
Post-CAI 2 (41)	37.73 \pm 3.74 ^b	0-81.48	15.21 \pm 2.43 ^b	0-51.68
P	0.006		0.013	

Table II. Sperm quality (motility, progressive motility and viability) in backflow after CAI and post-CAI (1 and 2).

Groups (n)	Motility (%)	Progressive motility	Viability (%)
CAI (36)	67.08 \pm 2.59	2.29 \pm 0.12	80.56 \pm 1.81
Post-CAI 1 (33)	61.97 \pm 3.42	2.16 \pm 0.11	83.93 \pm 1.42
Post-CAI 2 (36)	61.25 \pm 2.65	2.01 \pm 0.12	81.23 \pm 2.04
P	0.294	0.284	0.364

Conclusions

- The percentage of volume and sperm backflow is higher in cervical than in post-cervical AI. Thus, the rate of backflow is an event that depends on semen deposition site.
- Backflow sperm quality is not dependent on AI method used.

References

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