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Acidification of intracellular pH in bovine spermatozoa suppresses motility and extends viable life

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Intracellular pH (pHi) was determined in ejaculated bovine spermatozoa using a ratiometric absorbance technique under various incubation conditions that drastically altered sperm motility. The pHi was directly correlated with sperm motility. In a medium of Sodium, Potassium, and Magnesium [NKM] that supported active sperm motility, pHi was 6.9. In medium containing weak acids (NKM equilibrated with

100% CO2 or containing 80 mM 5,5-dimethyl-2,4-oxazolidinedione; DMO), pHi was depressed at least 0.5 pH unit and sperm motility was suppressed. After complete immobilization of sperm was established, removal of the weak acids indicated that suppression of motility was fully reversible for up to 48 hours in CO2 and up to 24 hours in DMO. This study shows that expression and conservation of sperm motility are inversely related, and that depression of pHi by weak acids can reversibly inhibit sperm motility. These findings may help to explain the mechanisms by which sperm are immobilized within the male reproductive tract, and could be applicable to the design of improved ambient temperature semen extenders.

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