

Freezing poultry semen

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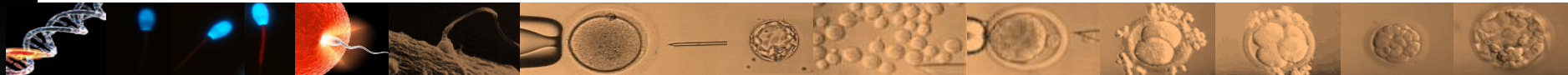
INRA

Bernal B, Santiago-Moreno J

INIA



European Project n° 677353



First Cryo success was: ...Poultry semen

1949: Polge, Smith and Parkes

Nature 164, 666-666 (1949)
*Revival of Spermatozoa after Vitrification
and Dehydration at Low Temperatures*

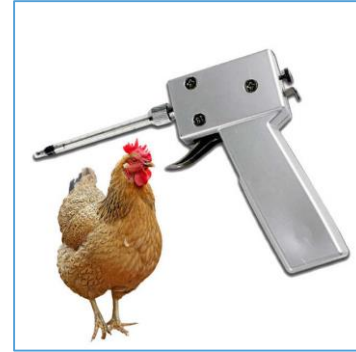
They had a bit of luck....

- Serendipitous 'invention' of glycerol as CPA



Use of AI and frozen semen in poultry

- Frozen semen quickly adopted in cattle
- Much less so in avian species
- AI in birds is largely restricted to 'fresh' semen
 - Frozen semen for routine purposes is not practical
- Fertility with frozen semen of $\pm 90\%$ is possible
 - Largely unnoticed in the poultry industry
 - Possibilities underestimated?
- Frozen avian semen is used for gene banking
- May be used for maintaining breeding lines
 - Cost-effective compared with holding live birds



Fresh semen: The extender

Industry use a low semen dilution.

Strange, as:

- Up to 40 times dilution yields a sufficient insemination dose
- Higher dilution means:
 - Sperm remain vital longer
 - Good fertility with semen stored 24 or 48h



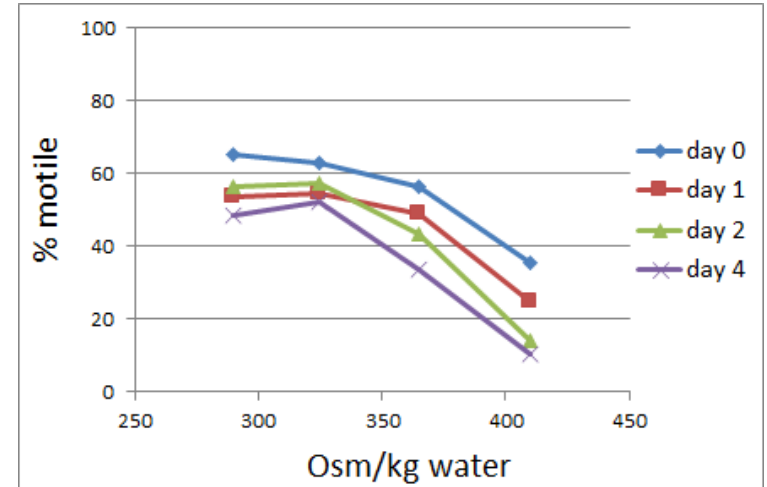
Perhaps 'fear' of diluting semen comes from inappropriate osmolality of extender used

Fresh semen: The extender



We have earlier compared all thinkable extender media.

- Best results: Lake and Ravie (1979) diluent “7.1”
- But...
 - Lake “7.1” is 411 mOsm/kg
 - **Too high!** Inhibits motility
 - We modified it: 325 mOsm/kg



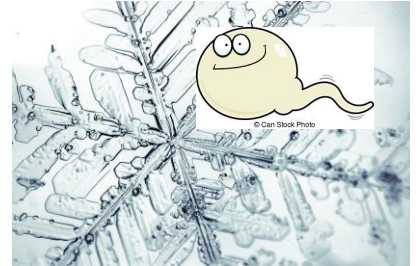
Frozen semen: Again ...the extender

“Happy sperm are freezable sperm”

So, first a good extender!

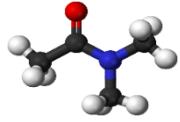
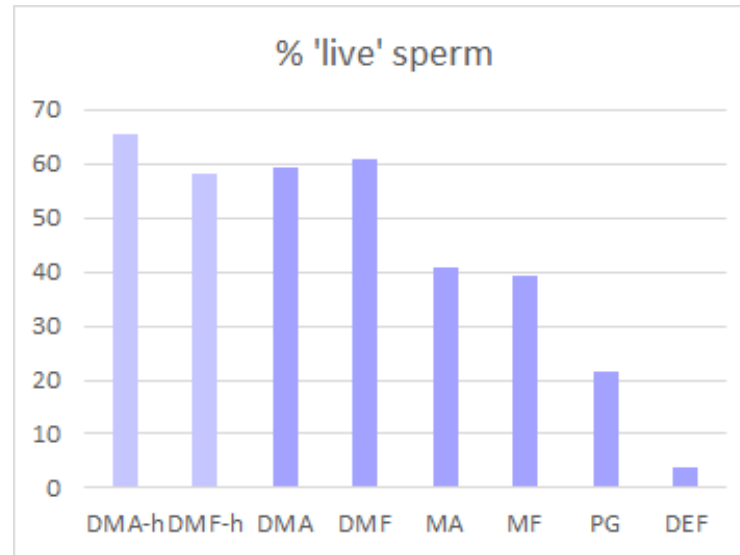
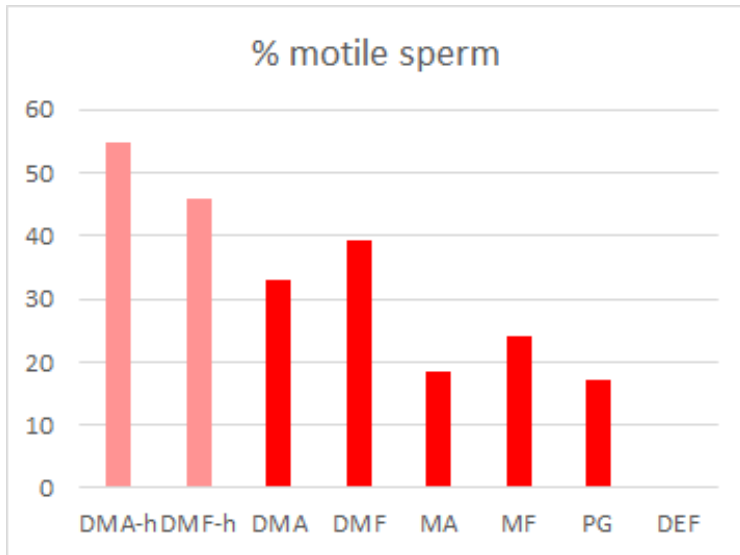
Next... A good CPA

Next ... Find optimal freezing rate *and* CPA concentration

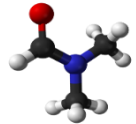


Type of CPA

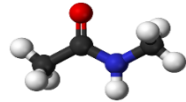
- Six different CPAs at 0.6M
- Semen frozen at 250°C/min
- 100 million sperm/ml
- 3 replicates x 5 cocks/replicate



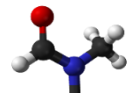
DMA



DMF



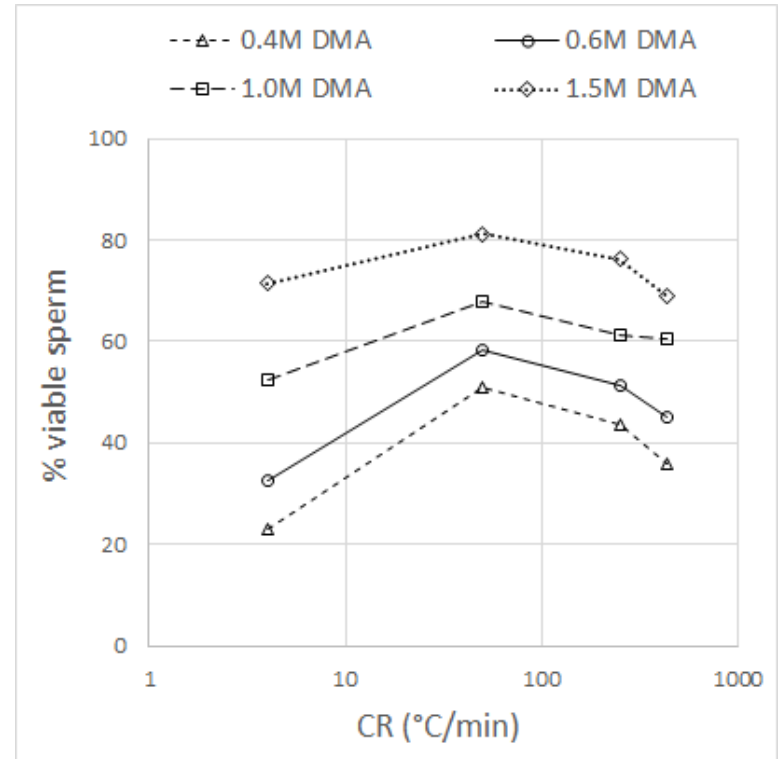
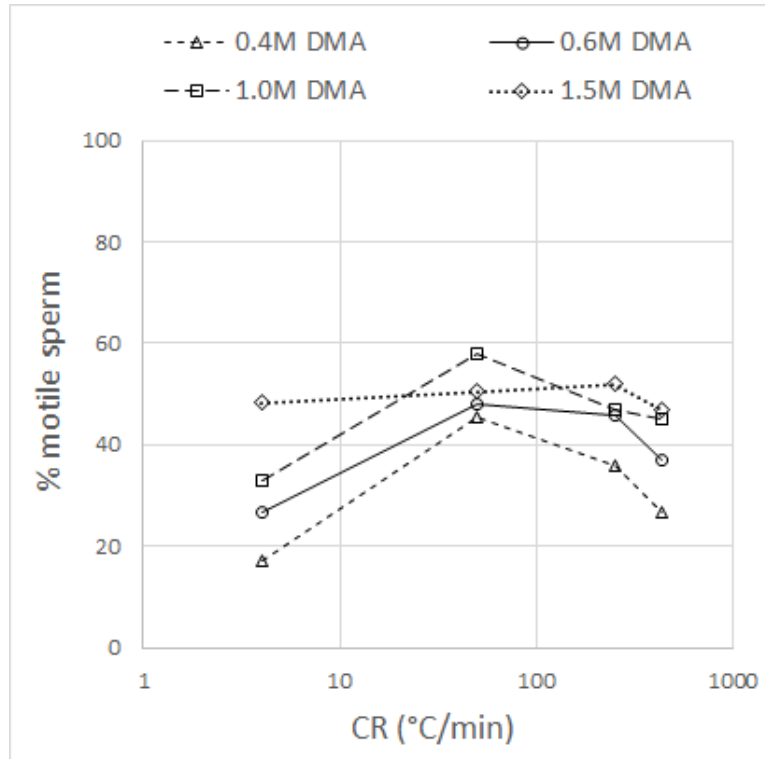
MA



MF

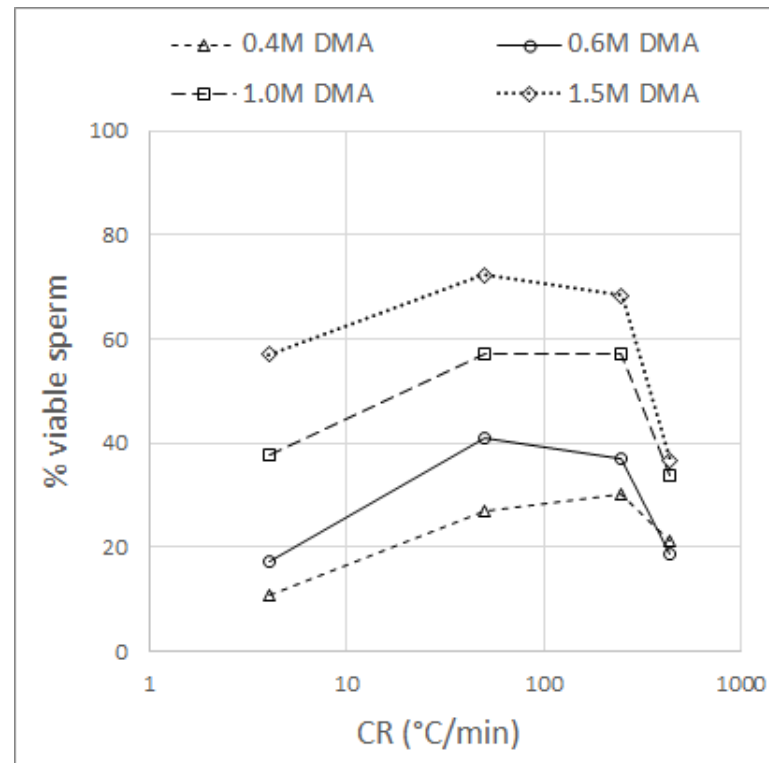
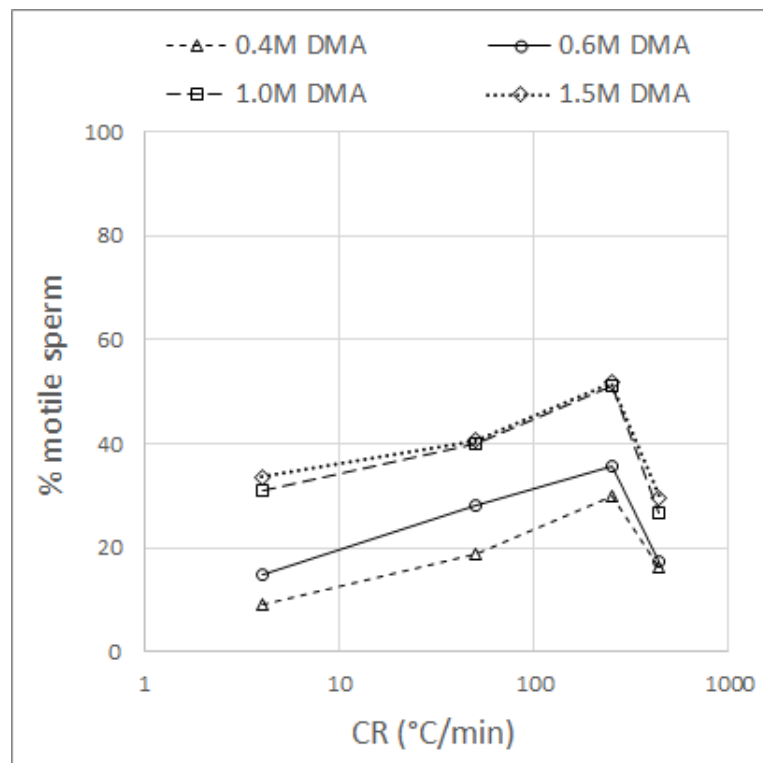
[CPA] x CR

- 4 cooling rates x 4 concentrations DMA
- Semen from individual cocks (10)
- \pm 100 million sperm/ml
- 2 replicates x 5 cocks/replicate

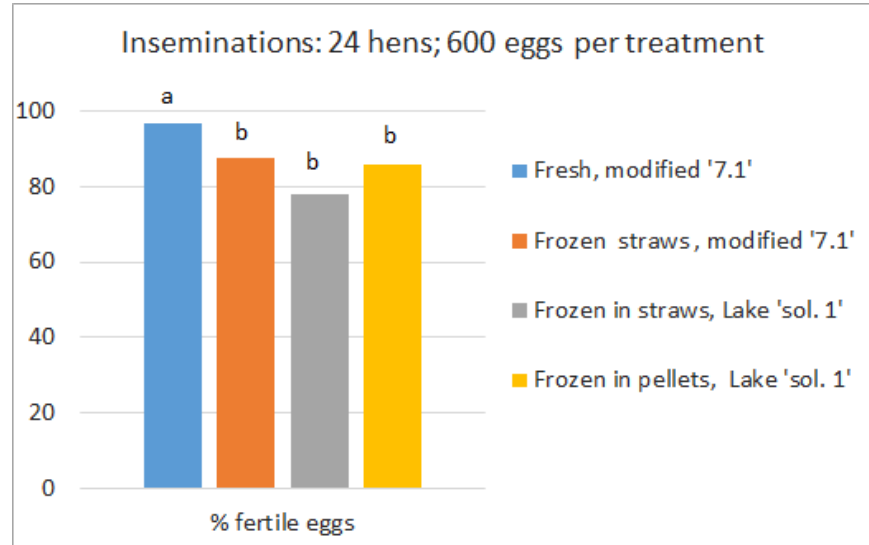
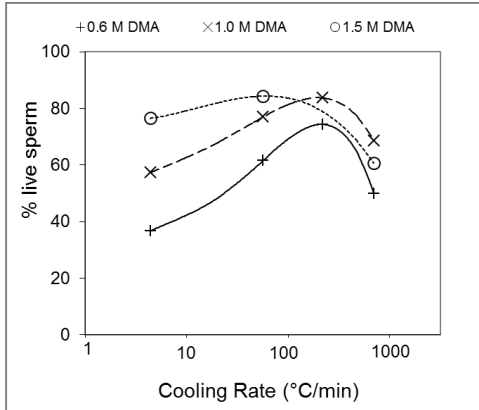


[CPA] x CR

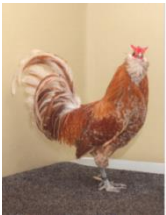
- 4 cooling rates x 4 concentrations DMA
- Pooled semen
- 1200 million sperm/ml
- 4 replicates x 30 cocks/replicate



Fertility with frozen semen

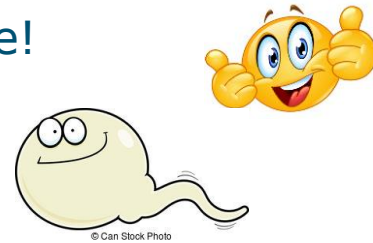


Woelders et al., 2006



Take home

- Good extender is important!
- Our PE (modified Lake '7.1') performs very good.
 - Important to give the sperm some space!
 - Cold storage; Longevity for days!
 - Good base medium for freezing!
- Good freezing results after optimization of CR and [CPA].



Thank you for your attention

Contributors



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This work is part of the IMAGE project which received funding from the European Union's Horizon 2020 Research and Innovation Programme under the grant agreement n° 677353.