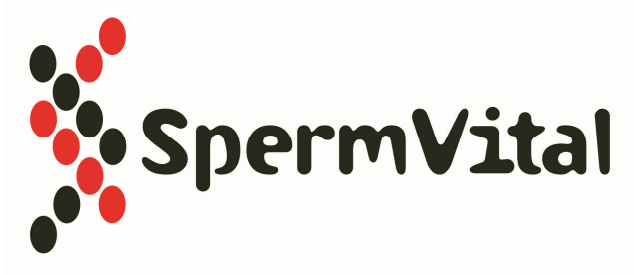
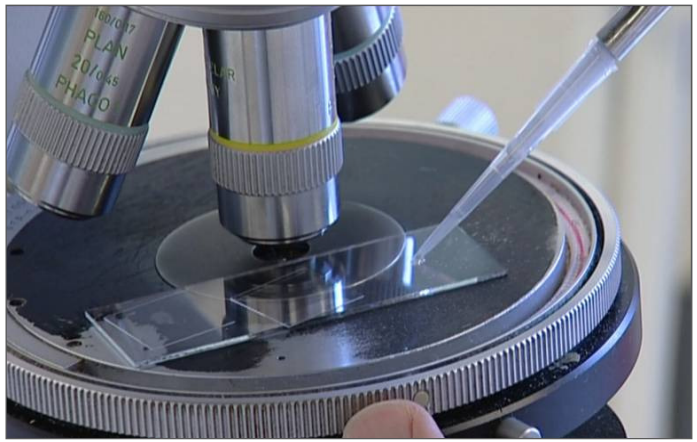


SpermVital ® – field trials with this new semen processing approach

Elisabeth Kommisrud

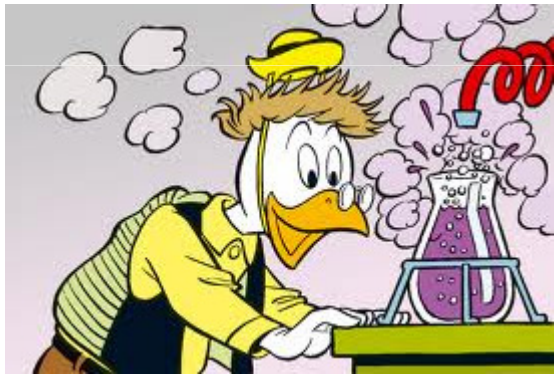
SpermVital, Hamar, Norway

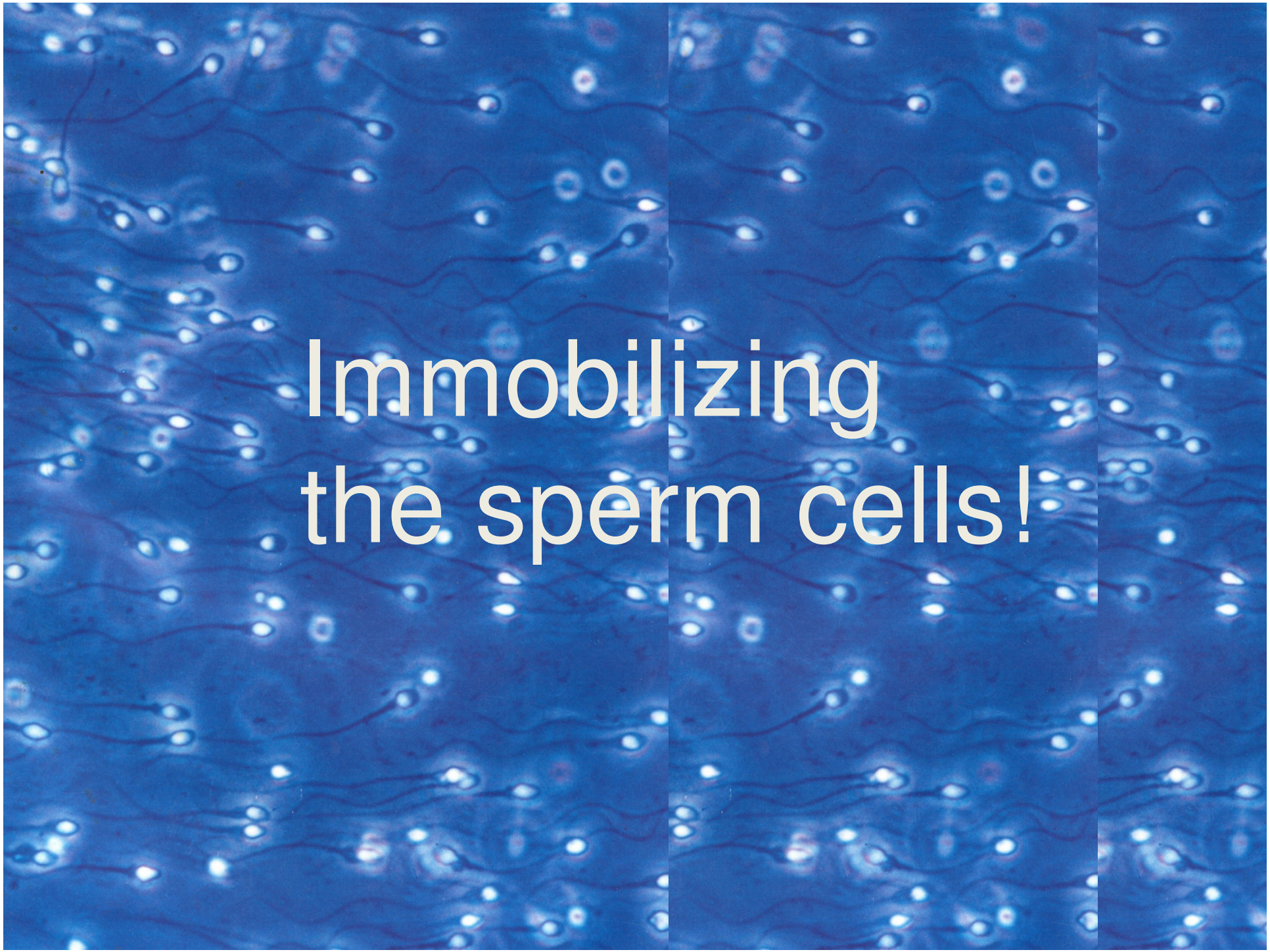
Semen processing – a new approach



The overall idea – prolonged shelf-life of spermatozoa

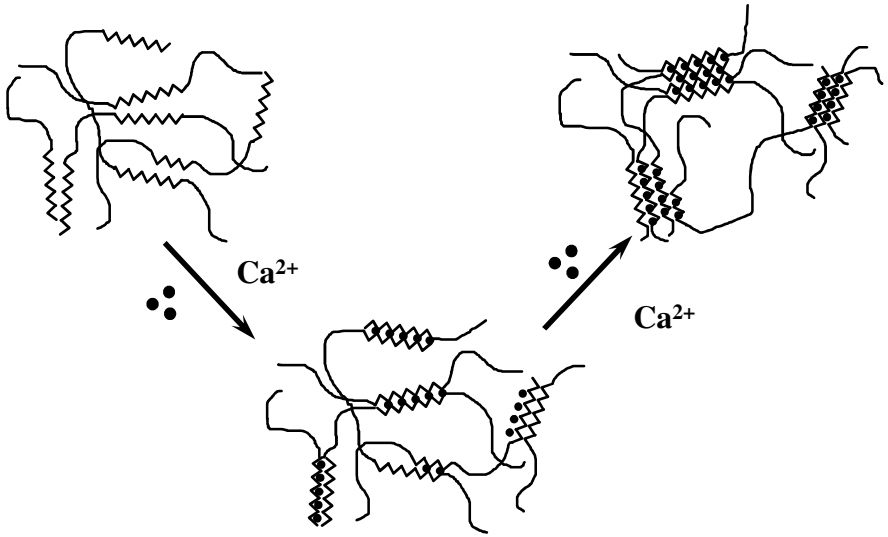
- Prolonged shelf-life of sperm cells
- Slow release of sperm cells after AI
  - Less critical timing of AI
  - Double AI can be avoided
  - AI in proestrus is OK
  - AI will reduce the extent of natural mating




Immobilizing
the sperm cells!

Why immobilize in alginate gel?

- ”Slow release” of sperm after insemination possible
- Protecting factors (nutrients, antioxydants) can be co-immobilized with the cells, thereby affecting the local environment within the particles after insemination
- Possible positive effects of immobilization in gel
- The alginate gel in the particles may give protection against environmental factors
- The particles (and the cells) can be easily separated from the surroundings



Alginate forms gel at the presence of divalent ions

The SpermVital process

- The sperm cells are harvested and processed in a simple 2 step procedure
- The sperm cells are cryopreserved until use
- The doses are inseminated according to standard procedures with standard equipment for insemination
- Viable sperm cells are released from alginate gel during a time interval after insemination

Milestones obtained

2003: storage 24 hours ambient temperature, dissolved before AI

2004: storage 24 and 48 hours ambient temperature, dissolved before AI 24 hours early

2005: storage 24 hours ambient temperature, AI 24 hours early

2007: new technology successfully combined with cryopreservation (-196℃)

2007, 2008: Field trials frozen semen

2009: Field trial, pilot

2010: Field trial, pilot

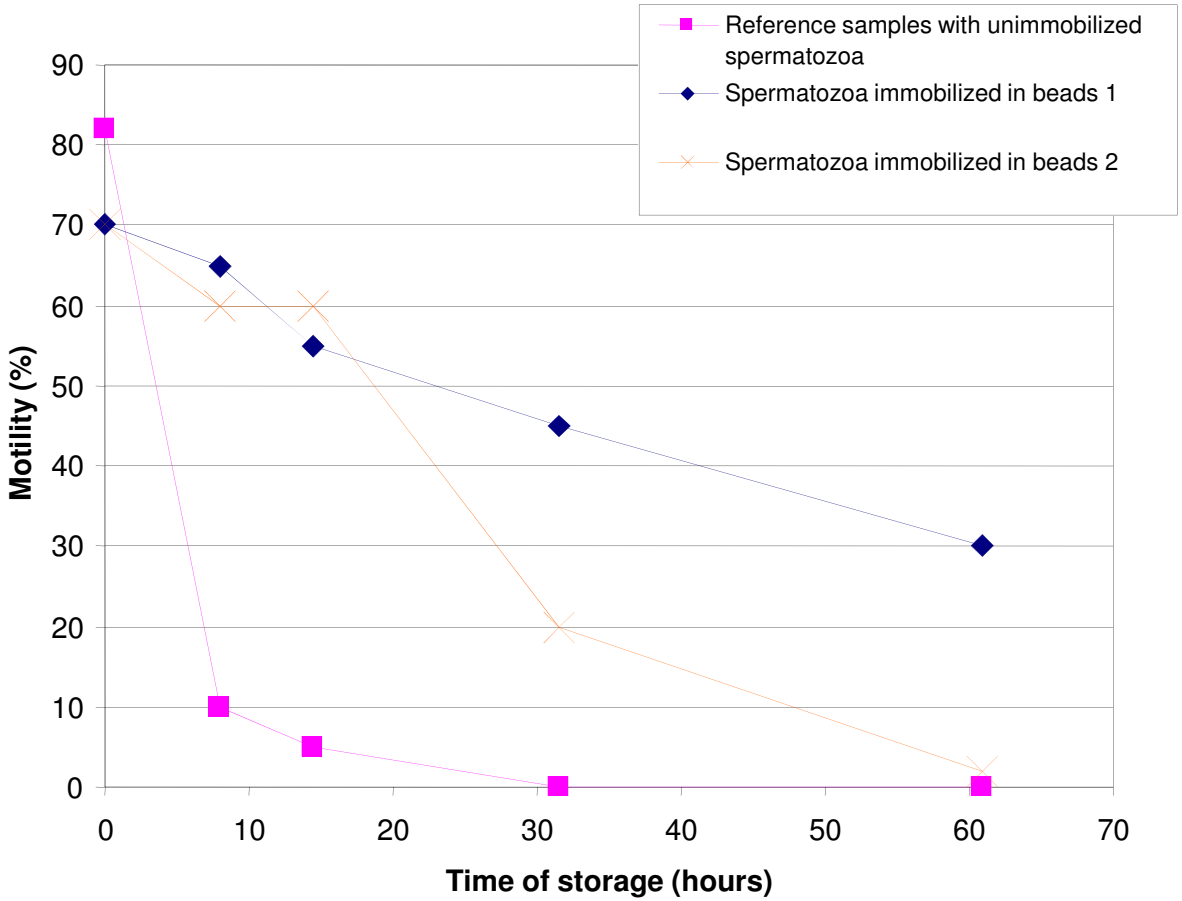
2010-2011: Large field trial

Patent application submitted July 2006
Application official January 2008
National applications 16 countries Januay 2009

Questions to be asked – and answered

- **Do sperm cells have prolonged shelf-life in the lab?**
- Will AIs performed too early give pregnancies?
- Will AIs performed at normal time in estrus give the same results as ordinary produced semen?
- Will the technology work out in large-scale production?

In-vitro trials – an example



Questions to be asked – and answered

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Field trial – pilots

SpermVital®

Trial design – groups of animals

Test-group 1: Control – AI with ordinary processed semen inseminated at ***normal timing***

Test-group 2: Trial – AI with SpermVital® semen inseminated at ***normal timing***

Test-group 3: Trial – AI with SpermVital® semen inseminated ***24 hours too early***

Only heifer or cows
in the same animal-group,
consisting of 3 animals,
one put into each test-group

Trial design

- 5 bulls
- Ejaculates processed split sample
- Controlled trial at selected farms
- One animal-group (3 animals) to be inseminated before start of next animal-group
- These 3 animals are put into test-group 1, 2 and 3
- SAME BULL (and ejaculate) used on those 3 animals

Double insemination NOT allowed!

Pregnancy control six weeks later

Results September 2010

Total number of animals inseminated: 255

Number of animals included, examined or returned to estrus: 249

- Heifers: 93
- Cows: 156

Average pregnancy rates: 67,9 % (169/249)

- Heifers: 71.0% (66/93)
- Cows: 66.% (103/156)

No significant difference between heifers and cows,
and no difference between groups

Biological impact?

Heifers	Number	Pregnancy %
Group 1	30	66.7
Group 2	30	70.0
Group 3	33	75.8

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Sp vil dis
SVs gaup

LANDBRUK · 6-7

Norsk sædoppfinnelse kan endre hele verdens storfeavl

Ny teknologi dobler oksesædens levetid

– Det var en revolusjon da man fant metoden med å fryse ned sæd på 60-tallet. Siden har det skjedd veldig lite. Dette er den største nyheten på dette området siden da, sier forskningssjef Elisabeth Kommisrud i avlsorganisasjonen Geno. Sammen med Sintef har de utviklet en ny metode for å inseminere kviger.

Kari Gåsvatn
er kommentator i Nationen.

* DISTRIKT · 8

Bortfesterne får ny sjanse i retten

Tomtefesteloven ruller videre i rettsvesenet. I år kan Høyesterett åpne for avgiftsøkninger for festetomter.

* LANDBRUK · 10

Krever økte satser for nødslakting

Bondelaget ber Landbruksdepartementet revidere satsene for erstatning når myndighetene krever nødslakting eller innfører andre restriksjoner på husdyrproduksjonen. Satsene er ikke blitt justert siden 2003.

NATIONEN RUNDT · 12

FOTO: SCANPIX

Øks forårsaket ikke flystyrt

Nordlendingene er så spesielle at de overlever det meste. Også forsøk på å styrte et fly i Bodø i 2004.

Commercial use - Italy

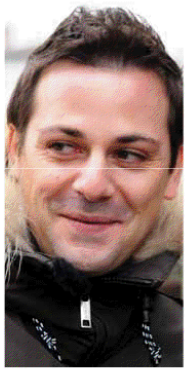
DAIRY PRODUCTION IN ITALY

- *1.1 million dairy cows in the Dairy Herd Recording System (1.8 million total)*
- *Yield 8,979 kg in the Dairy Herd Recording System*
- *Exports 15% of production*
- *Imports approximately 36% of consumption*
- *Milk price 32 euro cents*
- *82 cows per herd on average in the Dairy Herd Recording System (141 in the Lombardi region)*

NRF semen has been sold in Italy since 2006. The establishment of Geno Italy represents the first time that Geno Global has set up a daughter company to service a market. Managing director and co-owner Diego Galli has wide experience with the semen market in Italy. Diego and his sales manager Franco Anelli, together with a combination of salaried sellers, distributors and commission sellers, are in the process of building up a comprehensive marketing team. Norwegian Red Cattle (NRF) has been in this market long enough for there to be many crossbred cows in production, something which provides a living advertisement for the NRF breed. Interest for crossbreeding programs is growing, and developments in sales for Geno Italy these first few months have been uplifting, even though the semen is more expensive than normal Holstein semen. Geno Italy is also included in the trial of long-lasting semen, and the first cows were inseminated with SpermVital in the beginning of January.

Producers' meeting in Mantova

In order to stimulate sales in the Mantova region, Geno Italy issued invitations to a meeting of producers. Diego said that before the meeting, he had hoped that around 40 farmers would show up. By the time he opened the meeting, there were 55 dairy producers in attendance, all of whom paid close attention to the various presentations. There was a great deal of active discussion afterwards, with many thoughtful questions about the NRF breed and breeding program. Somewhat surprising was the appearance of several farmers who manage large herds of pure Holstein cattle. NRF clearly wakes the interest not only of active commercial dairy farmers in Italy, but also of those producers who have invested in Holstein breeding. Diego explains that many Holstein herds have difficulties getting their cows in calf, and require an average of three semen doses per pregnancy.



Diego Galli is very happy with developments in sales during the first months following the establishment of the company. His decision to give up a permanent position elsewhere and invest in Geno Italy is indicative of faith in the future of NRF in Italy.

five crossbred calves – and all are polled.

"I am very pleased with NRF, and we'll now be using NRF semen with the entire herd," Ernesto concludes.

There will then be a two-breed crossbreeding system, with alternating use of Holstein and NRF semen (the TwoPlus program).

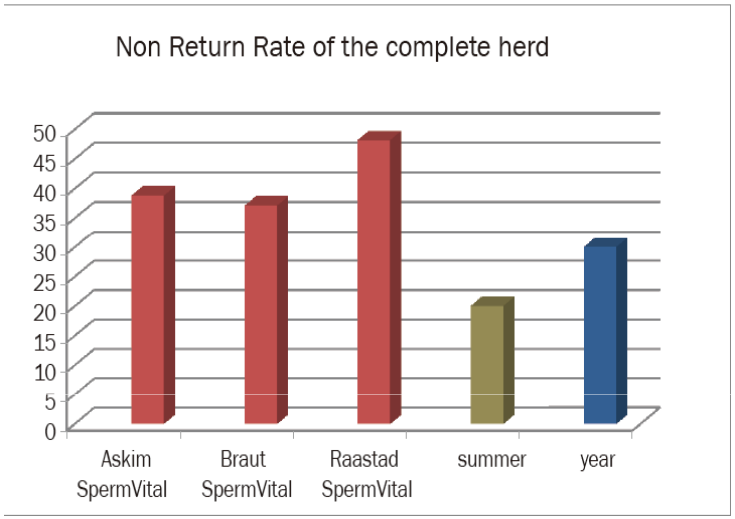
Semen with a long shelf life

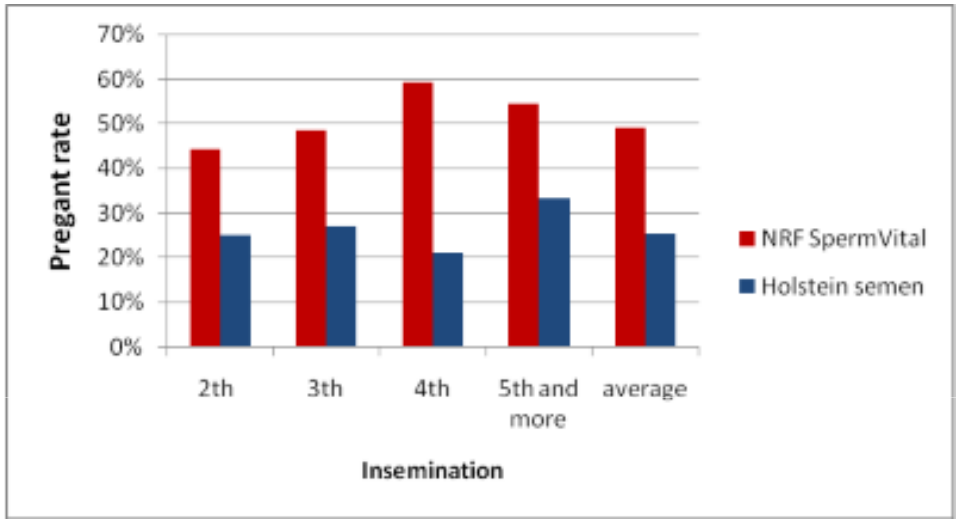
The Fasoli brothers use some sex-sorted semen. Ten-day old bull calves sell for only 2.03 euros, which explains some of the interest for this semen despite its costing four times more than ordinary Holstein semen. Fasoli Fratelli has been among the first in the world to trial long-lasting semen (SpermVital). The cows were inseminated in the beginning of January, and pregnancy tests towards the end of February will show whether the trials have been successful.

Satisfied NRF customers. From the left: Ernesto, Lorenzo, Nicolas (son) and Giuseppe Fasoli.

SpermVital®

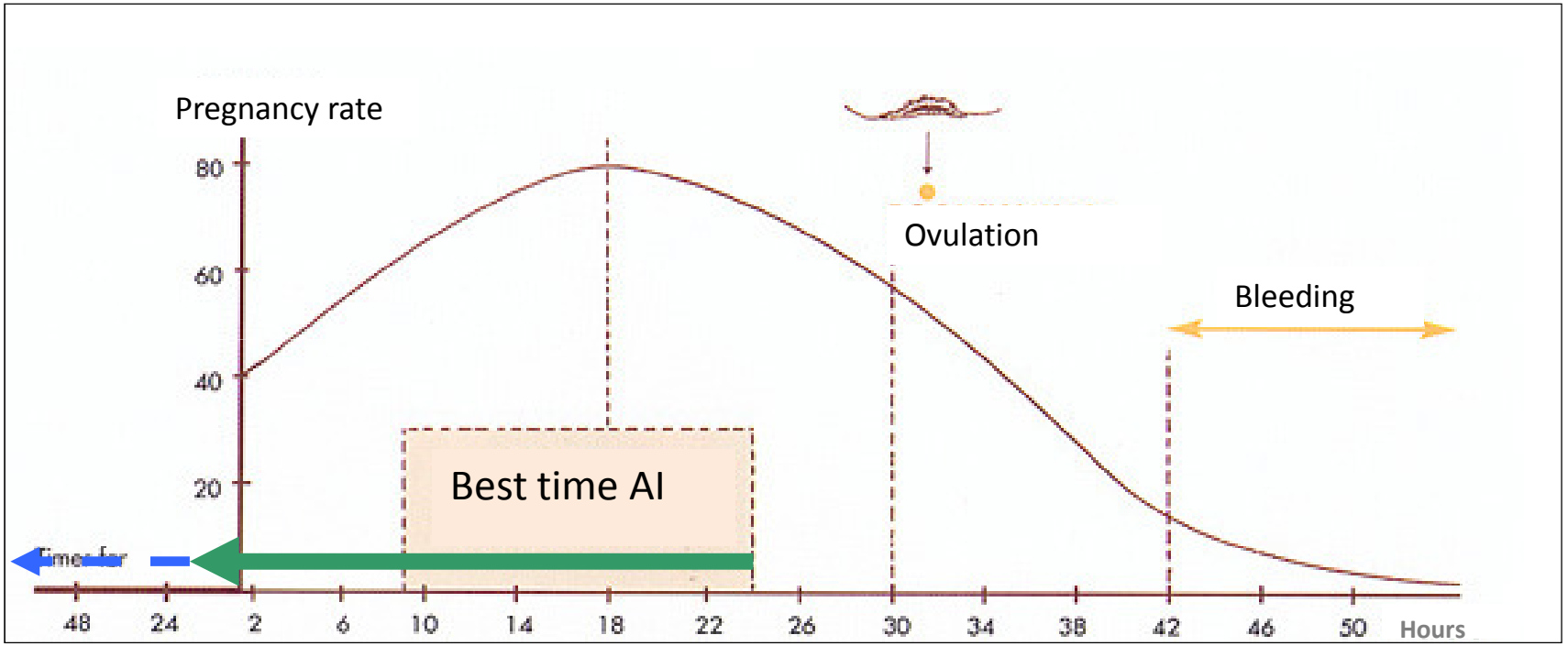
Commercial use by now – Germany and Holland





SpermVital®

Heat detection and timing of AI



Questions to be asked – and answered

- Do sperm cells have prolonged shelf-life in the lab?
- Will AIs performed too early give pregnancies?
- **Will AIs performed at normal time in estrus give the same results as ordinary produced semen?**
- **Will the technology work out in large-scale production?**

Large field trial – 2010 and 2011

SpermVital®

Large field trial

Design

- 16 young bulls – 2000 doses each
- Ejaculates processed split sample (SpermVital® and ordinary)
- Totally 32 000 semen doses produced (16 000 in each group)
- 5 + 5 doses in each goblet, blinded
- Randomly distributed in Norway
- Start September 2010

Insemination at “normal” time!!

Results

- Double inseminations discarded
- 56 days NRR (model including season, lactation number, technician etc)

Number of animals for statistics - model

Significanse 0.05, Strength 90 %

p1	p2	n
0,7	0,71	35767
0,7	0,72	8849
0,7	0,73	3890
0,7	0,74	2163
0,7	0,75	1367
0,7	0,76	937
0,7	0,77	679
0,7	0,78	513
0,7	0,79	399
0,7	0,8	318
0,7	0,81	259
0,7	0,82	214
0,7	0,83	179

To show a significant difference
at 1 percentage
more than 35 000 inseminations
are needed in each group

Field trial 2010-2011 – results (preliminary)

Procedure	Number of animals	Pr lactation number
SpermVital®	6936	2496 (0 = heifers)
		1924 (1)
		2516 (>1)
Ordinary procedure	6918	2510 (0)
		1891 (1)
		2517 (>1)

Results	56 days non return %
Total	73.5
Heifers (0)	77.3

Bull	SpermVital®	Ordinary
11037	79.9	73.4
11039	81.9	76.4

Conclusions and further R&D

SpermVital-semen technology works out as expected!

- In the lab
- With AIs too early
- With AIs at normal timing
- In large-scale production

Number of animals is too small
to get significant results

Ongoing R&D projects
to further improve technology and results ☺

New field trials this autumn


Thank you!
Thanks to everybody in the team at Sintef, BioKaptial and Geno!!