

The Swiss gene banking model - perspective and role of Swiss breeding organisation(s)

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<http://www.wallpaper.us.com/DesktopWallpapers/338/Cows/1366/768/>

Workshop of the ERFP Working Group Ex situ Conservation, 23 - 26 May 2012, Zagreb

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Topics

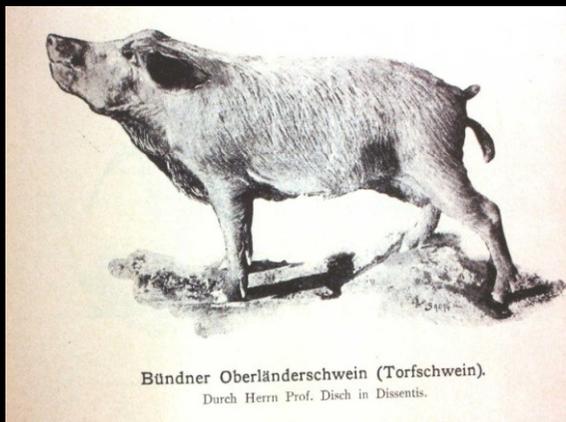
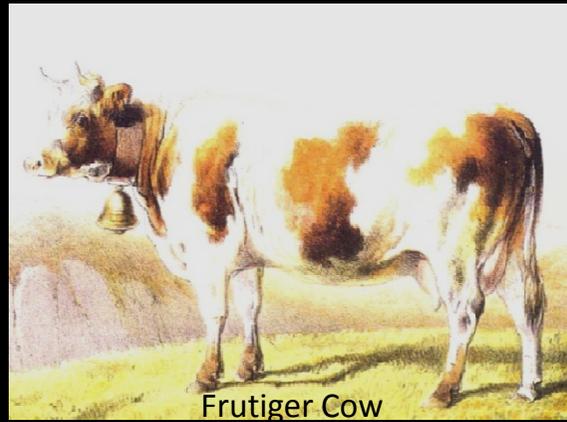
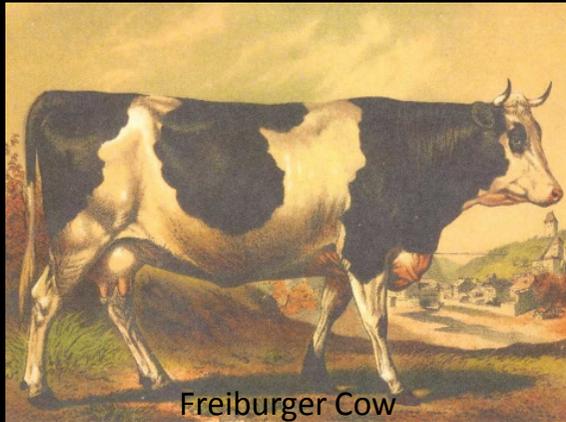
1. Why cryoconservation is also important for a breeding company
2. The Swiss model
3. Experiences and perspectives

Viewpoints of an AI company!

**See country report from Catherine Marguerat,
Federal Office for Agriculture (FOAG)**

Why cryoconservation is important

Marguerat & Boss, 2010:



- Prevention of loss of genetic material
- Conservation of rare bloodlines
- Conservation of biodiversity

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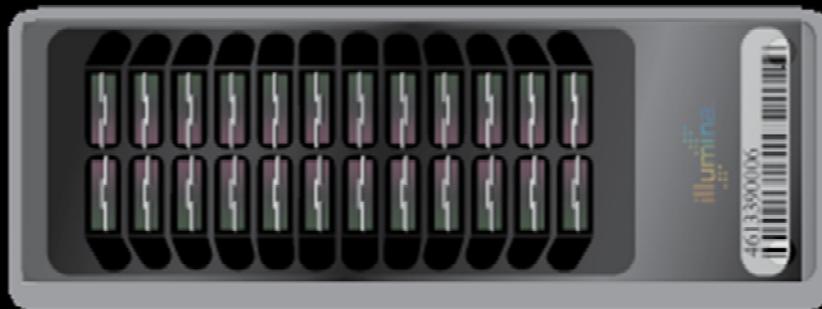
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Why cryoconservation is important

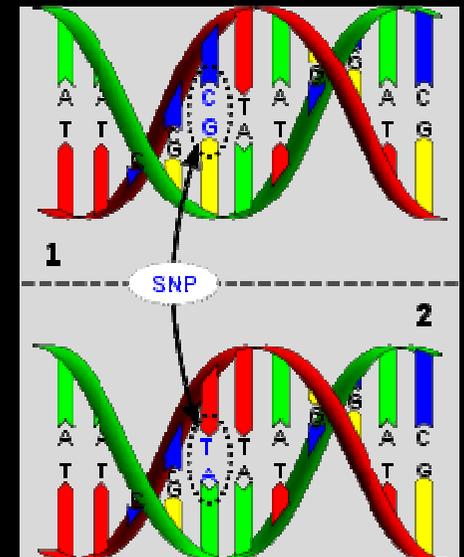
Additional points from an AI company's perspective:

1. Material for genomic analysis

- DNA from old, proven bulls was essential to set up **Genomic Selection** → competitive edge



Illumina BovineSNP50 (version 2)
24 samples, 54'609 SNP each

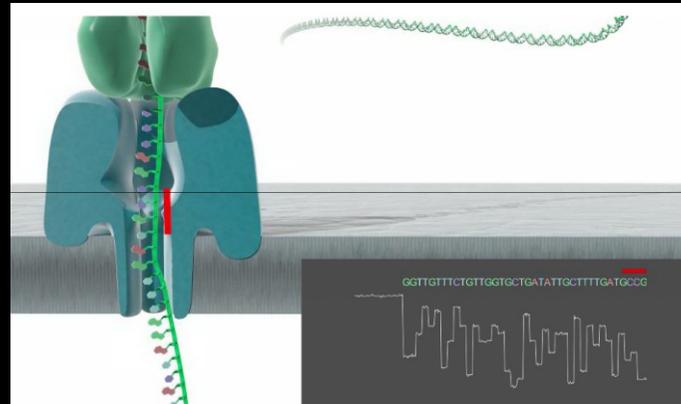
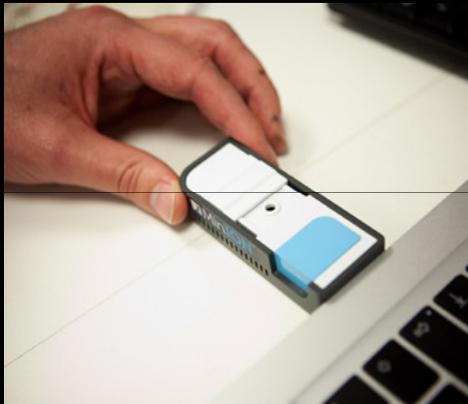


Why cryoconservation is important

Additional points from an AI company's perspective:

1. Material for genomic analysis

- More DNA from key ancestors is necessary for **Genome Sequencing**



Oxford Nanopore Technologies MinION Sequencing

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Why cryoconservation is important

Additional points from an AI company's perspective:

2. Material for long-term quality control
 - Semen quality
 - (Parentage)
3. Material for research purposes
4. Material for ...

The Swiss model

Swissgenetics

- founded in 1960 as Swiss Association for Artificial Insemination (a cooperative)
- began with freezing bovine semen in 1966
- lost its monopoly for AI insemination in 1995
- quit with boar semen production in 1993 (→ SUISAG), later also with billy goat semen
- has today still a market share of approx. 80 %

Swissgenetics semen banking

Swissgenetics started to bank systematically semen end of the 90ies

- first of own, positively proven bulls only
- later of all bulls collected
- plus then also from imported semen

Current strategy:

- bulls producing semen in our stud: 70 units
- imported semen:
 - bulls tested in Switzerland: 70
 - large dairy breeds: 30 / 15
 - small dairy breeds: 15
 - beef breeds: 15

Why Swissgenetics collaborates with the FOAG on the National Gene Pool

- Cryoconservation as a common interest
- FOAG contributes to the storing costs
- FOAG provides system to administrate the gene pool (hosting of CryoWEB, training etc.)

Elements of the service agreement between the FOAG and Swissgenetics

- Swissgenetics responsibilities to supply and maintain the National Gene Pool of cattle semen
- Semen of the Swissgenetics' gene pool which is transferred into the National Gene Pool initially (2010) and from thereon continuously supplied with
 - semen from Swiss cattle breeds (Eringer, Evolène, Original Swiss Braunvieh, Original Simmental) and Rhetic Gray Cattle
 - 50 semen units per bull in general (= core)

Elements of the service agreement between the FOAG and Swissgenetics

- Ownership and access rights to the National Gene Pool
 - Ownership stays with Swissgenetics
 - Removal only if preset rules are fulfilled and if both FOAG and Swissgenetics agree
- The one-time investment and the annual contribution of the FOAG to Swissgenetics for its service
- Additional responsibilities of the two parties

Experiences and perspectives

- The reorganisation and inventory (including data transfer into CryoWEB) of the gene pool take more time than anticipated.
- But up to now no difficulties, which cannot be resolved.

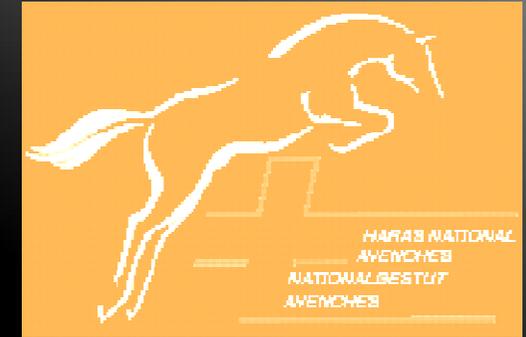
Conclusions

- The collaboration between the FOAG and Swissgenetics on the National Gene Pool for cattle is beneficiary for both sides
- It is a cost-effective solution
- Disadvantages:
 - Sanitary regulations do not allow to include semen from unqualified sources, e.g. harvested on farms
 - Focus on one AI company

Situation in other species

- **Horses:**

- National Gene Pool in Avenches at the Swiss National Stud, a federal institution
- Semen stored of Freiburger / Franches Montagnes stallions
- Most of the semen belongs to the Swiss Confederation
- Contracts with private owners of semen in the National Gene Pool are prospected



Situation in other species

- **Pigs:**

- Unfortunately no longer existing stock of semen
- Establishment of a new lab for collecting and storage semen is necessary
- A service agreement with SUISAG similar to the one with Swissgenetics is under negotiation for semen of boars alive



Situation in other species

- **Goats:**

- FOAG, Swiss Goat Breeding Association and Swissgenetics contributed to the National Gene Pool for Swiss goat breeds with semen projects funded by the FOAG between 2001 and 2012
- Additional semen of Swiss billy goats was collected in France
Problem: Sanitary regulations make it difficult to take back the billy goats
- Semen of the National Gene Pool is owned by the Swiss Confederation
- Swissgenetics stores the semen



Situation in other species

- **Sheep:**
 - Unfortunately no semen stock of Swiss breeds available anymore
 - A solution for harvesting and storing sheep semen still has to be found with the Swiss Sheep Breeding Association and Pro Specie Rara

Schweizerischer Schafzuchtverband
Fédération suisse d'élevage ovin
Federazione svizzera d'allevamento ovino



Perspectives

1. Registration of all cattle semen of the National Gene Pool in CryoWEB by Swissgenetics
2. Establishing the National Gene Pool for pigs by SUISAG on behalf of the FOAG
3. Finding a better solution for harvesting semen from billy goats (FOAG)
4. Finding a solution for sheep semen (FOAG)

Thank you for your attention!



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Questions to you

1. Which countries collect semen on farm for the national gene bank?
2. Where is this semen stored?

