

Possibilities and Plans for a National Cryo Reserve



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History (1)

- Plant gene banks since 19th century
 - ⌚ Random collections of „interesting species“
 - ⌚ National status before 1st world war
 - ⌚ „some seeds in labelled jam jars“
 - ⌚ Vast amount of genetic material
 - ⌚ Today´s tasks
 - Characterisation – weed out doublettes
 - Rejuvenate old material (if possible)
 - Store in modern cryo-banks
 - Build networks and safe storage (Svalbard project)





History (2)

Animal gene banking:

- Biotechnology of reproduction
 - ⌚ Deep freezing of semen – 1950ies
 - ⌚ Embryo transfer, freezing of embryos, in vitro fertilisation, embryo cloning - 1980ies
 - ⌚ Cloning – 1990ies
- First gene banks for AnGR established end of 20th century
- 2007 Global Plan of Action (FAO)





International obligation

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Ex situ conservation measures provide backup insurance against losses of animal genetic resources in the field, either through erosion or as a result of emergencies.

Ex situ measures are complementary to *in situ* measures, and should be linked, where appropriate.

Ex situ collections can also play an active role in strategic breeding programmes.

- Strategic Priority 9 (Global Plan of Action, FAO 2007)





Many questions

1. What will be the status of the collection?
2. What will be the purpose of the collection?
3. Who will be responsible for the collection, maintenance and documentation?
4. What about access and benefit sharing issues?
5. Which material(s) will be collected and stored?
6. How will the material be used and replenished?
7. Who pays the bill?





Status of the collection

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- National cryo reserve
 - ⌚ Owned by the government
 - Public research institutes
 - Universities
 - ???
 - ⌚ Owned jointly by the government and national breeding organisations
 - Include national AI industry
 - ⌚ Includes international organisations if possible





Purpose of the collection

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- **Genetic archive for**

- Endangered local (transboundary) breeds
- All local and transboundary breeds
- Local and commercial breeds
- All national FAnGR

- & **Support for conservation breeding**

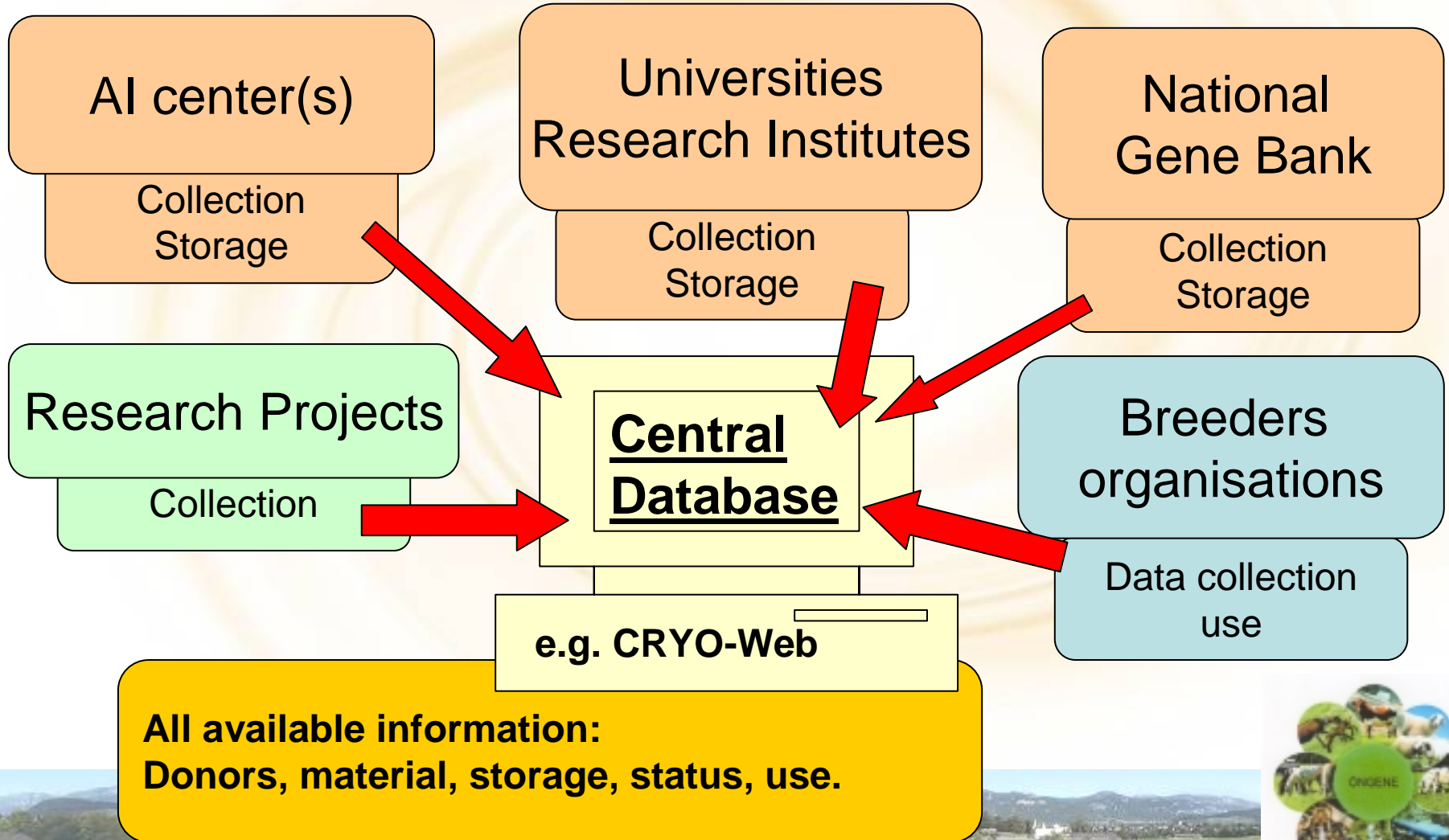
- National programs
- Transboundary programs (may mean export of material!)

- & **Support for all national breeding programs**





Responsibilities (1)





Responsibilities (2)

National Policies need to be fixed!

- Ownership of material?
- Access to the material?
 - ⌚ Scientific interest
 - Public
 - Private
 - ⌚ Commercial interests
- Fair and equal sharing of benefits?
 - ⌚ Discussed at international level, currently national issue





Material for reproduction

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Semen according to EU-standards

- + Co-operation with AI industry, easy in commercial cattle breeds
- + Free trade in EU- and many non-EU-countries
- + Conservation of endangered transboundary breeds, backup for commercial breeds
- Expensive in all save commercial cattle and pig breeds
- Difficult in local landraces (no pedigrees, hygienic standards)
- Collection difficult with free-range animals





Material for reproduction

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Ejaculated semen from field collections

- + Easier to get, cheaper to produce
- + Backup of endangered local breeds
- + Revival of breeds in case of loss in vivo
- No trade, no use in conservation breeding

Epidiymal semen from slaughter animals

- + Cheap, easy, quick
- + Suitably large samples for conservation
- Pedigrees, hygienic standards?





Material for reproduction

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Embryos according to EU-standards

- + Most complete documentation of genetics
- + Free trade in EU- and many nonEU-countries
- + Easy to revive a breed completely (together with stored semen)
- Most expensive way of conservation!

Embryos from slaughter material

- + Easy and reasonably cheap
- Needs experienced team with technical know how and well furnished lab





(Material for reproduction)

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Oocytes

- + Easy to collect (slaughter animals)
- Technical problems not solved completely
- Revival may be difficult

Somatic cells

- + Easiest, quickest and cheapest way of collection and storage of complete genome of a breed
- Revival success currently not satisfying and very expensive





National cryo reserves 2008

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poultry										
others										
goat										
sheep										
horse										
pig										
cattle										
	AT	CH	EE	FI	IS	NL	SK	SL	UK	





Material not for reproduction

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Genomic DNA

- + For scientific purpose
- + Isolation is standard lab-procedure
- + Can be stored infinitely
- + Cheapest way to build genetic archive

Collect 50 to 100 animals per breed and repeat collection after 5 to 6 generations!





Use and replenishment

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Continuous use

- ⌚ Support for (conservation) breeding programs
- ⌚ Replenish material from breeding program

Reestablishment of breed -

from embryos and semen

- ⌚ Replenish cryo reserve from offspring by replacement crossing
- ⌚ Replenishment of semen only after 6th generation

Document every movement and use!!





Conclusions

- ! The National cryo reserve has to be integrated into the National Action Plan for FAnGR and made available to all stakeholders
- ! Policy decisions concerning purpose, responsibilities, documentation and use are necessary
- ! Semen collections should be supplemented by embryos

The question is not „if“ we do it, it is „when“!





....busy
building a
national cryo
reserve...



.... thank you for your attention!

