The role and organization of cryopreservation in use and conservation of local cattle breeds in France, Finland, Italy and the Netherlands

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Introduction

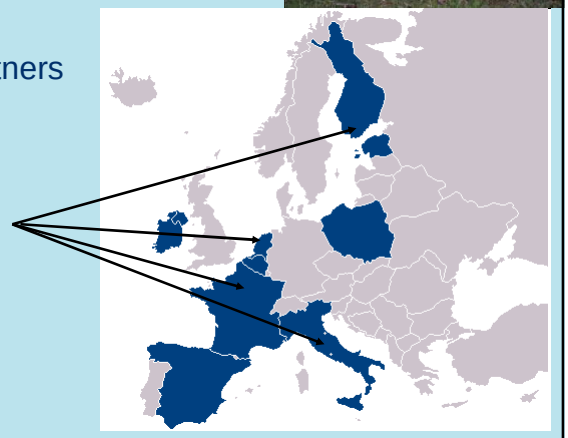
- European Regional Cattle: EuReCa
  - Conservation of the threatened, regional breeds
  - Towards sustainable European regional cattle
- WP2: Survey held in 4 countries, about cryoconservation activities for regional breeds, by AI stations and national cryoreserves.
- Look at
  - Available cryoreserves
  - Technical and organisational aspects (sanitary status, legal aspects, sampling strategies…)
  - Similarities and differences between countries
- Recommendations for rationalization of organisation and activities

EAAP meeting 2009

Countries participating

Four of the EURECA partners participated in this part:

- Finland
- The Netherlands
- France
- Italy



The survey: Topics raised

- Historical background of AI and conservation
- Local breeds concerned
- How cryoconservation activities are organised
  - sampling strategies, stakeholders, legal aspects, sanitary aspects, technical aspects…
- Types of cryoreserves
- The present stocks of semen available
- SWOT analysis

Historical background

- 1950-60
  - Introduction of use of frozen semen for routine purpose in all Europe

- 1960-2000
  - Gradual strong decrease of many local breeds with mechanisation and development of specialized breeds: Holstein or Charolais for example.

Historical background

- 1970-80:
  - First awareness of decline of local breeds → beginning of conservation programs
    - NL: SZH, foundation for rare farm animal breeds
    - FR: First conservation programme for the Bretonne Pie Noire
    - IT: First national program on farm animal genetic resources
- 1990 onwards
  - Increased recognition of the risk of loss of breeds and genetic diversity
  - Increased public and government effort to conserve genetic resources
  - Convention on Biodiversity (Rio) (1992).
  - Partially government funded centres for animal genetic resources were established like CGN in the Netherlands (2001) or Cryobanque Nationale in France (1999).

Local breeds concerned

FAO criteria Number of cows	Critical < 100	Endangered 100 to 1000	Vulnerable 1000 to 6500	Total
Finland	0	2	1	3
France	2	12	4	18
Italy	2	10	11	23
The Netherlands	0	4	4	8
Total	4	27	20	52

Total of 52 breeds concerned: almost half of them are vulnerable and half endangered, few are critical.

Types of cryoreserves

- AI stations
  - Routine AI. Semen used for routine AI. While the purpose is present day use, longer term storage may occur when doses used per year is small.
  - Genetic Reserve: Semen stocks conserved for longer time for strategic breeding purposes: reinject variability, create new bulls etc. Restricted access.
- (National) gene bank
  - Short term storage. Semen may be distributed to farmers to support breeding programmes of small populations/breeds, in order to minimise inbreeding.
  - Long term storage: Semen stored to secure a breed. May be used when breed is lost or has suffered dramatic los of genetic diversity, e.g. following a calamity.

Institutions / stakeholders involved

- NL
  - CGN National Gene Bank.
    - Longer term cryoreserve
    - Shorter term; to support breeding programmes of rare breeds
  - 5 commercial AI stations. Routine AI.
  - Individual breeders or breeding groups
- France
  - Institut Elevage: Choice of bulls (together with breeders society)
  - AI organisations (in regions). Freeze and store the semen
  - Cryobanque National : Coördinating role and gene banking of some species.

Institutions / stakeholders involved

- Italy
  - Local and national breeders associations
  - Regions → Support cryobanks of local breeds
  - AI centres
  - Research Institutions, e.g. IBBA CNR
  - Long term cryoreserves created on projectbasis
- Finland
  - Routine AI at 4 AI co-operative
  - Cryobanking
    - Planned by and paid for by MTT co-ordinator national genetic resource programme
    - Carried out by AI co-operation
- All countries
  - For the longer term gene banking, the majority of funds come from national and regional governments (e.g. Ministry of Agriculture)

On farm collection?

- **Finland and France**
  - No derogation → all bulls collected in EU AI certified centres
- **Italy**
  - Specific derogation for local breeds for collection on farm. → Almost half of the breeds collected exclusively on farm, and the other breeds are collected in AI EU certified AI centres and/or on farm.
- **The Netherlands**
  - Derogation for CGN to collect on farm for rare breeds, and to distribute the semen to support breeding programmes for rare breeds under very strict conditions. → Majority of bulls collected at EU certified AI centres. For some rare breeds also substantial number collected on farm

Number of semen doses/bull

Number of semen/bull	< 200 doses	200-999 doses	>1000 doses	Remark
Finland	19 %	36 %	45 %	
France	24 %	17 %	59 %	
Italy	57 %	40 %	3 %	
Netherlands	64 %	28 %	8 %	only CGN

- In Finland and France: Most bulls more than 1000 doses.
- In Italy, numer doses/bull generally lower
- In Netherlands, the nb of doses/bull is <200 in majority because for the rare breeds, semen of most bulls is in genetic reserves.

→ **2 types of sampling strategies**: less bulls with many straws and larger generation intervals (FR, FI) or “as many bulls as possible” but with less straws and rapid turn-over (IT, NL)

Birth date of bulls
available in routine use + cryoreserves

Birth date of bulls collected	< 1980	1980-1999	>2000	Unknown
Finland	22 %	50 %	28 %	
France	26 %	61 %	17 %	
Italy	3 %	58 %	34 %	5 %
Netherlands	26 %	55 %	19 %	

- Almost ¼ of the bulls available today have a birth date before 1980, except for Italy.
- In France, less bulls collected after 2000 because in many breeds the amount of straws/breed is already huge.

  For example in 2007 : for the breed Froment du Léon, 35/150 of first AI made using bulls born before 1980, for the Armoricaine 38/65 made with bulls born before 1960.
- In Italy, many bulls are currently collected.

Number of storage sites

Number of storage site / breed	1	2	3
Finland	100 %		
France	35 %	60 %	5 %
Italy	56 %	44 %	
Netherlands		65%	35%

Note that the totals includes different ‘types’ of sites.

For instance, CGN has two CGN sites for security reasons, but semen from the same bull may additionally be available at an AI station.

SWOT: main strengths/weaknesses

Strengths

- National coordination for conservation of genetic resources (FI, FR, NL)
- National governments funds (FI, FR, NL)
- Available stock of semen (all)
- Regulatory framework for local breed collection on farm (IT)

Weaknesses

- Cryoconservation activities expensive (FI)
- Limited public financial support (IT)
- Limited interest of AI organisations for local breeds (FI, NL)
- Lack of regulation of doses cryoconserved by AI centre (FR)
- Low numbers in embryos (FI, FR)

SWOT: main opportunities/threats

Opportunities

- National and local policies for AnGR conservation (FI,IT,NL)
- Breeders interest (FR,IT,NL)
- Capacity to manage these breeds with cryopreserved semen (FR)

Threats

- **Negative trend in public funds** (FI,FR,IT,NL)
- High cryoconservation costs (FI,NL)
- Continuity of national coordination (FR)
- Poor national strategy in AnGR conservation(IT)

Conclusion

Very important to have an organised and coherent collection of the bulls particularly for local breeds on a national level

- Important to know what are the existing stocks for each local cattle breeds. → localisation, status, evolution
- Complete the stock with semen/embryos to have a good representation of the genetic diversity of each population

- National co-ordination is important to secure animal genetic resources
- It is possible to reach the same objectives with different models of collaboration within countries
- Try to optimally use and increase participation of AI organisations and breed interest groups

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