

Private and Public Actors in Genebank Development in Norway

ERFP, Toledo Spain

May 21, 2023

Anna Holene

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Local Farm Animals in Norway

Species	Native	Endangered
Cattle	7	6
Sheep	12	6
Goat	2	1
Pig	2	1 (extinct)
Poultry (egg-layers)	11	11
Horse	4	3
Dog	7	6
Geese	2	2
Rabbit	1	1
Honey bee	1	1
TOTAL	49	37 (1 extinct)



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2023 is a Year of Celebration in Norway

– ***No local breeds of cattle, sheep, goat or horse are critically endangered any more*** 😊

– The last breed to cross the boarder was **western red polled** – with 307 breeding females in the latest census.



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Genebanks in Norway

Species	Genebank	Material	Purpose
Cattle	Yes	Cryo-conservation of semen	Daily use and long-time storage
Sheep	Yes	Cryo-conservation of semen	Daily use and long-time storage
Goat	Yes	Cryo-conservation of semen	Daily use and long-time storage
Pig	Yes	Cryo-conservation of semen	Long-time storage – extinct breed
Poultry (egg-layers)	Yes	Live	Serve the marked with healthy animals and eggs, and securing the breeds/lines for long-time storage
Horse	No		
Dog	Yes	Cryo-conservation of semen	Long-time storage
Geese	No		
Rabbit	No		
Honey bee	In progress		

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Genebank Development for Cattle, Sheep and Goat

Species	Genebank	Material	Purpose
Cattle	Yes	Cryo-conservation of semen	Daily use and long-time storage
Sheep	Yes	Cryo-conservation of semen	Daily use and long-time storage
Goat	Yes	Cryo-conservation of semen	Daily use and long-time storage
Pig	Yes	Cryo-conservation of semen	Long-time storage – extinct breed
Poultry	Yes	Live	Serve the market with healthy animals and eggs, and securing the lines for long-time
Horse	No		
Dog	Yes	Cryo-conservation of semen	Long-time storage
Geese	No		
Rabbit	No		
Honey bee	No		

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Long tradition of using frozen semen in commercial breeding work, for daily use and long-time storage

- Already in the 1960's the **dairy cattle** breeding organisations started to freeze semen.
- From the 1980's, frozen semen has also been used in Norwegian breeding for **sheep and goats**.
- Today frozen semen is used in all breeding programs for cattle, sheep and goat, in **the active breeding populations as well as in the local endangered breeds**.



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Ownership of Genebanks

- The genebanks are owned by the breeding organizations, so far there is no public cryo genebank for AnGR in Norway.
- The breeding organizations are co-operatives, that is, they are owned by their members, Norwegian livestock farmers.
- The financing of the genebanks
 - Cattle; so far; by the breeding organization GENO.
 - Sheep and goat; by the breeding organization NSG and by public grant
 - One of the criteria for applying the subsidies: It is assumed that the breeding organizations **cooperate with the Norwegian Genetic Resource Centre** to help **ensure that local endangered Norwegian breeds are not lost.**

Criteria for Male Candidates

- Important criteria for the males of endangered breeds that are being selected for semen production are
 - Well documented pedigree
 - Both the candidate and his mothers are good representatives for the breed
- To ensure this, the selection is a cooperation between **private and public actors**;
 - breed societies
 - the respective breeding organization
 - Norwegian Genetic Resource Centre
- In addition, Norway has implemented a tool for the endangered native cattle breeds to check the relationship to the already existing AI-bulls. In this way we can select bulls that widen the gene pool in the cryo genebank.

Genebank size and expansion

- Bulls
 - Semen stored from 40-80 bulls of each of the endangered native breeds. 100-150 doses for long-time storage and 500 for daily use.
 - Every year 1-3 new bulls of each of the native endangered breeds are included in the gene bank.
- Rams
 - Semen stored from 30-50 rams of each of the endangered native breeds. 50 doses for long-time storage and 300 for daily use.
 - Every year 1-3 new rams of each of the native endangered breeds are included in the gene bank.
- Bucks
 - Semen stored from 10 coastal goat bucks.

Private and public actors in Norway have recognized the importance of maintaining the existing genebanks

The importance of having cryo-conserved material in genebanks for long-time storage is **highlighted in Norwegian public published documents**;

- *National Strategy for the conservation and sustainable use of genetic resources for food and agriculture.*
- *Strategy Plan for Norwegian Genetic Resource Centre.*
- *Plan of Action for native endangered farm animals in Norway.*
- *National Plan of Action for GRFA – to be published any day...*
 - *Establishment of a public back-up genebank*



Conclusion

- It has been **easier and more obviously to develop genebanks** for breeds and species that **use frozen semen in the active breeding work**.
- Although Norway has well developed genebanks for cattle and sheep,
- It seems to be a challenge to develop genebanks for species where the breeding work doesn't use frozen semen, and thereby has the possibility to finance genebank for long-time storage.
 - Horse
 - Poultry
 - Geese
 - Rabbit

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