



UNIVERSITÀ DEGLI STUDI DI MILANO

DIPARTIMENTO DI SCIENZE VETERINARIE
E SANITÀ PUBBLICA

*Better integration of ex situ and in situ approaches
towards conservation and sustainable use of GR at
national and EU level: from complementarity to synergy.*

Animal Genetic Resources

for food and agriculture

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Workshop - Brussels 3rd June 2015

Definitions

AnGR in situ conservation:

“Conservation of a breed through continued use by livestock keepers in the production system in which the livestock evolved or are now normally found and bred” (FAO, 2013)

AnGR ex situ conservation:

“Activities that take place outside of their natural habitat” (*Article 2 of the CBD, 1992*).

“Includes both 1) cryoconservation of semen, ova, embryos or tissues for potential future use, and 2) the maintenance of live animals (not kept under the conditions referring to in situ conservation – Note: boundary not always clear)” (FAO, 2013)

(FAO Animal Production and Health Guidelines. No. 12 and 14, , 2012 & 2013)



IN SITU vs EX SITU

< 1990 - ex situ and in situ: alternative / mutually exclusive strategies



1990 - ex situ and in situ: complementary activities - *“CBD emphasizes the importance of in situ conservation and considers ex situ conservation to be an essential complementary activity”*.



> 2015: toward synergy / integration between ex situ and in situ



Conservation objectives	Ex situ		In situ
	Cryo	Ex situ live	
Flexibility of AnGR to meet future changes: <ul style="list-style-type: none"> • Insurance for changes in production conditions • Safeguard against catastrophic events • Research opportunities 	<p>++</p> <p>++</p> <p>++</p>	<p>+</p> <p>-</p> <p>++</p>	<p>++</p> <p>+</p> <p>++</p>
Sustainable utilization of rural areas <ul style="list-style-type: none"> • Opportunities for rural development • Maintenance of agro-ecosystems diversity • Conservation of rural cultural diversity 	<p>-</p> <p>-</p> <p>-</p>	<p>+ -</p> <p>+ -</p> <p>+ -</p>	<p>++</p> <p>++</p> <p>++</p>
Genetic aspects			
<ul style="list-style-type: none"> • Breed evolution / genetic adaptation • Increased knowledge of breed characteristics • minimising exposure to genetic drift 	<p>-</p> <p>+</p> <p>++</p>	<p>+</p> <p>+</p> <p>-</p>	<p>++</p> <p>++</p> <p>+</p>



Players

In situ	Ex situ
Farmers / breeders	
Farmers / breeders Associations ++	Farmers / breeders Associations + -
National Focal Point - FAO	National Focal Point - FAO
NGOs	
Research Institutions	Research Institutions
	Gene banks
Government (Agriculture)	Government (Agriculture)
Tourism Sector	
Food production Sector	
Nature conservation Sector	
etc.	etc.



Some key points

Exchanges across animal, forest, microbial, plant GR sectors?

- Successful in situ conservation usually requires changing the economic and market environment, allowing a breed to be financially sustainable.
- Cryoconservation: in the short term, collection and storage often too expensive?



Grazing activities and biodiversity (flora; soil bacteria, fungi, metazoa) in the Alps

Mosaic of grazing areas and woods



Abandoned grazing areas, gradually invaded by shrubs and woods



Food products as integration between microbial and animal GR



Bitto cheese, Valtellina, 15 years old



Salami, Nebrodi



Some key points (cont.)

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Table IV. Costs (Euros) for the creation of the cryo-bank in the horse, cattle, pig, rabbit and cattle-ET, across the strategies embryos + semen (% of embryos) and semen-only (MAXP n = maximum number of parturitions before culling)

Strategy		Horse	Cattle	Pig	Rabbit	Cattle-ET
Embryos + semen	90%	237 270	41 700	33 550	2770	41 700
	50%	151 080	34 150	28 140	3200	34 150
	10%			22 730	3630	26 610
Semen-only	MAXP 1	455 630	30 760	20 870	4100	24 140
	MAXP 2		24 140			24 140



Some key points (cont.)

- AnGR conservation more globally (vs. country) planned ?
- Research should more investigate concrete issues of short-medium term conservation relevance ? should include both investigation and implementation?



We have seen:

- **In situ and ex situ players often overlap**
- **In situ and ex situ often under same guidance**

Then, today in AnGR limited divergence among in situ and ex situ; however we should aim to:

- **Increase integration**
- **Do not allow divergence in the future**



From the ex situ perspective, which ways to better integration?

From the in situ perspective, which ways to better integration ?

- Cryomaterial use for in vivo management:
 - more research
 - implementation feasible: now? in future?
- In situ should provide more guidance to ex situ.
- Integrating in situ and ex situ in planning conservation actions

