GenRes Bridge

Genetic resources for a food-secure and forested Europe

# Joining forces for Genetic Resources and biodiversity management

Webinar series for the ‘Sharing perspectives workshop’ | October 2019

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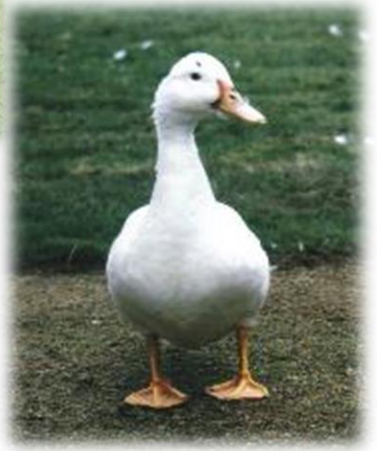
# What are the genetic resources in this domain?

AnGR

- ✓ Farm animal genetic resources for food and agriculture
  - Limited number of livestock species
  - Other domesticated animal species, related to agriculture
- ✓ Wild relatives and feral populations
  - Wild relatives almost all extinct
  - Little interest (so far) for breeding/development
  - Research interest



# What are the genetic resources in this domain?

Genetic diversity between and within species and breeds

- ✓ Breed / strain level
- ✓ Genetic diversity within breeds

Type of AnGR

- ✓ Breeding animals
- ✓ Reproductive material
  - Semen (+++)
  - Embryos (+)
  - Oocytes, ovarian tissue, primordial germ cells, somatic cells (-)

# Organization of work – national, European, global

- National:
  - ✓ National coordinators appointed by their Ministry to the FAO
  - ✓ Large variation of actors and stakeholders (type, number) / country.
- Europe:
  - ✓ ERFP = European Regional Focal Point – Network to help the implementation of the FAO Global Strategy and Global Plan of Action
  - ✓ EU – policy and regulatory framework
- Global:
  - ✓ FAO – Global Focal Point for AnGR
  - ✓ FAO Commission on Genetic Resources for Food and Agriculture (CGRFA) – Intergovernmental Technical Working Group for AnGR

# Political commitments

Global:

- ✓ Convention on Biological Diversity (CBD)
- ✓ Nagoya Protocol on Access and Benefit Sharing (NP)
- ✓ UN Sustainable Development Goals

  SDGs indicator 2.5.1 (genetic material stored) and 2.5.2 (breed classified as being at risk)
- ✓ FAO Global Plan of Action + Interlaken Declaration

European:

- ✓ EU Biodiversity and Forest Strategies
- ✓ EU Common Agricultural and Rural Development Policy
- ✓ EU Animal Breeding Regulation
- ✓ European Innovation Partnership, Horizon 2020
- ✓ Several other topics: animal health, trade, product quality, biotech, ABS, organic farming etc.

# Who are the actors in the domain?

Policy makers

Breeders associations and networks

Breeding industry

Research Education

Farmers advisory services

Conservation NGOs

Genebanks


Nature / landscape management

Entities linked with Tourism Gastronomy Rural culture


*Sergey_Kandakov / Freepik*

# Conservation of genetic resources

- *In situ* = On farm.

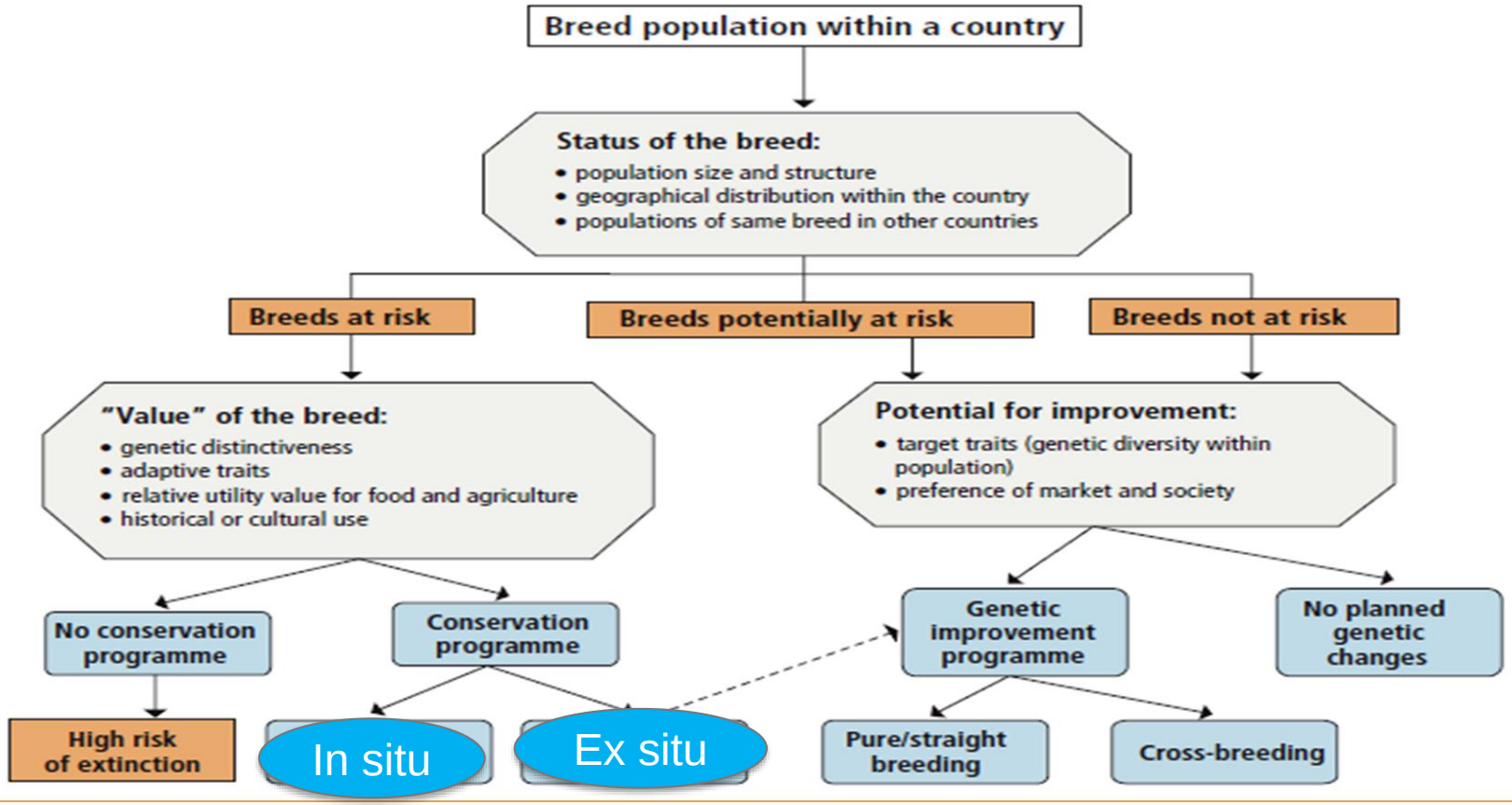
Commercial farms, Hobby farms, Nature and landscape management, Breeding populations

- *Ex situ in vivo*

Live animals in « ark farms » or « government/research » farms

- *Ex situ in vitro*

Genebanks: semen, embryos, cells in liquid nitrogen


Breed population within a country
Status of the breed:
• population size and structure
• geographical distribution within the country
• populations of same breed in other countries
Breeds at risk
Breeds potentially at risk
Breeds not at risk
"Value" of the breed:
• genetic distinctiveness
• adaptive traits
• relative utility value for food and agriculture
• historical or cultural use
Potential for improvement:
• target traits (genetic diversity within population)
• preference of market and society
No conservation programme
Conservation programme
Genetic improvement programme
No planned genetic changes
High risk of extinction
In situ
Ex situ
Pure/straight breeding
Cross-breeding

# Conservation of genetic resources

**<u>Setting up of a conservation program</u> – between breeds**

- ✓ Inventory/review of the breed status
- ✓ Adoption of the appropriate population management/breeding/conservation strategy
- ✓ Phenotypic and genomic characterisation of the breed
- ✓ Valorisation of the breed and its products/services

# Setting up of a conservation program: example

Boulonnais Sheep – France

Almost extinct beg.1980s - 600 ewes left

- Breed not adapted to global market (carcasses too big and not meaty enough)
- Crop taking over / sheep production

# Setting up of a conservation program: example

Boulonnais Sheep – France

1984 : regional help through a “conservatoire”

First steps:

- Funding for staff time to inventory last breeders/animals
- Pedigree recording and networking

# Setting up of a conservation program: example

Boulonnais Sheep – France

1990s:

- Semen cryoconservation (10 rams today) – National or local genebank
- “Genetic management” - complicated

# Setting up of a conservation program: example

Boulonnais Sheep – France

Years 2000 / On going

- Valorization: branding of the meat – networking with local butchers

Not easy: lambing all year long !

- Ecosystem services

# Setting up of a conservation program: example

Boulonnais Sheep – France

Today: about 2 000 ewes

National acknowledgement: Farm animal biodiversity award (3rd place) – ecosystem services

Breed is rescued but still fragile

# Information systems, databases and information tools

## Country level

- ✓ Breed associations/herd book information systems
- ✓ Individual animal identification and phenotypic/genomic data for individuals
- ✓ Specific databases for AnGR - very reliable information in species of major economic interest

## European level

- ✓ Information systems at European level
  - ✓ EFABIS/DAD-IS = European database for breed information (managed by FAO and ERFP)
    - ✓ Breed characteristics
    - ✓ Population size and risk status
    - ✓ Gene bank collections
- ✓ European Genebank Network (EUGENA)
  - ✓ Portal – Meta data and contact information
  - ✓ Collection details and genomic data (H2020 IMAGE portal)
- ✓ EU portals with list of breeding organisations, Artificial Insemination Centers etc.

European Farm Animal Biodive

www.fao.org/dad-is/regional-national-nodes/efabis/en/


EFABIS

Tools

EFABIS Greece

EFABIS Ireland

EFABIS Poland

EFABIS Slovenia

EFABIS United Kingdom

## European Farm Animal Biodiversity Information System (EFABIS)

The European Farm Animal Biodiversity Information System (EFABIS) is the European information system for animal genetic resources. It is managed by the European Regional Focal Point for Animal Genetic Resources (ERFP). EFABIS serves as the platform for the exchange of national data on animal genetic resources, provided by the European National Coordinators. EFABIS is the source of European breed-related data for the Domestic Animal Diversity Information System (DAD-IS).

### Results

#### Breed Diversity in Europe

Mammalian and avian livestock breeds are reported to occur either in only a single country (local breeds), in several countries in one region (regional transboundary) or in different regions of the world (international transboundary).


ERFP

Key facts

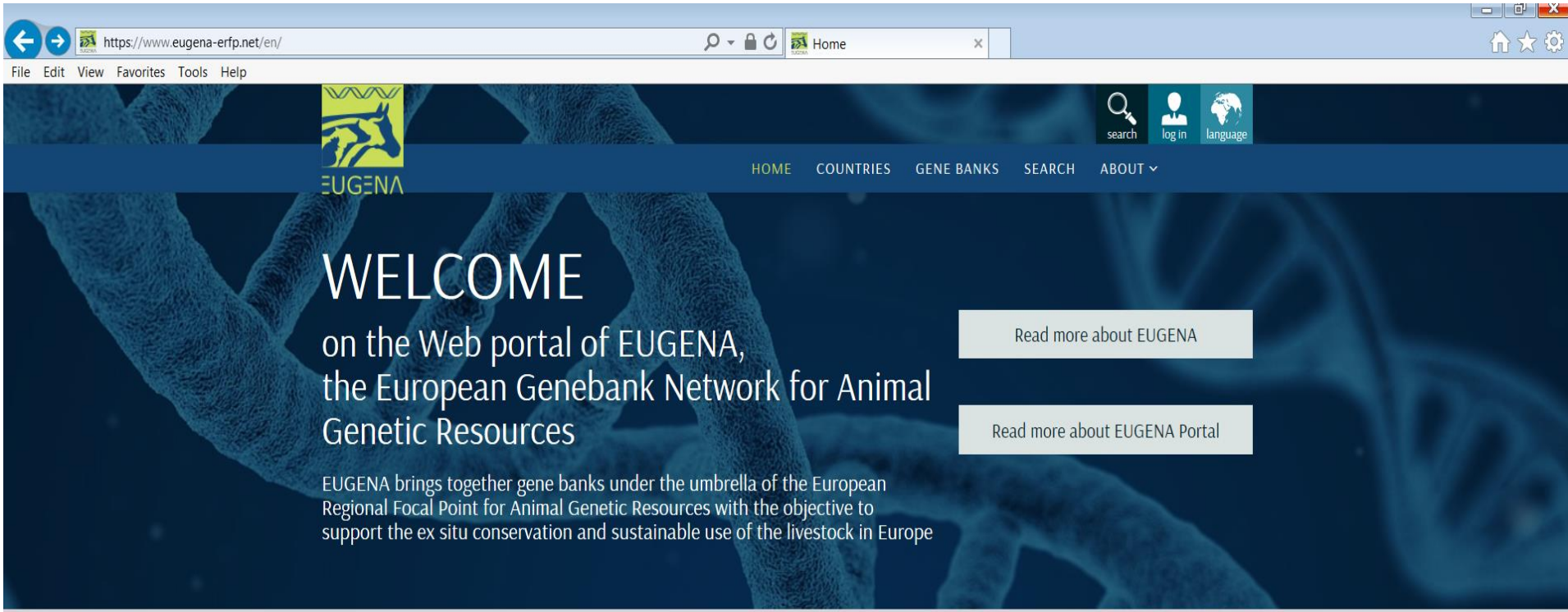
Many local breeds are at risk. Strategies and action are needed at national and pan-European level.

Links

European Regional Focal Point for Animal Genetic Resources (ERFP)

The European Genebank Network for AnGR (EUGENA)

# Information systems, databases and information tools




5 Countries

7 Gene Banks

# Existing strategies in the domain

**GLOBAL – FAO Global Plan of Action for Animal Genetic Resources:**

- ✓ Strategic Priority Area 1: Characterization, Inventory and Monitoring of Trends and Associated Risks
- ✓ Strategic Priority Area 2: Sustainable Use and Development
- ✓ Strategic Priority Area 3: Conservation
- ✓ Strategic Priority Area 4: Policies, Institutions and Capacity-building

# Existing strategies in the domain

**EUROPEAN - ERFP - Roadmap defined in MyPOW :**

- ✓ Improvement of documentation of AnGR in Europe
  - Updating and improvement of national data and documentation
  - Further development of EFABIS and EUGENA website/portal
  - Development and improvement of AnGR indicators
- ✓ Improvement of *in situ* conservation of AnGR in Europe
  - Guidelines and good practices
  - Valorisation strategies
- ✓ Improvement of *ex situ* conservation of AnGR in Europe
  - Development of European Genebank Network (EUGENA)
  - Improving gene bank management
  - Further development of CryoWEB/genebank database

# Key take-”to the workshop” messages

- ✓ **Conservation by utilization** – many different actors contribute to conservation “*in vivo*” – important to raise awareness among actors and society
- ✓ Investments needed in valorisation strategies for (local) AnGR
- ✓ Important complementarity of *ex situ* and *in situ* conservation strategies - Gene banks are crucial:
  - for long term conservation
  - broad genetic base for breeding and research
- ✓ Local breeds are directly linked to the maintenance of valuable agro-ecosystems. They contribute to the diversity in landscape, food and production systems and social values (rural traditions and knowledge)
- ✓ Target: development of integrated, sustainable production systems, based on rational management of GR, taking into consideration the orientation to the market and the demands of society/consumer, thanks to good breeding practices and quality products… And being innovative on top of it !
- ✓ Transboundary collaboration for effective pan-European strategy

# Expectations for the workshop

What would you want to achieve for yourselves/for your domain/for collaboration?

Ourselves/domain:

- ✓ Shared view on main priorities to maintain broad genetic base and to promote the (sustainable) use of genetic diversity
- ✓ AnGR Europe 2030

Collaboration

- ✓ Identify key components of a joint strategy (besides individual domain strategies)
- ✓ Integrated approach for future agricultural and food system development. (incl. biodiversity, circularity, food quality, environmental, climate, social objectives)
- ✓ Better (access to) information and documentation - inventory of breeds/genetic diversity – in broad sense – agro-ecosystem link and opportunities for enhanced use of information systems
- ✓ Complementary conservation strategies *in situ* + *ex situ* – opportunities for valorization

https://www.animalgeneticresources.net/

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