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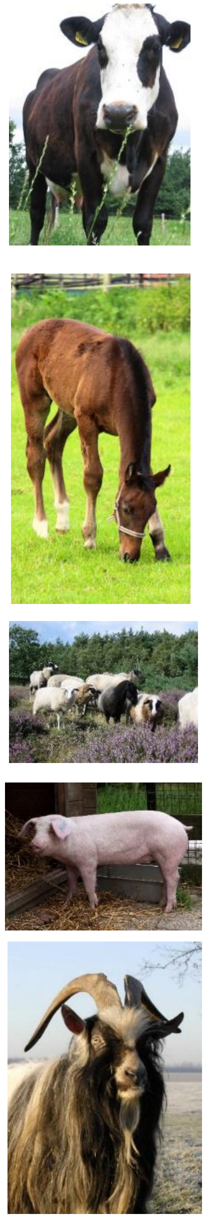
ANIMAL BREEDS



Update EURC-EAB activities

ERFP WG meeting Sassari

19/05/2026, Mirjam Spoelstra

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Designation of the EURC-EAB

- Responsible for the scientific and technical contribution to the establishment and harmonisation of methods for the preservation of endangered breeds, and the preservation of the genetic diversity existing within those breeds
- Bovine, Porcine, Ovine, Caprine, Equine species
- EURC-EAB works on endangered breeds of those animal species only

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for Agriculture and Food

Work Programme 2025-2027

Work package 1 – Cooperation with breed societies, NCAs and third parties

1.1 - Contact point and communication

1.2 - Training and dissemination

1.3 – Guidelines and best practices

Work package 2 – Methods for preservation of (genetic diversity within) breeds

2.1 - Evaluation of breeding programmes of endangered breeds

2.2 - Breed risk status indicators

2.3 - Integration of ex situ

2.4 - Transboundary breeds

Work package 3 – International cooperation

3.1 - Cooperation

3.2 - Standing Zootechnical Committee

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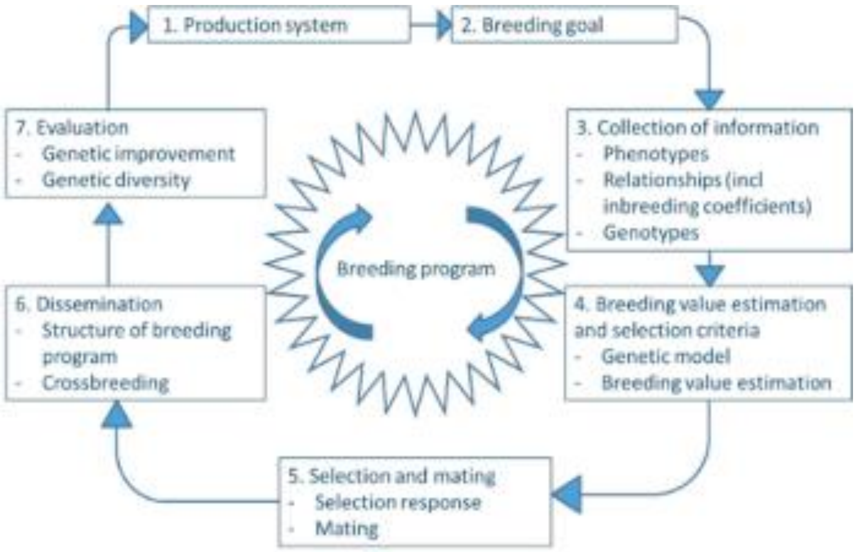
Update: Breeding programme assessment

Lead institute WUR – Jan ten Napel, Mirjam Spoelstra, Mira Schoon

Guidelines and tools for (self)evaluation of breeding programmes for endangered breeds



1. Production system

2. Breeding goal

3. Collection of information
- Phenotypes
- Relationships (incl inbreeding coefficients)
- Genotypes

4. Breeding value estimation and selection criteria
- Genetic model
- Breeding value estimation

5. Selection and mating
- Selection response
- Mating

6. Dissemination
- Structure of breeding program
- Crossbreeding

7. Evaluation
- Genetic improvement
- Genetic diversity

Breeding program

<u>Objectives:</u>

- *Support development of effective breeding programs*
- Propose (self) assessment framework - “comparable” across breeds, species and countries

<u>Target groups</u>: Breed societies & NCAs

<u>Approach</u>: Expert group and ERFP involvement

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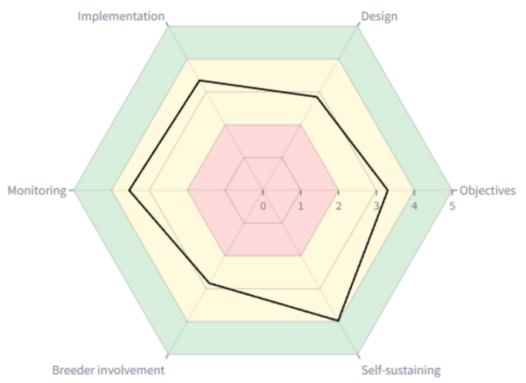
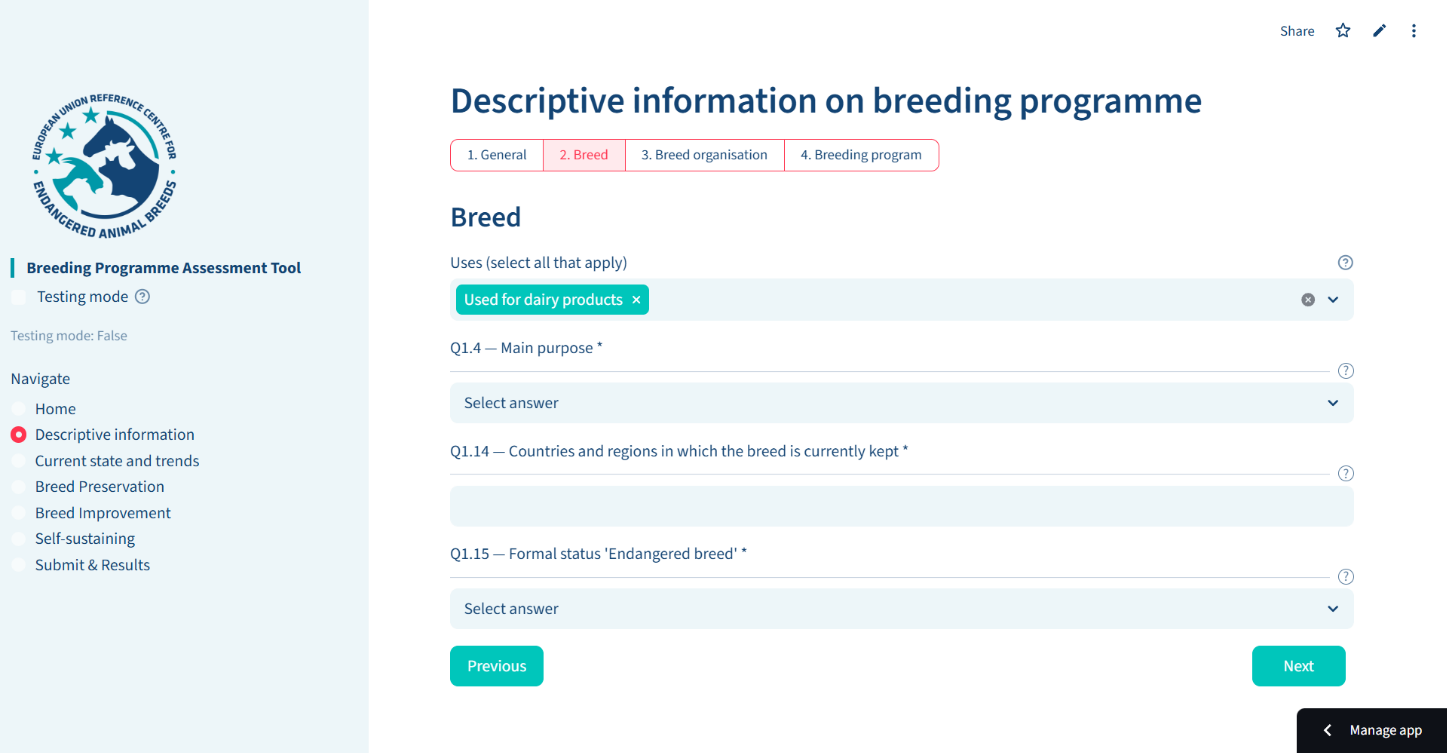
Prototype online tool BPA

Spiderweb — Final Scores by Assessment Area





Breeding Programme Assessment Tool

☐ Testing mode ⓘ

Testing mode: False

Navigate

○ Home
● Descriptive information
○ Current state and trends
○ Breed Preservation
○ Breed Improvement
○ Self-sustaining
○ Submit & Results

Descriptive information on breeding programme

1. General | 2. Breed | 3. Breed organisation | 4. Breeding program

Breed

Uses (select all that apply)
Used for dairy products ×

Q1.4 — Main purpose *
Select answer

Q1.14 — Countries and regions in which the breed is currently kept *

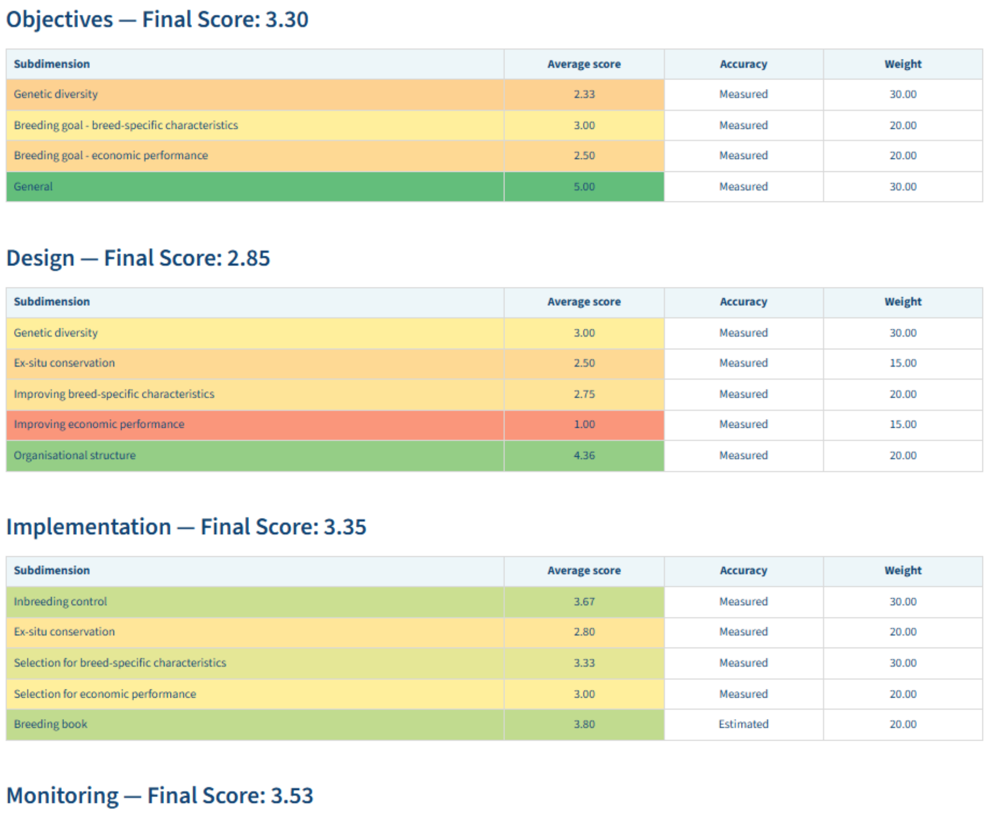
Q1.15 — Formal status 'Endangered breed' *
Select answer

Previous | Next

Export

Download Excel

Download PDF



Objectives — Final Score: 3.30

Subdimension	Average score	Accuracy	Weight
Genetic diversity	2.33	Measured	30.00
Breeding goal - breed-specific characteristics	3.00	Measured	20.00
Breeding goal - economic performance	2.50	Measured	20.00
General	5.00	Measured	30.00

Design — Final Score: 2.85

Subdimension	Average score	Accuracy	Weight
Genetic diversity	3.00	Measured	30.00
Ex-situ conservation	2.50	Measured	15.00
Improving breed-specific characteristics	2.75	Measured	20.00
Improving economic performance	1.00	Measured	15.00
Organisational structure	4.36	Measured	20.00

Implementation — Final Score: 3.35

Subdimension	Average score	Accuracy	Weight
Inbreeding control	3.67	Measured	30.00
Ex-situ conservation	2.80	Measured	20.00
Selection for breed-specific characteristics	3.33	Measured	30.00
Selection for economic performance	3.00	Measured	20.00
Breeding book	3.80	Estimated	20.00

Monitoring — Final Score: 3.53

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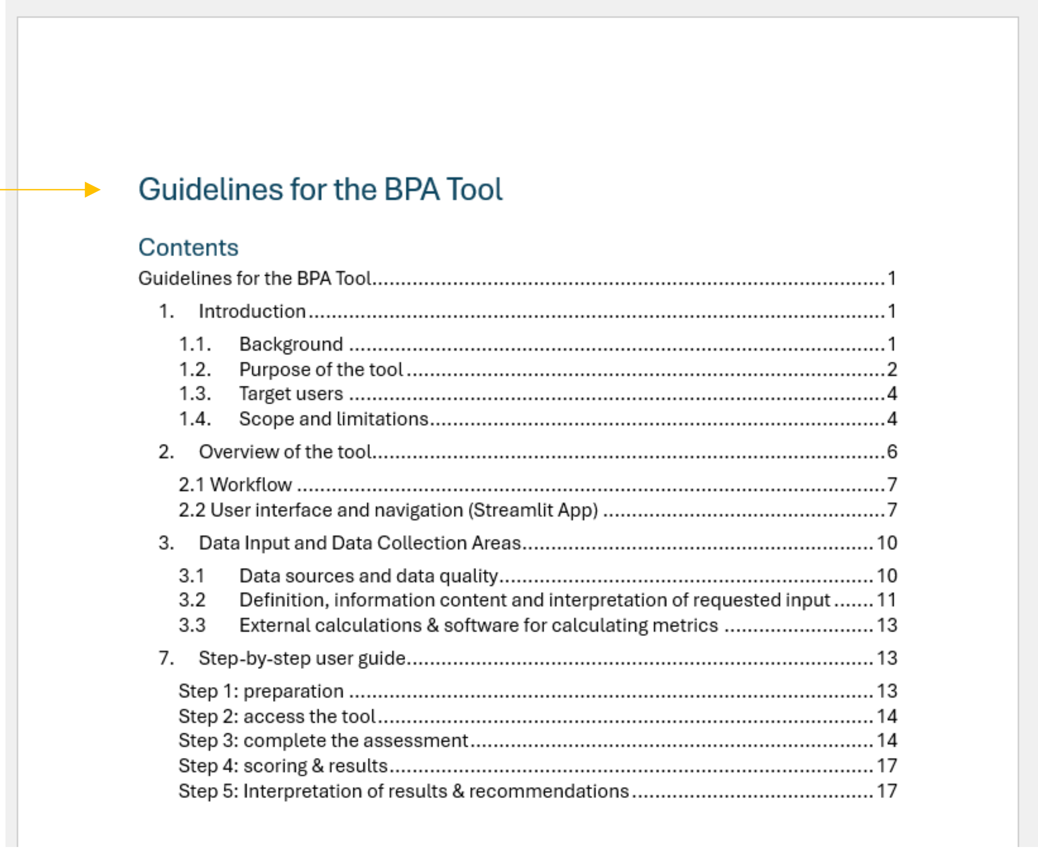
Feedback and next steps

Feedback

- Feedback collected from expert group
  - Further refinement of indicators in the tool
  - Clarification needed inside tool & through guidelines

Next steps

- Writing guidelines
- Feedback round (2) after updating the tool
- Later: write recommendations based on scores



Guidelines for the BPA Tool

Contents

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INSTITUT DE L'ELEVAGE idele

Federal Office
for Agriculture and Food

Breed risk status indicators

Lead institute IDELE - Stéphanie Minéry, Coralie Danchin

Working group EURC EAB – ERFP

Country	First Name	Name	Organization
BELGIUM	Steven	Janssens	KU Leuven's Centre of Animal Breeding and Genetics
BULGARIA	Zhivko	Duchev	Department "Information services", Agricultural Academy
FRANCE	Eleonore	Charvolin	INRAE
FRANCE	Stéphanie	Minéry	Institut de l'Elevage (IDELE)
GERMANY	Lisa	Balzar	BLE
GREECE	Christina	Ligda	Hellenic Agricultural Organization
SERBIA	Srdjan	Stojanovic	Ministry of Agriculture, Forestry and Water Management
SLOVENIA	Tina	Flisar	University of Ljubljana
SPAIN	Clara	Santos	Spanish Ministry of Agriculture
UNITED KINDOM	Marcus	Bates	British Pedigree Association - Chief Executive of British Pigs Association

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Review of indicators currently used to assess the status of endangerment breeds in the European countries

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EURC-EAB :
Review and Proposal for the indicators used to assess the status of endangerement breeds

Stéphanie Minéry, Coralie Danchin
6-7 May 2025

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INSTITUT DE L'ELEVAGE idele
Federal Office for Agriculture and Food

Based on results of the survey on the implementation of Regulation (EU) 2016/1012 for endangered breeds sent in May 2023 to representatives of breeding organizations and federations of breeding organizations, national competent authority and national coordinators for animal genetic resources.

+ completed by email responses (2024/2025)

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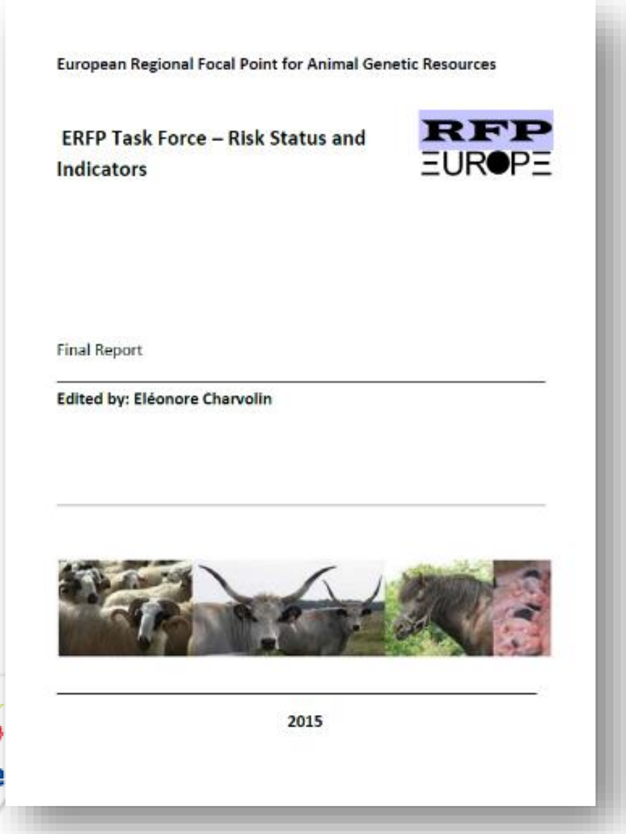
Federal Office
for Agriculture and Food

Second step : Guideline

How to answer to a European country ***asking for recommendations*** *about computation of risk status?*

- LEVEL 1 : Primary indicators
  - **Group 1 “Demographic Data”**
  - **Group 2 “Genetic Data”**
  - **Group 3 “Geographic distribution”**
- LEVEL 2 : Secondary indicators
  - **Group 4 “Breed viability” (economic context)**
  - **Group 5 “Organization” (genetic management of the breed)**
  - **Group 6 “Social context”**
  - **Group 7 “Cultural”**



European Regional Focal Point for Animal Genetic Resources

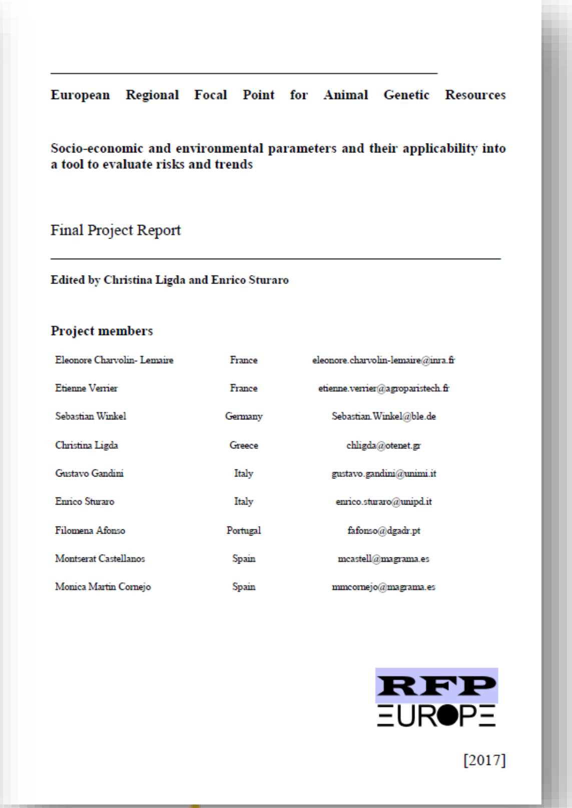
ERFP Task Force – Risk Status and Indicators

RFP EUROPE

Final Report

Edited by: Eléonore Charvolin

2015



European Regional Focal Point for Animal Genetic Resources

Socio-economic and environmental parameters and their applicability into a tool to evaluate risks and trends

Final Project Report

Edited by Christina Ligda and Enrico Sturaro

Project members

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RFP EUROPE

[2017]

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Integration of ex situ

Lead institute BLE – Lisa Balzar & Holger Göderz

ERFP
European Regional Focal Point for Animal Genetic Resources

ANIMAL GENETIC
RESOURCES
STRATEGY
FOR EUROPE

- Recommendation out of European AnGR Strategy:

Develop and implement national strategies and action plans for integrated and complementary in situ and ex situ long term conservation strategies for AnGR, engaging all relevant public and private stakeholders in the process

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Integration of ex situ

Lead institute BLE – Lisa Balzar & Holger Göderz

Cooperation with ERFP Ad hoc action “Integration of in situ and ex situ conservation approaches”

- Started in 2025
- Primary outcome: guidelines for all stakeholders
- Draft of the guidelines is available; it is currently being further revised
- Meeting on 18th May in Sassari

Integration of ex situ

Lead institute BLE – Lisa Balzar & Holger Göderz

Key elements of the guidelines:

- Building a national network
- Conservation of genetic diversity
- International collaboration

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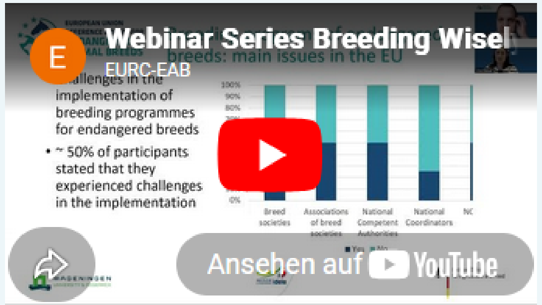
Webinar series “Breeding Wisely – Safeguarding endangered livestock breeds within the EU"

Lead institute BLE – Holger Goederz & Lisa Balzar

Safeguarding endangered livestock breeds within the EU

For representatives of the National Competent Authorities for Animal Breeding

Webinar 1: Setting the scene: protecting animal genetic resources



…allenges in the implementation of breeding programmes for endangered breeds

- ~ 50% of participants stated that they experienced challenges in the implementation

Download Slides

Webinar 2: Monitoring and assessing endangered breed populations

1 Monitor breed population according to data availability

2 **Choose endangerment** … according to data availability and infras…

3 Define thresholds and c…

4 Inventory of all monitored breeds → identify endangered breeds

Download Slides

Upcoming Webinar 3:
9th of June 12.00h CEST!
Registration via
info@eurc-eab.eu

https://www.eurc-eab.eu/publications-webinars

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Website – Webinar recordings

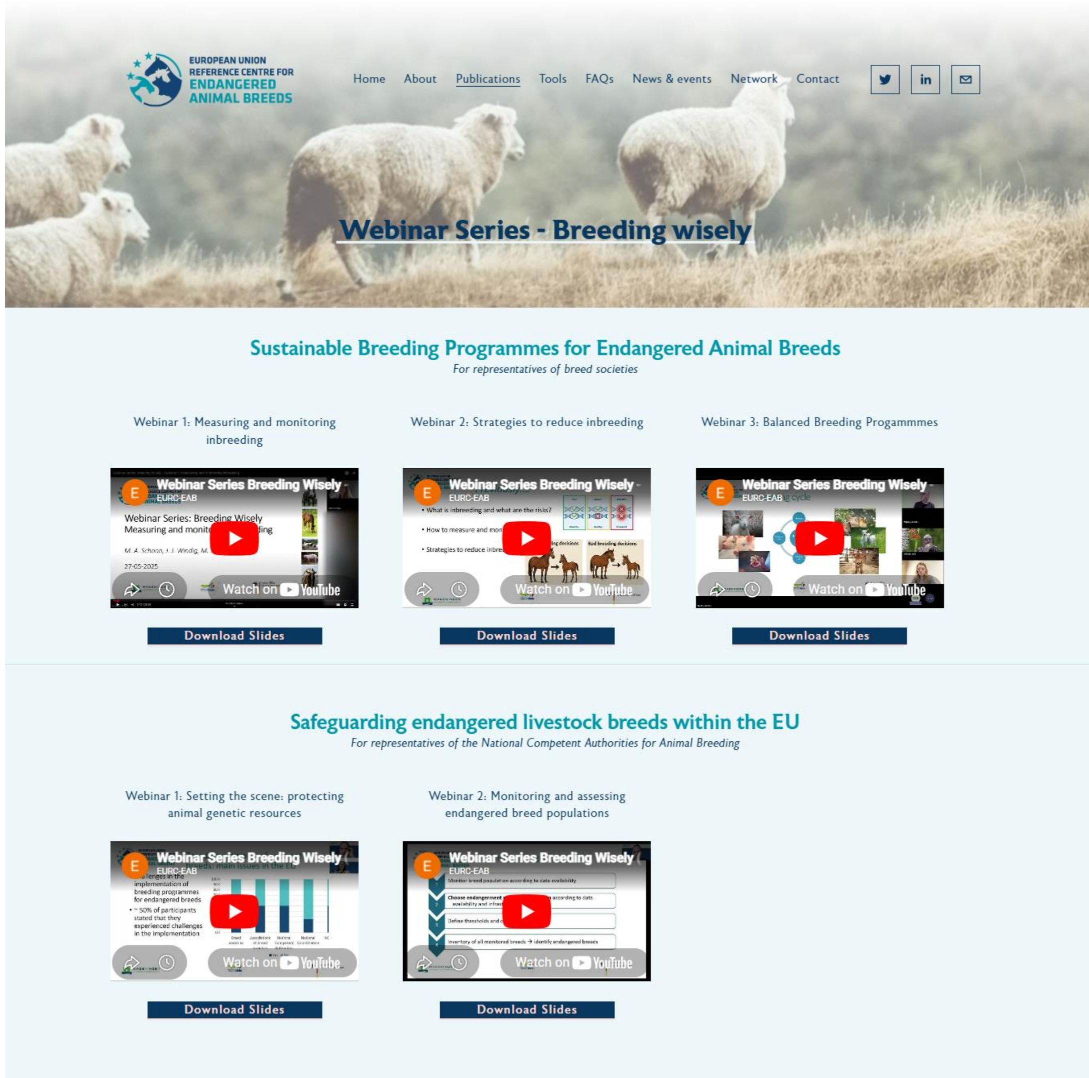
Webinar Recordings – Breeding Wisley

Sustainable Breeding Programmes *(For representatives of breed societies)*

1. Measuring and monitoring inbreeding
2. Strategies to reduce inbreeding
3. Balanced breeding programmes

Safeguarding endangered livestock breeds within the EU *(For representatives of NCAs)*

1. Setting the scene: protecting animal genetic resources
2. Monitoring and assessing endangered breed populations



Webinar Series - Breeding wisely

Sustainable Breeding Programmes for Endangered Animal Breeds

For representatives of breed societies

Webinar 1: Measuring and monitoring inbreeding

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Webinar 2: Strategies to reduce inbreeding

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Webinar 3: Balanced Breeding Progammmes

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Safeguarding endangered livestock breeds within the EU

For representatives of the National Competent Authorities for Animal Breeding

Webinar 1: Setting the scene: protecting animal genetic resources

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Webinar 2: Monitoring and assessing endangered breed populations

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National webinars (for representatives) of breed societies

Welkom bij de 7de thema-avond van 'Fokken met verstand'

Het programma start om 19.30 uur

Centrum voor Genetische Bronnen Nederland (CGN)

WAGENINGEN
UNIVERSITY & RESEARCH

www.fokkenmetverstand.nl

wur.nl/cgn

RETROUVEZ LE REPLAY DU WEBINAIRE ORGANISÉ LE VENDREDI 12 DÉCEMBRE 2025

[Replay webinaire] La consanguinité, mythes et

Institut de l'Elevage (idele)

Anomalies génétiques et cor

Tout individu est porteur de quelques mutations (récessives) nuisibles

Estimations réalisées chez l'h moins une vingtaine de mutations affectent directement la synthèse des protéines

1. Le reproducteur parfait n'existe pas
2. Des anomalies dans toutes les espèces et toutes les races

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Avec la contribution financière du compte d'affectation spéciale développement agricole et rural CASDAR

MINISTÈRE
DE L'AGRICULTURE
ET DE LA SOUVERAINETÉ
ALIMENTAIRE

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for Agriculture and Food

Website – Publications & links

Links to National Competent Authorities and EU-approved breeding programmes per country

Original webpage European Commission

- Austria
- Belgium
- Bulgaria
- Croatia
- Cyprus
- Czech Republic
- Denmark
- Estonia
- Finland
- France
- Germany
- Greece
- Hungary
- Ireland
- Italy
- Latvia
- Lithuania
- Luxembourg
- Netherlands
- Poland
- Portugal
- Romania
- Slovakia
- Slovenia
- Spain
- Sweden
- Norway
- Switzerland

Safeguarding Endangered Breeds Before and During Disease Outbreaks

Europe is currently facing the spread of several serious animal diseases, including sheep pox, Bluetongue disease, lumpy skin disease (in cattle), swine fever, avian influenza (bird flu), and West Nile virus (in equine). These outbreaks often necessitate the slaughter of infected animal populations, and preventive culling is sometimes required.

Necessary national disease eradication measures pose an extreme threat to endangered livestock breeds, especially those with populations localized within a restricted geographical area. Although we fully subscribe to the need for disease eradication measures, we want to draw attention to several options to support the conservation of endangered breeds in the light of current and upcoming disease threats.

Read more

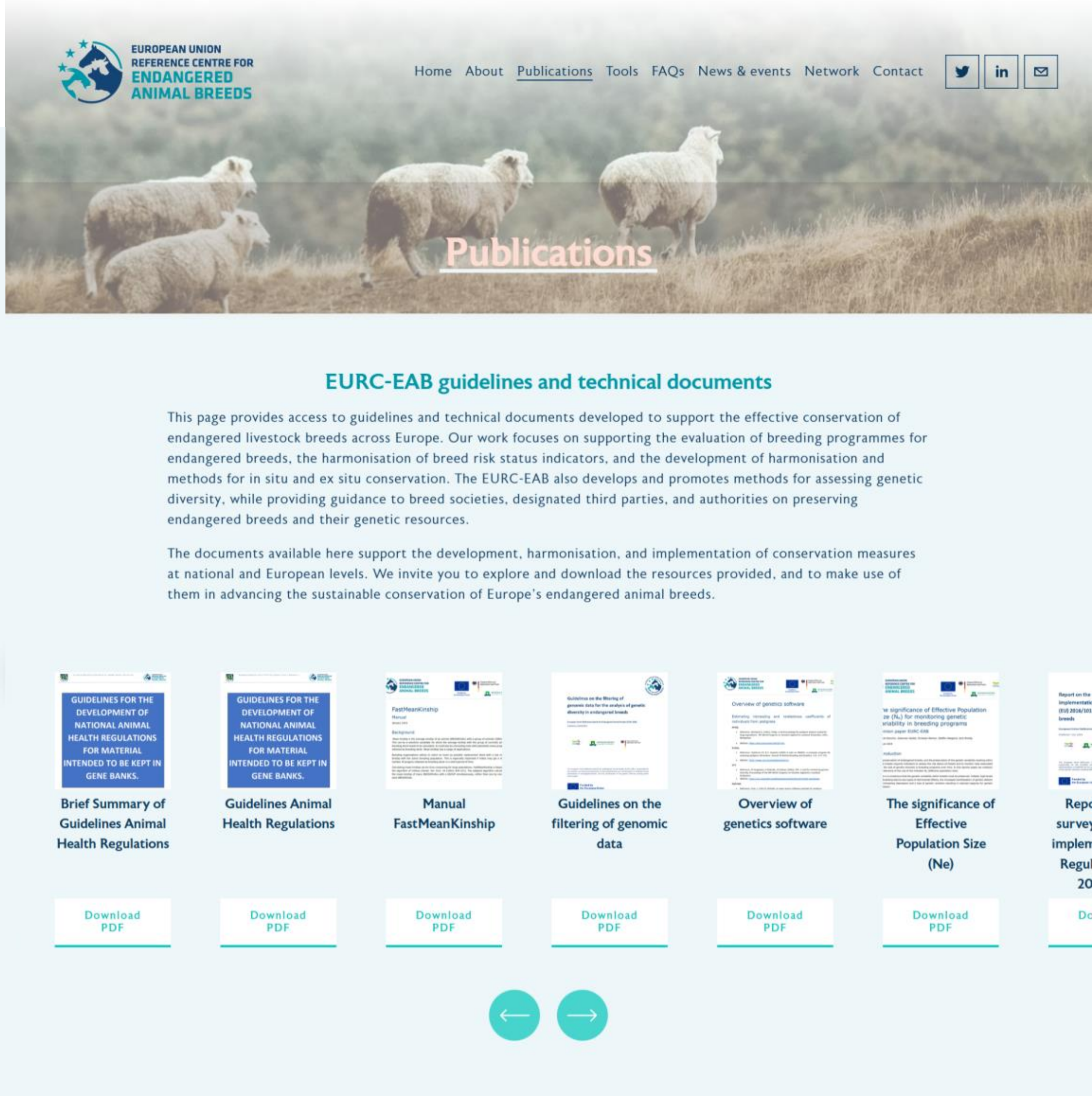
Publications

The EU reference centre for endangered animal breeds shares all presentations, reports, documents and factsheets publicly on this website. have a look at our most recent pbulications:

EURC-EAB presentations

EURC-EAB documents

Other relevant publications on genetic resources



EURC-EAB guidelines and technical documents

This page provides access to guidelines and technical documents developed to support the effective conservation of endangered livestock breeds across Europe. Our work focuses on supporting the evaluation of breeding programmes for endangered breeds, the harmonisation of breed risk status indicators, and the development of harmonisation and methods for in situ and ex situ conservation. The EURC-EAB also develops and promotes methods for assessing genetic diversity, while providing guidance to breed societies, designated third parties, and authorities on preserving endangered breeds and their genetic resources.

The documents available here support the development, harmonisation, and implementation of conservation measures at national and European levels. We invite you to explore and download the resources provided, and to make use of them in advancing the sustainable conservation of Europe's endangered animal breeds.

- Brief Summary of Guidelines Animal Health Regulations
- Guidelines Animal Health Regulations
- Manual FastMeanKinship
- Guidelines on the filtering of genomic data
- Overview of genetics software
- The significance of Effective Population Size (Ne)
- Repo survey implem Regul 20

Website – Tools

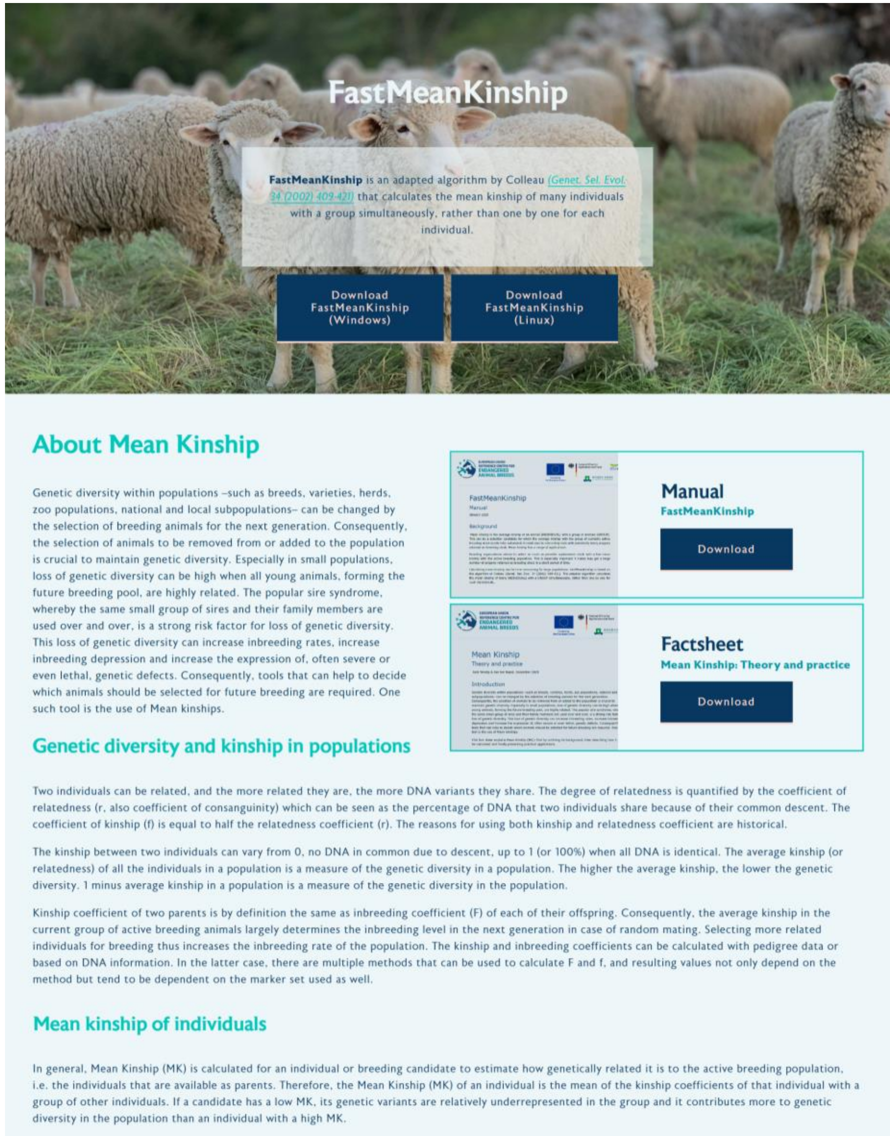
FastMeanKinship

is an adapted algorithm by Colleau[1] that calculates the mean kinship of many individuals with a group simultaneously, rather than one by one for each individual.

Application

The tool can help to decide which animals should be selected for future breeding. Breeding organizations are advised to select as much as possible replacement stock with a low mean kinship with the active breeding population.

Genet. Sel. Evol. 34 (2002) 409-421[1]



FastMeanKinship

FastMeanKinship is an adapted algorithm by Colleau *(Genet. Sel. Evol. 34 (2002) 409-421)* that calculates the mean kinship of many individuals with a group simultaneously, rather than one by one for each individual.

About Mean Kinship

Genetic diversity within populations –such as breeds, varieties, herds, zoo populations, national and local subpopulations– can be changed by the selection of breeding animals for the next generation. Consequently, the selection of animals to be removed from or added to the population is crucial to maintain genetic diversity. Especially in small populations, loss of genetic diversity can be high when all young animals, forming the future breeding pool, are highly related. The popular sire syndrome, whereby the same small group of sires and their family members are used over and over, is a strong risk factor for loss of genetic diversity. This loss of genetic diversity can increase inbreeding rates, increase inbreeding depression and increase the expression of, often severe or even lethal, genetic defects. Consequently, tools that can help to decide which animals should be selected for future breeding are required. One such tool is the use of Mean kinships.

Manual

FastMeanKinship

Factsheet

Mean Kinship: Theory and practice

Genetic diversity and kinship in populations

Two individuals can be related, and the more related they are, the more DNA variants they share. The degree of relatedness is quantified by the coefficient of relatedness (r, also coefficient of consanguinity) which can be seen as the percentage of DNA that two individuals share because of their common descent. The coefficient of kinship (f) is equal to half the relatedness coefficient (r). The reasons for using both kinship and relatedness coefficient are historical.

The kinship between two individuals can vary from 0, no DNA in common due to descent, up to 1 (or 100%) when all DNA is identical. The average kinship (or relatedness) of all the individuals in a population is a measure of the genetic diversity in a population. The higher the average kinship, the lower the genetic diversity. 1 minus average kinship in a population is a measure of the genetic diversity in the population.

Kinship coefficient of two parents is by definition the same as inbreeding coefficient (F) of each of their offspring. Consequently, the average kinship in the current group of active breeding animals largely determines the inbreeding level in the next generation in case of random mating. Selecting more related individuals for breeding thus increases the inbreeding rate of the population. The kinship and inbreeding coefficients can be calculated with pedigree data or based on DNA information. In the latter case, there are multiple methods that can be used to calculate F and f, and resulting values not only depend on the method but tend to be dependent on the marker set used as well.

Mean kinship of individuals

In general, Mean Kinship (MK) is calculated for an individual or breeding candidate to estimate how genetically related it is to the active breeding population, i.e. the individuals that are available as parents. Therefore, the Mean Kinship (MK) of an individual is the mean of the kinship coefficients of that individual with a group of other individuals. If a candidate has a low MK, its genetic variants are relatively underrepresented in the group and it contributes more to genetic diversity in the population than an individual with a high MK.

Website – Tools

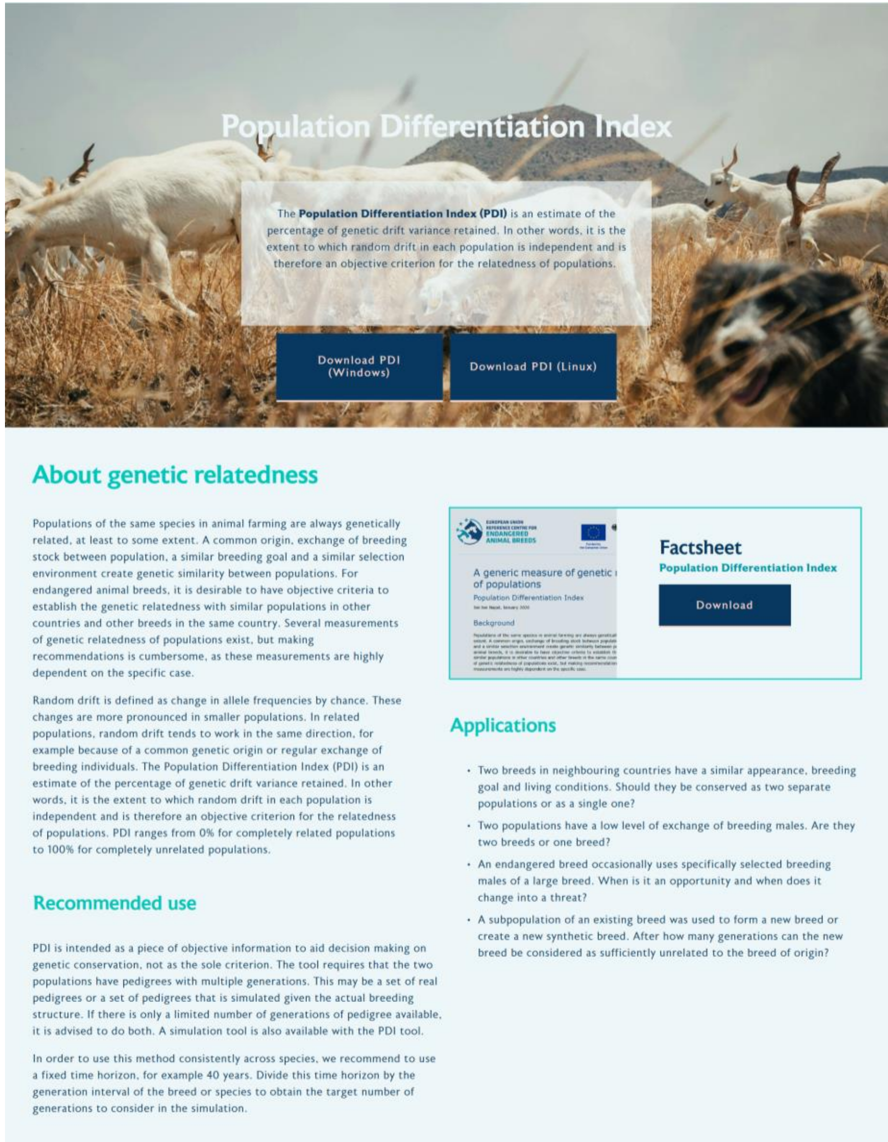
Population Differentiation Index (PDI)

PDI is the extent to which random drift in each population is independent and is therefore an objective criterion for the relatedness of populations.

Population Differentiation Index	Interpretation
0-20%	Freely interbreeding populations
20-40%	Highly related populations
40-60%	Related but distinct populations
60-80%	Largely unrelated populations
80-100%	Two separate populations

Recommended use

PDI is intended as a piece of objective information to aid decision making on genetic conservation, not as the sole criterion. The tool requires that the two populations have pedigrees with multiple generations.



Population Differentiation Index

The **Population Differentiation Index (PDI)** is an estimate of the percentage of genetic drift variance retained. In other words, it is the extent to which random drift in each population is independent and is therefore an objective criterion for the relatedness of populations.

About genetic relatedness

Populations of the same species in animal farming are always genetically related, at least to some extent. A common origin, exchange of breeding stock between population, a similar breeding goal and a similar selection environment create genetic similarity between populations. For endangered animal breeds, it is desirable to have objective criteria to establish the genetic relatedness with similar populations in other countries and other breeds in the same country. Several measurements of genetic relatedness of populations exist, but making recommendations is cumbersome, as these measurements are highly dependent on the specific case.

Random drift is defined as change in allele frequencies by chance. These changes are more pronounced in smaller populations. In related populations, random drift tends to work in the same direction, for example because of a common genetic origin or regular exchange of breeding individuals. The Population Differentiation Index (PDI) is an estimate of the percentage of genetic drift variance retained. In other words, it is the extent to which random drift in each population is independent and is therefore an objective criterion for the relatedness of populations. PDI ranges from 0% for completely related populations to 100% for completely unrelated populations.

Recommended use

PDI is intended as a piece of objective information to aid decision making on genetic conservation, not as the sole criterion. The tool requires that the two populations have pedigrees with multiple generations. This may be a set of real pedigrees or a set of pedigrees that is simulated given the actual breeding structure. If there is only a limited number of generations of pedigree available, it is advised to do both. A simulation tool is also available with the PDI tool.

In order to use this method consistently across species, we recommend to use a fixed time horizon, for example 40 years. Divide this time horizon by the generation interval of the breed or species to obtain the target number of generations to consider in the simulation.

Factsheet

Population Differentiation Index

Applications

- Two breeds in neighbouring countries have a similar appearance, breeding goal and living conditions. Should they be conserved as two separate populations or as a single one?
- Two populations have a low level of exchange of breeding males. Are they two breeds or one breed?
- An endangered breed occasionally uses specifically selected breeding males of a large breed. When is it an opportunity and when does it change into a threat?
- A subpopulation of an existing breed was used to form a new breed or create a new synthetic breed. After how many generations can the new breed be considered as sufficiently unrelated to the breed of origin?

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