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European Livestock Breeds Ark and Rescue

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1. State of *in vivo* conservation in Europe

Europe is endowed with the great diversity of farm animal genetic resources – on our continent there are some 200 breeds of cattle, 90 breeds of goats, 200 breeds of sheep each having specific characteristics resulting from their evolution in the environment and selection. However, many less-productive indigenous or locally adapted breeds lost their importance, shrinking in size and thus becoming endangered.

In the past century there was a number of isolated initiatives for saving breeds at risk of extinction. These initiatives were mainly a result of the growing awareness of risks connected with the economic use of an ever-smaller number of breeds and also the enthusiasm of hobby breeders, non-governmental associations and the academic community. Soon it was felt that saving these breeds can no longer be left to the ever-sinking numbers of dedicated hobby breeders and conservation of endangered breeds 'as the genetic resources of the future' has become a social responsibility. Public awareness on the need to protect biodiversity resulted in commitments of the world community expressed in 1992 at the “Earth Summit” held in Rio de Janeiro and the Convention on Biological Diversity (CBD) signed by 150 governments and later ratified by 188 states. All European states ratified the CBD. The Rio Summit adopted also Agenda 21 as a plan of action to be undertaken by all stakeholders at global, national and local levels. The Chapter 14 of the Agenda deals with increasing food production and food security including programme areas related to conservation and development of farm animal genetic resources.

On the basis of 169 country reports and a number of special studies, FAO has prepared the report “The State of the World’s Animal Genetic Resources for Food and Agriculture”. The Report was approved by the Inter-governmental Technical Conference on Animal Genetic Resources in September 2007, in Interlaken Switzerland. The Conference also approved the Global Plan of Action for Animal Genetic Resources and the Interlaken Declaration.

All European countries participated in the preparation of the Report on the state of AnGR. They reported that in June 2005, functional conservation programmes existed in 33 out of 39 European countries, which submitted country reports. 27 countries had active *in*

vivo in situ conservation, 7 had *ex situ* and 19 countries reported on the existence of cryoconservation programmes.

27 countries had *in vivo* conservation programmes for cattle, 25 for sheep, 14 for goats, 20 for pigs, 10 for chickens, 2 for ducks, 1 for buffaloes, 18 for horses, 4 for gees, 3 for rabbits, 1 for donkeys and 2 for turkeys.

In Europe and Caucasus, *in vivo* conservation programmes of **local breeds** cover 137 breeds of cattle, 175 breeds of sheep, 51 breeds of goats, 47 breeds of pigs and 113 breeds of horses. (FAO 2007). Programmes cover also **regional transboundary breeds** present in several countries of the region, namely 28 breeds of cattle, 79 breeds of sheep, 13 breeds of goats, 17 breeds of pigs 101 breed of chickens and 38 breeds of horses. Some countries have established co-operative conservation programmes for breeds present in the sub-region. However, the general picture is that each country has a separate conservation programme for breeds present also in neighbouring countries.

In some countries, *in situ* conservation programmes are closely related to a variety of other compatible projects, such as protected areas and landscapes and natural parks. The programmes are managed by farmers, breeders' associations, state administration or public entities. The aim of some programs is to maintain and manage rural ecosystems of long-standing cultural interest in traditional ways and thereby conserve the biological, cultural and historical assets associated with them. Nature conservation thereby contributes to the conservation and use of these breeds.

Other forms of *in situ* conservation are based on the sustainable utilisation of breeds within traditional production systems and through production and marketing of special local products. In the European Union, conservation through sustainable utilisation is often combined with the production of typical local products supported by systems of PDO (Protected Designation of Origin), PGI (Protected Geographical Indication) and TSG (Traditional Specialty Guaranteed). Among the 154 protected types of cheese and 74 protected types of meat products, many derive from milk and meat of local indigenous breeds and breeds under conservation. For example, in Spain 2 out of 4 protected sheep cheeses can be produced only from defined local breeds. The same principle has been applied in Portugal (2 out of 9 protected sheep cheeses) and France (3 out of 9 protected sheep cheeses) (Casabianca, 2005).

The European Union has developed a coherent system of direct and indirect support for the sustainable utilisation and conservation of animal genetic resources (AnGR). Council Regulation No 870/2004 established a Community programme on the conservation, characterisation, collection and utilisation of genetic resources in agriculture for the period up to 2007.

In vivo conservation programs constitute an integral part of the national legislation regulating the implementation of the CBD at the national level as well the implementation of the Common Agricultural Policy (CAP) in the EU Member States or attainment of national rural development and agricultural policy objectives. In each country, there is a number of players and stakeholders in the development and the implementation of national policies and programs for the conservation of AnGR. This includes legislative bodies, governments and their institutions, research and academic institutions, non-governmental organizations, including hobby farmers, farmers and agricultural producers in mountains and other difficult ecosystems.

2. Risks and threats connected with in situ conservation

Conservation programs cover endangered and rare breeds, which are characterised by small populations concentrated on the limited geographic areas. These populations are exposed to a number of risks and threats, such as inbreeding, loss of diversity through cross breeding with mainstream breeds, loss of economic incentives and interests by farmers, outbreak of epizootics, and other. There is a range of techniques and corrective measures at the disposal of stakeholders and policy makers to avoid threats and protect the animal population from potential risks.

3. Breeding programs for small and endangered populations

The definition of breeding objectives is the first step in the establishment of breeding programs. In doing so, one must bear in mind the purpose of conservation of local, endangered and rare breeds of farm animals:

- cultural values of AnGR as national heritage,
- association of local breeds with specific knowledge;
- local breeds are adapted to specific environment and production system;
- safeguarding for future needs;
- biodiversity has its intrinsic value and should be conserved for its own sake.

Breeding program is defined as a systematic and structured approach aimed at changing or maintaining the genetic composition of population based on objective characterisation, description and performance criteria. In general, functions and requirements of breeding programs may include

1. increase in production and product quality,
2. productivity and cost efficiency,
3. maintaining genetic diversity,
4. supporting conservation and
5. use of specific breeds in sustainable production systems.

3.1 Breeding for genetic diversity

Maintaining genetic diversity is basic function of breeding program for populations under conservation. Planned breeding and in particular breeding for maintaining genetic diversity requires controlled mating. Controlled and planned mating is efficient only if information on origin of individual animal is known. Therefore, herd books become the basic tool in animal breeding in the case of breeding for genetic diversity. This is particularly important for elimination of risks of inbreeding. Application of DNA techniques in parentage recording is essential for the documentation of origin of animals and the estimation of their breeding value.

Although the major part of work on characterisation of European breeds has already been completed, it is necessary to undertake genetic analysis and distancing between breeds (particularly various populations of trans-boundary breeds). Gene mapping will give more insight to potential use of breeds under conservation in meeting future demand for animal products.

The implementation of breeding programs require detailed description of each breeding animal and a good knowledge about its productive and functional traits. Each animal must be identified (conventional or electronic ear tags, boluses, rings, tattoos) and registered. For the future use of breed in meeting future demand and insuring sustainability of production of basic importance are functional traits, such as longevity, productivity, adaptability to different ecosystems, disease resistance and reproduction. The implementation of modern recording systems available in Europe

3.2 *Breeding for sustainable use in specific production systems*

Other functions may be included in breeding programs in combination with related breeding methods, such as pure breeding of small and endangered population in order to reach their size above the level of endangerment and then cross breeding of the surplus of animals with selected mainstream or more productive breeds to obtain more productive animals or different quality of animal products. In this way, the danger of loss of genetic diversity through un-controlled cross breeding would be greatly reduced.

Within breed selection for specific productive traits, such as breeding dual purpose cattle for beef production would mean the loss of alleles responsible for other traits. However, this method may be applied once the size of the population and breed under conservation has exceeded the level of endangerment.

3.3 *Cryo-conservation as a back-up*

Animals in *in vivo* conservation programs are exposed to variety of risks. Therefore, it is necessary to preserve a representative number of samples of semen and embryos of endangered breeds as a back-up of breeding for maintenance of genetic diversity.