INTRODUCTION

The permanent improvement of domestic livestock, i.e. increasing of the per head main products became nearly the only breeding goal in modern animal breeding. It seemed to harmonize well with both the food supply of the starving world and the economy of agriculture. In recent years, however, other aspects came more and more into consideration. The accommodation to the harsh environmental conditions and some special viewpoints like quotas, tourism in agriculture, etc., are emphasized from several aspects.

After the discussions of the last decades a consensus seems to develop: the animal genetic resources should be conserved. There are a lot of cultural and technical arguments underlining the importance of this activity. People are more and more aware of the fact that domestic livestock belong to the valuable heritage of mankind. On one hand the conservation of domestic animal genetic resources is similar to the protection of wildlife, organised by several organizations, because the objects of both are living animals; and on the other hand it resembles also the maintenance of monuments because ancient buildings are also the products of historical human activities.

Many conferences were organized in recent years and lots of problems are already clarified. The theoretical idea of conservation is formulated incorporating both the preservation of populations of domestic animals and their sustainable use.

The aspect and idea of conservation covers the whole theory and practice of animal breeding and applied genetics. It means that we should maintain genetic variability within domestic species even when some populations are intensively selected according to some economically important or sophisticated breeding goals. It means that all the valuable genes or traits should be maintained (including the newly created ones) as far as it is possible.

It means also that unifying the world’s livestock is a dead-end way and the separate domestic animal populations should be maintained for a possible crossbreeding strategy or for posterity as far as the physical and financial conditions make it possible, and this activity as a whole is called preservation.

METHODS OF PRESERVATION

The classification of the methods of preservation can be considered more and more elaborated, as detailed below:

The preservation of domestic livestock

- organized in large-scale units
- organized in small-holder farms
ex situ
- in experimental farms or zoos
- cryogenic storage of sperm
- " - " - of oocytes
- " - " - of embryos
- " - " - of isolated genes

From another aspect we can speak about the preservation of haploid cells (sperm or oocyte) or diploids (somatic cells) - and the preservation of homozygous populations (purebred animals) or heterozygotes (gene pool) is also a possible solution.

All these methods have their advantages and disadvantages.

Advantages of the in situ methods:
- afford the possibility of permanent observation, which is important for describing the unknown characteristics of the populations in question, and the data collection.
- the genetic defects can be detected and eliminated.
- the reconstruction of populations "contaminated" by others is possible.
- many human generations can enjoy the sight of living herds (aesthetic and touristic point of view).?
- their use as control populations is possible in education and in research.
- tourism and the products of the rare populations can decrease the costs of maintenance.
- accommodation to the changing environment during many centuries.

Disadvantages of the in situ methods:
- genetic change can not be avoided by the inevitable selection and drift.
- there is a threat of disease and other disasters.
- there is a danger of increasing inbreeding and homozygosity.
- the breeding of these ancient breeds is unproductive compared to modern breeds or lines.

Advantages of the ex situ cryogenic methods:
- no genetic change.
- after the basic investment the maintenance is not expensive.

Disadvantages of the ex situ methods:
- it needs a highly developed technical background.
- there are so far some species whose semen or embryos cannot yet be stored by deep freezing without lethal damage or essential loss.
- the possible damage by background radiation must be taken into consideration when storing the genetic material during many centuries.
- the stored material can be damaged by human faults or negligence.
- the resistance of the stored genetic material cannot follow the evolution of noxious agents (bacteria, viruses).
- the living animals can not be observed and therefore can be forgotten.

The case of experimental farms and zoos needs special consideration.
Their advantages and disadvantages are intermediate between those of the cryogenic methods and the in situ maintenance of living herds.

All these aspects and approaches must be used in preservation of domestic livestock, because none of them alone can guarantee the maintenance of valuable domestic animal genetic resources for the future mankind.

ASPECTS OF PRESERVATION

During its history, mankind produced a lot of domestic animal breeds and in the future it will produce even more. Therefore it would be impossible to maintain all these populations in the framework of preservation. Thus, it is important to gather the goals in the selection of breeds because in some cases one has to make an order of rank, and to neglect certain breeds or lines. The following factors must be considered when making an order of rank of animal populations which possess the merits to be preserved:

1. national merit
2. genetic value
3. status of endangering

1. In general the maintenance of an autochton breed is the obligation of the country of origin. All nations have to weight the pros and cons of the preservation of each population. It is part of the national heritage and therefore the maintenance is the responsibility of each nation. (e.g.: Berkshire in UK, Mangalica in Hungary etc.). There are some exceptions, however

- when the population in question is extinct in its native land, then it is an obligation to maintain it wherever it can be found (e.g.: the Cikta breed in Hungary).
- when the rare breed or population can be used for other purposes like tourism or farm parks (e.g.: Clydesdale horses in the US or Caspian ponies in UK).
- when a new type of the breed has been developed in the second country which can be considered as a new population with enough value to be preserved. (e.g.: the Brown Swiss in the USA).

2. The genetic merit of a population from the preservation aspect can be subdivided as follows:

valuable traits: performance
adaptability
resistance
other traits
purity
distinctiveness
complementarity

The moderate performance is also valuable when it is produced in harsh conditions. The traits neglected in modern times (e.g.: draught power) should not be forgotten. Adaptability to the local environment (climate, nutrition and human habits) is the most valuable in indigenous breeds. The resistance is also very important because it is missing from modern and highly selected breeds. All the other traits, even morphological ones, which have no economic value nowadays can have some
<table>
<thead>
<tr>
<th>Domestic animal</th>
<th>Red data book</th>
</tr>
</thead>
<tbody>
<tr>
<td>Categories</td>
<td>(IUCN)</td>
</tr>
<tr>
<td>(Bodó, 1989)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Status</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>normal status</td>
<td>the population is not in danger of extinction (more than 10000 females)</td>
</tr>
<tr>
<td>out of danger</td>
<td>effective conservation measures have been taken and the population is considered relatively secure</td>
</tr>
<tr>
<td>indeterminate</td>
<td>lack of enough information to say which category is appropriate</td>
</tr>
<tr>
<td>rare</td>
<td>taxa with small world populations that are not at present endangered or vulnerable but are at risk</td>
</tr>
<tr>
<td>insecure</td>
<td>the problem is enlarged, continuing decrease can be seen (1-5000 females)</td>
</tr>
<tr>
<td>endangered</td>
<td>taxa in danger of extinction and whose survival is unlikely if the casual factors continue operating. Included are taxa whose numbers have been reduced to a critical level or whose habitats have been so drastically reduced that they are deemed to be in immediate danger of extinction. Also included are taxa that are possibly already extinct but have definitely been seen in the wild in the past 50 years</td>
</tr>
<tr>
<td>critical</td>
<td>the population is near to extinction (less than 100 females)</td>
</tr>
<tr>
<td>endangered</td>
<td>taxa in danger of extinction and whose survival is unlikely if the casual factors continue operating. Included are taxa whose numbers have been reduced to a critical level or whose habitats have been so drastically reduced that they are deemed to be in immediate danger of extinction. Also included are taxa that are possibly already extinct but have definitely been seen in the wild in the past 50 years</td>
</tr>
<tr>
<td>extinct</td>
<td>species not definitely located in the wild during the past 50 years (criterion as used by CITES)</td>
</tr>
</tbody>
</table>
chance in the unpredictable future (e.g.: seaweed eating sheep)

The exclusive importance of purity of a breed is disputable. The Rare Breeds Survival Trust consider it as a "conditio sine qua non" when the breeds are selected for preservation, but within valuable primitive non selected breeds there is a great extent of variability.

The basis for the distinction between breeds or other domestic animal populations (strains or lines etc) is the origin, the history, the location, the morphology and the biochemical and immunogenetic markers. The maintenance of the separate breeds affords the possible crossbreeding systems utilizing complementarity and heterosis.

3. Only the endangered populations should be preserved, because the others do not need protection; they can survive without genetic loss.

In the literature a lot of various opinions can be found on the minimum size of the maintainable populations and the classification of their status concerning the danger of extinction (Maijala, 1974; Alderson, 1981; Crawford, 1981; Campo Orozco, 1982; Bellharz, 1983; Pirchner, 1983; Perret, 1985; Dohy, 1989). Such classification is well known for wild species (IUCN, Thornback, 1984). The comparison of these two systems is given in Table 1.

It is obvious that these categories can not be the same. In the wildlife the uncertainty is at a higher level. Domestic animals are bred using more sophisticated methods, therefore more refined breeding methods and more detailed categories can be used. That is why a new system was necessary for domestic species, instead of using the formerly elaborated red data book categories.

The given figures for domestic animals are quite practical, summarizing several opinions from the literature, and they hold in respect of wide practice; however theoretical calculations are also possible, (e.g. Smith, 1976; Alatalo, 1979; Sirkkomaa, 1984). For the cryogenic storage other regulation is necessary. According to general opinion, 25 non-related breeding females are enough for the reconstruction of a domestic animal population (Gowe et al., 1959), which means a start from critical status. Although this number is disputable, there are already calculations of the possibilities of the production of this number of animals, taking into consideration the freezing rate, the pregnancy rate, the embryo survival rate, the expect sex ratio, the mortality of calves, etc. (Springmann et al., 1987).

THE PROBLEM OF "BREED OR SUBPOPULATION"

The most important taxonomic category for animal breeders is the breed. It is also widely used in conservation (e.g. Rare Breeds Survival Trust, American Minor Breeds Conservancy, etc.). It is useful also in this field. There are, however, three problems for consideration in this respect.

1. In most of the cases pure populations have the merit and value to be preserved (Alderson, 1981). Essentially it implies that the population should be free from foreign influence. The purity however should not postulate a homogenous breed, because there are some very valuable primitive populations of domestic animals which are not fixed as breeds. Sometimes even these are the most valuable ones for the unknown purpose of future generations.
2. The conservation of valuable genes in gene pools is a method for conservation of the genes and not of the breeds.

3. The breeds are not constant populations. They are born, they are developing and changing, and some of them also dying out. During the last period a tendency of international uniformization can be seen everywhere (e.g. beef breeds in the US, or the modern horses for show jumping, etc.). It means that the difference between the breeds is only their name and perhaps their colour, and nothing else. For the next human generations the value of special animal types is their speciality in their traits or production fixed in their genes, and not only their names or the reputation of their breeders. Therefore the well distinguished type and performance, the original and sometimes not improved shape, the size and conformation and adaptability should be maintained.

THE UTILIZATION OF PRESERVED LIVESTOCK

The preservation involves the maintenance of the value instead of the profit and it means adaptability to the environment instead of adaptability to the market (that is the reason for the social or governmental support). The utilization of possible sources however is very important, although the change of genetic parameters and variability is not allowed.

The following can be mentioned:

1. Commercialization of various products of the preserved special breeds, e.g. the "cantal" cheese of Salers cattle, the "beaufort" of Tarentaise (Pelaum, 1989) or the fur of Racka lambs (Bodá, 1985).

2. Primitive animals can be used in various crossbreeding systems. The crossing of such female lines with highly selected beef or mutton producing male lines affords effective profit heterosis in harsh environmental conditions. The maintenance of original dams is necessary in order to avoid the decline of the breed, for example, crossing of Hungarian Grey cows with Charolais bulls (Bodó-Réti, 1987).

3. The production of so-called bioproducts can easily be combined with the preservation. One of the most important factors for maintaining the most valuable original traits of the rare breeds is the unchanged original environment and therefore the animal production without any artificial impact is appropriate to preservation of animal genetic resources.

4. Where the environmental conditions afford the possibility of creation of feral populations, it is also an interesting solution. A healthy environment is here combined with random mating. The preservation of genetic material is sure, but it is not the same procedure as in domestic populations from the scientific point of view.

5. Tourism can also help in the maintenance, when the traits of a breed are valuable only for the future and not appreciated at present, for instance a team of oxen.

6. Modern biotechnology like A.I., MOET, open nucleus systems (Hodges, 1989) etc. can also be used in preservation and the combination of them with management of living herds is the most profitable solution.
7. The role of hobby breeders can not be neglected. People who can sacrifice something for rare non-commercial breeds because they do not depend on the profit produced by their animals can solve some problems of maintenance of domestic animal populations in many cases.

REFERENCES

THORNBACK, J. 1984. Wild cattle, bison and buffaloes, their status and potential value. WWF, UNEP, IUCN ed. 64p.