Working definitions

Clear terminology is necessary in the conservation effort, to advance understanding, facilitate education and training, communicate successfully with the wider public and realise a common purpose in application.

A minimum set of working definitions are presented in table 1

Table 1: Working definitions

Animal Genetic Resources (AnGR): At the breed level, the genetically unique breed populations formed throughout domestication processes within each animal species of interest to the production of food and agriculture.
Breed: Cultural and technical (genetic) terms are accepted
Domestic Animal Diversity (DAD): The genetic variation or genetic diversity existing among species, breeds and individuals
Conservation of DAD: Sum of operation involved in the management of AnGR such that these resources are best used and developed to meet immediate and short term requirements for food and agriculture, and to ensure the diversity to meet possible longer term needs
***In situ* Conservation of DAD**: The active breeding of animal populations for food production and agriculture, including performance recording schemes and breeding programmes. In situ conservation also includes: ecosystem management, use for the sustainable production of food and agriculture. It does not mean: storage (preservation of a sample of a breed in a situation removed from its normal production environment or habitat, collection and cryopreservation of resources in the form of living semen, ova, embryo or tissues.

Sometimes there is not a clear distinct line between *in situ* and *ex situ* conservation, as might be the case in keeping animals of rare breeds by hobby breeders

It seems reasonable to make efforts to build a framework and search options for an integration of *in situ* and *ex situ* techniques, in which *ex situ* is complementary to *in situ* conservation

Techniques of maintaining endangered breeds *in situ*

Only continuous utilisation maintains breeds as dynamic entities, adapted to both the needs of the society and the production environment.
The key factor for minimising costs for conserving breeds *in situ* is to maintain breeds that retain the potential to be economically self-sustaining.

Table 2: Options for *in situ* conservation

Choose the breed: establish the economic performance of the breed in a certain area, cultural and historical merit, special traits that are of interest, genetic uniqueness, risk status.
Techniques
Genetic: continue genetic improvement or maintain purebreds characteristics; mating to avoid inbreeding (group mating; uniformity of the family size); selection across breeds.
Production and marketing

Choose the breed

- Need to assess the economic value of these components: 1) advantage/disadvantage of a endangered or local breed as a function of the relative prices for the different (local) animal products; 2) traditional products such as milk, meat, wool, etc…., but also services such as insurance for future development of animal production, environmental and cultural functions.
- Need of reliable data on performances of the breed and fitness traits (longevity, fertility, mortality, feed and management requirements characters).
- Awareness for interaction between farm management and the characteristics of the breed.
- Additional trials at rescue farm level under controlled conditions for the evaluation of purebreds and crossbreds to better understand the potential use of the local breed in different production systems and to estimate the heterosis involved in crossbred performance.
- Cultural and historical merit, as antiquity, agricultural systems historically linked to the breed, role in landscape formation, role in gastronomy, role in folklore, role in handicraft, presence in form of higher artistic expression
- Special traits that are of interest, like adaptation to a specific environment, natural resistance to parasites or diseases, high fertility, muscle development, wool quality and quantity….
- Genetic uniqueness: the importance of the breed in the between- and within-breed diversity.
- Risk status of the breed, deduced from the number of breeding males and females or population dynamics like increasing or decreasing population size.
- Selection across breeds: In some situation it is not possible to maintain a breed as a close breeding population, because either the number are too small to avoid excessive amounts of inbreeding, or the number are too small to create a competitive scheme, or characteristics from another breed are higly needed

Techniques

- Remove the constraints that decrease the economic performance of the local breed
- Improve infrastructures and technical assistance; recover and utilize traditional breeding techniques and nutrition
- Community-based management of animals: family farms and individual farms should set up participatory breed management programmes (see the “Allevatori Solidali” of RARE) for keeping animals, pastures, etc., and improvement programmes based on open-nucleus schemes.

Genetic: selection programs may increase genetic ability for productivity and, consequently, profitability of local breeds.

Breeding goals should take into account the conservation value of the breed; accurate evaluation of traits proposed for selection
Breeding schemes should be adapted to the farming environment
Mating to avoid inbreeding: selection schemes should take into account maintenance of genetic variation within the breed and risks associated with high rates inbreeding. Mating between relatives such as full-sib and half-sib matings produces progenies with high coefficient of inbreeding. This should be avoided since the offspring from these matings will be highly inbred and will thus show increased inbreeding depression.
Group mating: in the *in situ* conservation program, since the number of animals kept in one place is usually limited, the population is sometimes maintained with divided subpopulations. In this case, it is difficult to carry out random mating over all subpopulations and it is effective to change males among the subpopulations instead of overall random mating. Maintenance of animals in different locations has the additional merit of reducing the risk of accidental loss of the population.
Uniformity of the family size: one of the most efficient techniques to keep genetic variability is to make the family size as equal as possible. It may be easy to imagine that the extinction probability of a certain allele is less in the case that every reproductive animal produces two progenies for the next generation than in the other case that one reproductive animal produce ten progenies and the others produce non. It is usual in a population of domestic animals that males are extremely less than females, but the difference in the number of males and females is not desirable for the small population of the genetic resources, since it means the extreme difference in the number of progenies. When the number of population is fixed, we can minimize the reduction of genetic diversity by equalizing the number of progeny from each individual.

Production and marketing

- Optimise the production system and develop activities to increase the market value of purebreeds
- Re-organise if necessary the production system of rare breeds, such as seasonal planning of the production, changing age or weight at slaughter, etc. Need for strategies to induce the market recognising non traditional products (see Marketing W.G.)
- The rare breed might be used for the production of commercial crosses with a high performance breed. The commercial crosses might benefit from higher input production systems, while the local breed should be maintained in its original production environment to maintain its adaptation characteristics
- Use a female population of a local breed to guarantee the maintenance of a large population
- Do not use a high performance breed that will produce crosses that cannot be distinguished from the local breed (avoid the risk of involuntary introduction of exotic genotypes into the local breed)

HERDBOOK

Data for each animal and flock/herd

General information
Species
Breed name (also local name)
Distribution

Specific data (farm and animals)
Year
Flock or herd size
Trend (inc., stable, dec.)
Total n° of breeding females
N° of females registered (herd book or register)
Total n° of males
N° of males registered (herd book or register)
% of females bred to the males (registered)
Reproduction system

Origin and development
Origin (description and year)
Imported from
Exported to
Organization monitoring breed (address, phone, mail)

Mangement
Mangement system
Feeding (adults)
Feeding (young)
Housing period
Specific management conditions

Conservation
Description of in situ conservation program

Performance
Birth weight
Age at sexual maturity
Age at first parturition
Parturition interval
Lenght of productive life
Milk yield and characteristics
Average daily gain
Other
Managenent conditions under which performance was measured