THE ROLE OF INTERNATIONAL ORGANIZATIONS IN THE CONSERVATION
OF THE WORLD'S ANIMAL GENETIC RESOURCES

J. RENDEL*

SUECIA

The need for conserving farm animal genetic resources was discussed in a Special Round Table Session of the First World Congress on Genetics Applied to Livestock Production held here in Madrid six years ago (Mason, 1974). Since then, the interest in this particular subject has shown a steady increase. In the period 1974-80, FAO and UNEP arranged a number of surveys, studies and meetings on animal genetic resources in different regions of the world which culminated in 1980 with a technical consultation in Rome on animal genetic resources conservation and management (FAO, 1980, 1981). Regional agricultural or animal husbandry organizations in Africa (IBAR of OAU), Europe (EAAP), Asia and Oceania (SABRAO) and Latin America (ALPA) also set up committees and undertook several studies on the subject. Special attention was given, in particular at the FAO/UNEP consultation, to a detailed discussion of why animal genetic resources needed to be better managed and how this could be undertaken. The term "management of genetic resources" will be used here to refer to breeding activities which would retain genetic variability within the overall resource at the same time as this resource is subject to genetic improvement. The term "conservation", however, is taken to imply direct action for maintaining populations and genes which are threatened by extinction.

Genetic variability is the basis for future genetic changes in any given species. It is imperative, therefore, that variability is maintained so that future generations of mankind will be in a position to adapt their livestock to the many unknown future demands and requirements which will be put on them. Although this overall problem is of great general concern, it is obvious that international organizations such as FAO or UNEP or societies for animal production science such as WAAP, EAAP or ALPA, can only play a limited role in the actual work. The major activities will have to depend on governmental funds made available for action in individual countries. However, the organizations and societies mentioned above, as well as the scientific community as a whole, have a great responsibility in guiding the national governments on animal genetic resources conservation and management.

Different problems in industrialized and in developing countries

Industrialized countries

The conditions with regard to animal genetic resources differ considerably between the industrialized world and the developing countries. In the former countries, the livestock resources have been subject to strong within-population selection for increased animal growth rate, milk yield, egg production, etc. At the same time, the production systems have changed towards intensification with continuous availability of high quality feed and improved management, housing and health care. Populations/breeds which did not respond well to the changes in requirements have been discarded or have lost their competitiveness. As a result, the number of livestock breeds has decreased at a surprising speed. This is best illustrated in the FAO/UNEP survey of cattle breeds in Europe and the Mediterranean (FAO, 1975). Parallel with the numerical decrease in the less improved indigenous breeds, there has been a concentration of livestock production in areas of high agricultural potential, whereas areas with marginal productivity have seen a loss both in animal and human numbers.

The developments in Europe just described have led to two types of actions and reactions from groups of scientists and agriculturalists interested in animal genetic resources, viz. (a) development of conservation programmes for specific breeds, (as examples see papers by Alderson and Devillard, FAO, 1981)

* University of Agricultural Sciences, S-750 07 Uppsala. Sweden
and, (b) research projects on the breed/land type interaction in marginal areas. The breed conservation programmes are well known to the present audience and will not be described further here. The research on the interaction between breed types and land types undertaken in particular by Casu and Vissac in the Mediterranean area are less publicized (for a discussion in English and French, see FAO, 1977). The results indicate that in the harsh Mediterranean pastures, beef production based on well-adapted indigenous breeds or local mother-cows that are used for the production of crossbred weaner calves (e.g. Sardinian x Charolais) gives higher productivity per hectare than that from the specialized European beef breeds such as the Charolais. It is interesting to note that the Italian farmers have realized that on poor pastures some of the local cattle derived from Podolic stock are superior to these specialized breeds. For instance, the Maremmana cattle which some 15 years ago were considered to be threatened by extinction have increased in numbers and are now widely used in the poor pasture areas north of Rome.

Developing countries

The major portions of the world's livestock are found in the developing countries (70 percent of the cattle, 65 percent of the sheep and goats, 57 percent of the pigs). Although there are many clearly distinguishable livestock types or strains in the developing countries, breeds, in the sense of the word used in the industrialized countries with herdbooks and production recording etc., are very rare. There is usually great variability in phenotypic characteristics within the populations. The animals are, however, well adapted to the local conditions, including the prevailing disease situations. Although there are notable exceptions such as the Boran cattle of Kenya and the Sahiwal of Pakistan, little systematic genetic improvement - using modern breeding methods - has been undertaken.

Crossbreeding with European-type livestock, particularly with dairy cattle, and the replacement of indigenous poultry with high-yielding commercial strains are under way in many countries. In cases where the production systems are being improved/intensified, these genetic changes may be well justified and give good economic returns. However, in many areas, it will be a very long time (if ever) before the environmental conditions, in particular feed availability, and the disease situation (e.g. tickborne diseases and trypanosomiasis) are such that the use of either crossbred or purebred European-type livestock can be recommended. Genetic improvement will, therefore, have to be made within the existing stock, paying due regard to productivity under the conditions in which the majority of the livestock will be kept, e.g. on pastures showing great seasonal variation, or under feeding systems based on coarse agricultural by-products and in environments with parasites and endemic diseases. The conditions for genetic resources development are thus quite different from those in the industrialized countries. Systems of recording and evaluation need to be developed which must take into account not only productivity at governmental stations but also under ordinary farm level production systems. Considerable emphasis will have to be given to tolerance/resistance to disease. Against this background which prevails in the majority of the developing countries, the management of animal genetic resources will need to comprise a strong element of within-population selection to be followed by appropriate selection between populations. Admittedly, this course of action may eventually lead to the same problems as the industrialized countries are now experiencing, e.g. the disappearance of many less-productive breed types. However, the conditions are so variable and will probably remain
so in the foreseeable future that it is unlikely that any single breed will completely dominate the scene in the way that, for instance, Black and White dairy cattle now dominate in North America and Europe. In other words, well-managed genetic resources programmes in the developing countries could be expected to lead to the development of a relatively large number of breeds each adapted to a broad zone with similar climatic and environmental conditions. At present, the available genetic resources are not threatened by intensive selection and improvement programmes but rather by their absence. In some areas, e.g. tropical Latin America, there exists a real danger that useful genetic material might be swamped and lost through poorly conceived crossbreeding by imported unadapted stock. This danger is likely to become real in many more areas, should action for improving local livestock be delayed much further.

Topics requiring international attention and coordination

There are at least four areas of work on animal genetic resources management and conservation in which there is a need for leadership by one or more international organizations, viz.

(a) information in the broad sense including both exchange of information, e.g. on conservation methods and on work going on in different countries and regions, and collection of information, e.g. the establishment of regional data banks and guidelines for data collection;

(b) policy advice to governments;

(c) promotion of intercountry cooperation, in particular for the improvement of useful breed types which occur in several countries but where financial, manpower or other resources do not allow the establishment of efficient breeding programmes in each individual country. The trypano-tolerant strains of cattle and sheep in West Africa or the Andean camelidae can be mentioned as examples of such animal populations;

(d) development assistance to developing countries regarding breeding improvement projects and resource management. In this regard, special attention is required as to how to integrate breeding improvement with rural development activities.

FAO has a long-standing interest in the above subjects. A considerable amount of work has been done, particularly on topics (b) and (d). In the case of (d), the financial resources for the country activities have mainly come from the United Nations Development Programme (UNDP) and from bilateral trust funds, e.g. the Swedish International Development Authority. Topics (a) and (c) are currently being tackled through pilot projects under the FAO Regular Programme.

Possible coordinating mechanisms

Due to shortage of funds, the international coordination of work on animal genetic resources management and conservation has been rather weak. For instance, regular, periodic information exchange, which is a link vital to any coordination programme, has been missing.
The international coordination of plant genetic resources work is more satisfactory. With the assistance of funds from the Consultative Group on International Agricultural Research (CGIAR), an International Board for Plant Genetic Resources (IBPGR) was established nine years ago. The IBPGR Secretariat is located in the FAO Plant Production and Protection Division and has an annual budget of US$ 3.4 million which has allowed IBPGR to publish a newsletter, engage in training of young scientists from the developing countries and undertake a number of pilot conservation efforts as well as offer advice to governments. Obviously, something similar is required in the animal field but for the time being, the financial resources of CGIAR are fully committed to cover the financing of the so-called international research centres. CGIAR is not, therefore, in a position to engage in new activities.

The question, how to improve coordination in the animal sector, was discussed at the recent FAO/UNEP Technical Consultation on Animal Genetic Resources Conservation and Management (FAO, 1980) which recommended that "FAO establish an appropriate coordinating mechanism for the conservation and management of the world's farm animal genetic resources at national, regional and international levels, with the following terms of reference:

(a) To give support and advice to existing activities concerned with breeding programmes, management and conservation of the world's farm animal resources and to find means of providing a framework for cooperation.

(b) To stimulate the establishment of activities with respect to the conservation of farm animal genetic resources in countries where no such activities exist, but are required.

(c) To stimulate the establishment of regional activities and laboratories devoted to the documentation, evaluation and conservation of regional livestock resources, including the rationalization of breeding programme development and conservation programmes in each of the countries of each region.

(d) To stimulate the development of training programmes at regional level for the techniques appropriate to the conservation and management of farm animal genetic resources.

(e) To promote research on the mechanisms of adaptation and disease resistance and tolerance in the genetic stocks in developing countries.

(f) To facilitate study of health barriers to the international exchange of genetic materials."

At the same time, FAO and UNEP were requested to arrange for the preparation and distribution of an international newsletter on the conservation and management of farm animal genetic resources. The newsletter would provide information about training programmes, new techniques and development activities as well as promote cooperation on a world-wide basis. UNEP has agreed in principle to provide funds for the newsletter but, due to financial difficulties, funds have not yet (March 1982) been made available.
Obviously the bulk of the necessary work on animal genetic resources conservation and management will have to be carried out by national organizations. Regional societies and organizations will also have an important role to play. The FAO/UNEP Technical Consultation referred to above suggested that a suitable modus operandi would comprise a three-tiered cooperation where within-country activities, directed by national bodies, would be coordinated regionally by regional bodies such as the Inter-African Bureau of Animal Resources (IBAR), while the global coordination would be carried out by FAO in close cooperation with the regional organization concerned. Each regional coordinating "unit" would receive scientific and technical advice from a specific "expert group". Where appropriate, an "expert group" might also take on the coordinating or executive responsibility through its chairman or secretary. For instance, the EAAP committee on animal genetic resources is likely to work in that way. For regions with a large workload, e.g. Africa, and less well-developed national institutional structures, the coordinating unit will require specific staff and funds in order to work properly. At the global level, FAO is now establishing an "expert panel on animal genetic resources management and conservation" which will draw expertise from all the regions, making use of the regional expert groups already in existence. However, the "coordinating unit" in FAO is presently weak and is unfortunately likely to remain so under the existing financial stringencies.

In several discussions with representatives of the scientific community, such as at the present gathering, I have noted the strong interest among individuals and groups of animal geneticists to get international action going on a more intensive and better coordinated work programme on animal genetic resources management and conservation. However, interest from the scientific community is not enough. Financial resources are required, particularly for the urgent work needed in the developing countries. I hope that this meeting might come forward with suggestions as to how to arrange the coordinating mechanism required, as well as the financing thereof.

**SUMMARY**

The need for work on animal genetic resources management and conservation is stressed. In the industrialized countries, the livestock resources have been subject to strong within-population selection accompanied by an intensification of the production system. The number of breeds is decreasing rapidly. In the developing countries, there are many clearly distinguishable strains but few established breeds with herdbooks and production recording. The available genetic resources are not threatened by intensive breeding and selection programmes but rather by their absence and by poorly conceived crossbreeding with imported stock. International attention and coordination is needed regarding four areas of work, viz. (a) information exchange and collection; (b) policy advice to governments; (c) promotion of inter-country cooperation, particularly with regard to related animal strains occurring in several countries, and (d) assistance to developing countries in breeding improvement and resource management. Appropriate coordinating mechanisms are discussed and the responsibility of the scientific community is stressed.
RESUMEN

Se hace hincapié sobre la necesidad de trabajar en la conservación y manejo de los recursos genéticos animales. En los países industrializados, los recursos pecuarios han sido sometidos a una fuerte selección intra-poblacional acompañada de una intensificación en el sistema de producción. El número de razas decrece rápidamente. En los países en desarrollo existen muchas cepas que se destacan claramente por sus características particulares; pero hay pocas razas que permitan su empadronamiento en registros pecuarios por sus fichas de producción. Los recursos genéticos disponibles no se encuentran en peligro por programas de cría intensiva y de selección, sino al contrario, por la ausencia de ellos y por programas de cruzamientos indiscriminados con ganado importado. Por lo tanto se hace necesario guiar la atención de los organismos internacionales, con el propósito de asegurar la coordinación hacia cuatro áreas de actividades, a decir (a) recolección e intercambio de información; (b) asesoramiento a los gobiernos sobre políticas pecuarias; (c) promoción de la cooperación entre países, especialmente en relación con cepas afines de animales existentes en diversos países, y (d) asistencia a los países en desarrollo en el manejo de los recursos y mejoramiento ganadero. Se discuten los mecanismos de coordinación apropiados y se da énfasis a la responsabilidad de la de la comunidad científica.

References

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