

# WELCOME AND INTRODUCTORY REVIEW

## ADDRESS OF WELCOME

by

Dr. R.B. Griffiths

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I am pleased to welcome you here on behalf of the Director-General of FAO and the Executive Director of UNEP to the First Meeting of the Joint Expert Panel on Animal Genetic Resources Conservation and Management. It is encouraging to see such a distinguished group of scientists, representing, as you do, not only the many separate disciplines of genetics but also different regions of the world. It is noteworthy that although you are here in your personal capacities, and not representing your governments, you are drawn from developing countries in Africa, Asia, Latin America and the Caribbean, as well as from the Middle East; and also from developed countries in Europe, North America and Asia. Such widespread and diverse backgrounds, qualifications and experiences among its members augurs well for the work of the Expert Panel.

Although FAO has been active in animal breeding since its inception, the joint approach since 1974 with UNEP has added a new dimension to the conservation and management of animal genetic resources. A number of joint activities have been undertaken, including such projects as the survey of indigenous sheep breeds in the Middle East, the study of the use and potential of trypanotolerant livestock in Africa, in association with ILCA, and expert consultations on the breeding of Mediterranean cattle and sheep, on the breeding of dairy cattle in the humid tropics, and on the evaluation and conservation of animal genetic resources in Latin America.

The Joint Consultation of FAO and UNEP on Animal Genetic Resources in 1980 provided the first world focus on the objectives, possibilities, limitations, problems and hopes for this important subject. At that Consultation, in which some of you took part, we arrived at a coherent and rational global plan for action for the next few years. Funding for the implementation of the proposals outlined at that time has since been provided by FAO and by UNEP; and the plans have been endorsed by the governing bodies of FAO. Solid foundations are being laid, and although progress may seem to be slow, it is important to know not only where to go, but also how to get there. For this reason, pilot trials and methodological studies have featured prominently in the recent work of FAO and UNEP. This work is directed operationally by the Animal Production Service of FAO. One of the tasks we shall ask you to address during this week is an appraisal of the work which is now in progress. Additionally, we shall be looking to you for new ideas on some of the problems which have been encountered to date.

The subject is a fascinating one, partly because of the unusual combination of objectives. First, we seek not only to harness the animal genetic resources of developing countries in improved management programmes to enhance the production of food, fibre and animal power, but secondly we aim to conserve, in the preservation sense, those genetic resources that are in danger of being lost. The first is capable of yielding immediate results, whereas the second is a means of maintaining the flexibility necessary to respond to future unforeseen changes in animal production and market requirements. Cryogenic storage of fertilized ova and semen constitute appropriate means for the conservation of animal resources, but the mechanics of achieving them in the developing world are yet to be worked through.

Overhanging in this field of interest is the rapid, and to some, terrifying speed of research and development in genetic engineering, which regularly breaks new barriers and opens new scenarios of opportunity. It seems likely that we shall find these affecting both our attempts to increase animal productivity and our options for storing genotypes or even gene segments at risk of extinction. We are maintaining close links with the proposals for the establishment of an International Centre for Genetic Engineering and Technology and we expect to play a lead role in work on animal genetics if and when the Centre materializes.

All of this underscores the need for a wide base of continuing consultation and up-to-date scientific knowledge, combined with concern and commitment to the needs of the developing world. This is another of your roles on this Panel.

The subject of communication is of first rank in every area of human activity and includes as prerequisites the storage of knowledge and the provision of ready access to data needed for competent decision making. In 1980, recommendations were made therefore to create data banks on animal genetic resources and also for a Newsletter. I am glad to tell you that both have been started. We shall be inviting your involvement in facilitating their growth to maturity and their use. Only then will they contribute to the prudent conservation and management of animal genetic resources throughout the world.

We have noted a growing and very encouraging interest throughout the world during the 3 years that have followed the Expert Consultation on Animal Genetic Resource Conservation and Management held in 1980. Several groups of scientists, gathering

principally for other purposes, have turned their attention to the matter, and have passed resolutions calling for increased activity at the international level by responsible bodies including FAO, UNEP and CGIAR. We regard the creation of this Joint Expert Panel between FAO and UNEP as a realistic step towards the establishment of an international programme in this field.

We are pleased today that among you are those who, while here in a personal capacity, are nevertheless associated with the work of other organizations in Animal Genetic Resources Conservation and Management. These include the Society for the Advancement of Breeding Researches in Asia and Oceania (SABRAO), The Interafrican Bureau for Animal Resources (IBAR), the Latin American Society for Animal Production (ALPA), the International Livestock Centre for Africa (ILCA) and the Commonwealth Bureau of Animal Breeding and Genetics (CAB). Our working relationships with each of these organizations have been established for many years, and we are pleased that during the last year we have been able to strengthen them further in the pilot trials now under way for data bank establishment.

Finally, may I convey good wishes to you for success in the meeting, not only from myself but also from Dr. D.F.R. Bommer, the Assistant Director-General (Agriculture) of FAO, who would be here welcoming you today but for his unavoidable absence for meetings in the USA. We thank you for coming. We look forward with great interest to your recommendations on this important subject of Animal Genetic Resources Conservation and Management.

## **REVIEW OF THE FAO/UNEP PROGRAMME ON ANIMAL GENETIC RESOURCES CONSERVATION AND MANAGEMENT**

John Hodges<sup>1</sup>

In 1980 FAO and UNEP held a Technical Consultation on Animal Genetic Resources Conservation and Management, which resulted in a number of specific recommendations. The Consultation was global in concept, and was the culmination of earlier work done by FAO and later in cooperation with UNEP, at local, national or regional levels. The Consultation brought together representatives of member countries, scientists and administrators. The recommendations are given in Appendix A to this paper.

Since then, FAO and UNEP have drawn up a cooperative programme of work which is operated by FAO, with funding from the FAO/UNEP project entitled Conservation of Animal Genetic Resources - Phase II and from FAO's Regular Programme. I will deal in turn with the items, giving an outline of the stage reached. Most of the items are also on the agenda for this meeting, and opportunities for detailed discussion of them will therefore arise later.

### **1. THE JOINT FAO/UNEP EXPERT PANEL ON ANIMAL GENETIC RESOURCES CONSERVATION AND MANAGEMENT**

The Terms of Reference are given in Appendix B. The Panel was constituted earlier this year with 36 members being appointed (Appendix C) out of a possible maximum of 40. Members were nominated and agreed by both organizations. Members will serve for four years in a personal capacity and not as representatives of their governments. Consultation will be by meetings such as this, by correspondence with groups or with individuals, depending upon the subject matter. On this occasion 19 of the Panel Members have been invited to attend; in addition 5 invited speakers with special expertise are also invited. Future meetings will be held when needed and will be alternately funded by FAO and UNEP. FAO is funding this meeting from its Regular Programme budget.

The organization of the meeting is in sections each with a rapporteur who has kindly agreed to prepare written summaries of the major points presented and discussed, and also to bring to the meeting on the last afternoon the recommendation of their sections. In preparing these, they will be supported and guided, not only by the general discussion, but also by the speakers in the sections concerned, who with them will form a small consultative group to formulate the recommendations. Following the meeting, a report with the summaries of the meeting and the recommendations will be produced; later, proceedings will be published carrying the papers. Authors will, of course, have the opportunity of revising their working papers before publication, and should return their amended papers to me by 31 December for inclusion in the proceedings.

I should add that the proceedings will be published in two parts. Part 1 will carry all papers except those in the section on Cryogenic Storage of Germplasm and Molecular Engineering, which will be in Part 2, and published separately. The authors for this section, at the request of FAO, have produced longer papers and the publication on this topic is intended to contain comprehensive reviews of the subject matter.

### **2. DATA BANKS**

This topic was the subject of a recommendation in 1980. During the last six months pilot trials for one year each have been established in Africa, Asia and Latin America. Their main purpose is to identify appropriate methodologies for the preparation of data for the

bank, working with a variety of species in different parts of the world. A more detailed review of the work in progress on this subject will be given later in the meeting.

### **3. CONSERVATION PROJECTS**

Some breeds with economic potential, which are often scattered in several countries, or which are in danger of total loss through having very small population size, are the subject of pilot conservation projects. These are at various stages of progress, and include some of the few dairy breeds suited to the tropics, such as the Sahiwal, Kenana and Butana breeds; also trypanotolerant cattle breeds and sheep breeds in West Africa. Others are being explored in association with the development of data banks. More details of these will be given in the section on this subject later in the meeting.

### **4. GENE BANKS**

The concept of conservation by gene banks is complex. One can think of live animals, being preserved *in situ*, or in some semi-artificial situation; alternatively one may think of cryogenic storage of sperm or fertilized ova or other tissues or gene segments. The economic problems are difficult with both live animals and with haploid or diploid cells. Who is to pay? There are also questions of how many to preserve, for how long, and where. These questions are not easy to solve even in the developed countries where cryogenic technology had its origin, but they become especially difficult when applied to the developing countries. At present the plan is to seek the advice and recommendations of this Expert Panel and of other scientists in the field, and as already mentioned to publish their work in a special volume. Then, a feasibility study is planned to study some of the practical problems of costs, health control, movement of semen across national boundaries, safety, etc.

### **5. TRAINING COURSES**

The first training course for animal scientists from developing countries in Animal Genetic Resources Conservation and Management was organized by FAO/UNEP in September 1983. It was held in English and was mounted by the Hungarian University of Veterinary Science in Budapest. This Institution was chosen because of the advanced stage of planning and live animal conservation initiated in Hungary and because of the body of lecturers available in the country. They were supplemented by lecturers from other countries. Eighteen animal scientists from fifteen countries were present. You will hear more later in the meeting. The intention is to arrange further courses, as the demand exists, from other developing countries and as the technology and experience in the subject matter advances. Other courses may be held in French and Spanish as needed.

### **6. NEWSLETTER**

As requested by the 1980 Consultation, FAO and UNEP have started a newsletter for all concerned with the subject of animal genetic resources conservation and management. It will be published twice yearly. The first issue was in the summer of 1983 and the second will be early in 1984. An initial mailing list of 1000 was created. The newsletter, known as Animal Genetic Resources Information (AGRI) will have 40/50 pages, and will carry articles of up to 3000 words with illustrations, news items, book reviews, descriptions of methodologies, details of breeds in need of conservation and plans for undertaking this work. It will also report on the activities of FAO and UNEP. It is also hoped that there will be a correspondence section which we encourage members of the Expert Panel to initiate and use. We also invite you to nominate others who ought to be on the mailing list.

### **7. INVENTORIES**

The 1980 Consultation drew attention to the lack of information in the West about the extensive livestock resources of the USSR and of China. Initiatives by FAO/UNEP have resulted in a positive response from the USSR in the last month, indicating their willingness to cooperate in creating an inventory of their breeds. This work will be carried out by scientists of the USSR with all the support on techniques and experience that can be offered by FAO and UNEP. The Inventory will be published in Russian and in English. It is also planned to link this inventory with the creation of data banks. We are less advanced in our contact with China, but are glad to be able to announce the intention of FAO to publish, in English, Professor Cheng's book on Chinese Livestock Breeds, already published in Chinese by Chinese Academic Publications. We are fortunate in having the services of Dr. Helen Newton-Turner as editor to prepare the manuscript in readiness for the English publication. Hopefully, this initial work will be extended by further cooperation with our animal geneticist colleagues in China.

These are the principal activities currently underway as a result of the 1980 Consultation. In conclusion, I would like to add that in most of the components of this extensive programme, we are able to cooperate with national and regional organizations as well as with national governments. For example, in Asia, with The Society for the Advancement of Breeding research in Asia and Oceania

(SABRAO); in Africa with the Interafrican Bureau for Animal Resources of the Organization of African Unity (IBAR of OAU) and the International Livestock Centre for Africa (ILCA); in Latin America the Latin American Association of Animal Production (ALPA).

## APPENDIX A

### I. RECOMMENDATIONS OF THE FAO/UNEP TECHNICAL CONSULTATION ON ANIMAL GENETIC RESOURCES CONSERVATION AND MANAGEMENT, ROME 1980

#### A. Recommendations to FAO/UNEP

1. It is 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:

- i. 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.
- ii. 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.
- iii. 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.
- iv. To stimulate the development of training programmes at regional level for the techniques appropriate to the conservation and management of farm animal genetic resources.
- v. To promote research on the mechanisms of adaptation and disease resistance and tolerance in the genetic stocks in developing countries.
- vi. To facilitate study of health barriers to the international exchange of genetic materials.

2. FAO/UNEP are requested to arrange for the preparation and distribution of an international newsletter on the conservation and management of farm animal genetic resources. The newsletter should provide information about training programmes, techniques, activities and developments; should contain a correspondence section; and should be a means of stimulating cooperation on a worldwide basis.

3. It was agreed that the FAO/UNEP project had brought out a great deal of interesting information on livestock populations and their conservation. However, it was noted that the information was very incomplete and that in particular, the project did not include two of the major livestock countries of the world, namely China and the USSR, and barely touched on a third, namely the USA. The Consultation therefore recommended that FAO and UNEP, in collaboration with the countries concerned, should try to complete this study.

4. FAO/UNEP should examine the feasibility of establishing one or more centres for the conservation and long-term storage of genetic material - a gene bank. Each gene bank should be designed, health considerations permitting, to serve a region and should be capable of long-term storage of semen, oocytes and embryos (and other types of genetic material where appropriate) of all farm species with which storage is possible. FAO/UNEP should include in the feasibility study the training needs for the establishment, maintenance and use of regional gene banks; the nature (location, size, etc.) and control (health and safety) of stored genetic material; and the circumstances relating to the choice of initial material for storage and the release and replacement of stored material.

#### B. Recommendations to FAO/UNEP and Member Governments

5. It is recommended that FAO/UNEP assist in the development of a data bank for livestock resources in member countries, and in the coordination of these at regional levels. In this context, it is recommended that FAO/UNEP should investigate:

- i. the development of standardized definitions, nomenclature and data collection and collation systems;
- ii. the provision of assistance to existing regional organizations, and the development of, and subsequent assistance to, necessary new regional organizations in maintaining documentation systems;
- iii. the development of a two-stage data bank system
  - a. initially emphasizing enumeration of breed populations, population structure and minimum information on productive and adaptive characters;
- iv. to be followed in each country as part of breeding programme development by more extensive documentation of performance and adaptive traits and the environmental conditions under which performance, etc. was measured.

6. In view of the importance of adapted breeds for agricultural development in general and for the promotion of the livestock industries in particular, it is recommended that FAO should encourage Member Governments and/or participating organizations to include in the agricultural development programmes a component for the development and conservation of local breeds. Such breed development and conservation should take account of economic and genetic considerations appropriate to local conditions.
7. The implementation of breeding programmes at the national level would be greatly facilitated by the introduction of routine recording, evaluation and selection procedures. FAO should assist in the establishment of a limited number of pilot schemes for selection in local populations which pioneer methods of livestock improvement that make most efficient use of limited resources and infrastructure.
8. Several important breeds in the developing world are spread over a number of countries covering one or more regions. FAO should assist the governments concerned to cooperate in the implementation of a common programme for the genetic improvement and conservation of each such breed.
9. International research projects should be stimulated with a view to (a) the comparison under different environmental conditions, of breeds from different countries, and (b) the clarification of the genetic nature of any differences observed and their implications for breeding programmes. (These might be arranged via AI on the lines of the current dairy cattle strain comparisons in Poland and Bulgaria or suitable modifications of them. Or they might be performed using the technique of reference breeds (control breeds).) Groups of breeds for consideration include prolific sheep, tropical beef cattle and buffaloes.
10. There are several livestock species/breeds which are adapted to very specific environments and which play a major role in rural economies (e.g. the Andean Camelidae, Old World camels, the Himalayan Bovidae, livestock in tsetse-infested areas, etc.). In spite of their importance, too little is known about these species/breeds. It is recommended that international support be given to the governments concerned for studies on their biology, genetic profile, genetic improvement and conservation. Special attention should be paid in this context to endangered as well as genetically unique species/breeds that have particular traits to an exceptional degree and deserve priority treatment.
11. Some livestock breeds which played a significant role in the past in the rural economies of developed countries, and which were adapted to specific environments, are now in danger of disappearing (e.g. seaweed eating sheep, heavy draught horses, breeds of large donkeys). It is recommended that international encouragement be given to the governments concerned, for their conservation, and where not so far available, for their study.
12. The Consultation urged all governments to give full consideration to ways and means of conserving viable populations of wild animal species, including avian, which are the ancestors or close relatives of domestic species and recommended that FAO and UNEP expand their programmes in support of the establishment and improved management of national parks and reserves.

## **APPENDIX B**

### **EXPERT PANEL ON ANIMAL GENETIC RESOURCES CONSERVATION AND MANAGEMENT**

#### **TERMS OF REFERENCE**

##### **1. Background and Justification**

In the 1930s and 40s the scientific basis for the genetic selection of animals was worked out in institutions in Europe and the United States of America. The application of these findings to practical animal breeding improvement programmes has made possible an unprecedented rate of increase in the production of food and fibre per animal. A few high performance breeds have emerged which are gradually displacing the local breeds in temperate regions. As a result there is growing concern that the latter may disappear altogether unless special efforts are made to conserve them.

The developing countries are likewise increasingly concerned about their livestock resources, especially after the many large scale introductions of high-yielding breeds from the temperate zones which often cause a decline in the numbers of local livestock types. The latter have, through natural and man-selection, developed characteristics which make them well adapted to the often harsh environmental conditions under which livestock have to live and produce in these areas. This valuable genetic material needs to be maintained and improved as the basis for national livestock breeding programmes and policies.

The problems facing the world's animal genetic resources were identified by a high level FAO/UNEP Technical Consultation held in 1980 as being principally of three kinds. The first is a decrease in genetic variability within breeds; this is mainly a problem of the high-yielding breeds maintained in temperate zones and employed in intensive production systems. The second is the rapid disappearance of indigenous breeds and strains of domestic animals through the indiscriminate introduction of exotic breeds. The third

concerns the special problem of hot, humid climates and other harsh environments common the developing countries. Only in restricted areas within these environments is it possible to improve animal health protection measures and feeding and management practices to levels that would allow high-yielding animals from the temperate zones to be used. In these circumstances the need is to design and implement appropriate selective breeding programmes based on existing populations of animals adapted to harsh environments.

The emerging awareness of the need for urgent action to conserve and develop the world's animal genetic resources has resulted in a number of limited and mostly uncoordinated efforts in this direction. Regional agricultural and/or animal husbandry organizations in Africa (IBAR of OAU), Europe (EAAP), Asia and the Pacific (SABRAO) and Latin America (ALPA) have set up committees on animal genetic resources and initiated studies on their management. However, there is an obvious need for the coordination of these activities as well as for the continuous exchange of information on experiences, achievements and methodologies for the efficient management and conservation of animal genetic resources for future needs. The future potential use of a specific animal genetic resource may not necessarily be confined to the country or area where it is at present threatened. Instead, it may well prove its usefulness in some other part of the world. This fact underlines the need for a strong involvement of international bodies like FAO and UNEP.

In recent years techniques for the recovery of embryos of animals and their long term conservation at supra-low temperatures have been developed and the scientific research in this field is at present in a very intensive phase of development. In consequence, new knowledge is being continuously generated on animal genetic resources conservation in vitro, for both short and longer term periods. At present, of course, the development of the embryo transfer/storage techniques is geared mainly toward its immediate use for commercial purposes. But the potential for its use in connection with the conservation of animal genetic resources is great. This would require its continuous study at the global level. There is already information available that embryo banks are being established in some of the industrialized countries.

In the light of the above considerations, it would be desirable to establish an FAO/UNEP Panel of Experts on Animal Genetic Resources Conservation and Management. This would be consistent with the recommendations of the FAO/UNEP Technical Consultation (1980) that FAO and UNEP establish an appropriate coordinating mechanism for the conservation and management of the world's farm animal genetic resources at national, regional and international levels. The work of the Panel will be enhanced by support from UNEP through the FAO/UNEP Project on Conservation of Animal Genetic Resources - Phase II which was recently approved.

## II. Objectives and fields of activity

The objectives of the Panel would be to:

- Review periodically ongoing work on animal genetic resources conservation and management in the different parts of the world and delineate future work programmes on a priority basis.
- Identify the principal problems hampering the exploitation and improvement of animal genetic resources at national and regional levels.
- Determine how these problems may be solved, what action programmes and projects may be developed in given situations, and how existing national and regional organizations may be strengthened for this purpose.
- Formulate ways and means of stimulating regional and global cooperation in programmes for promoting animal genetic resources development with special emphasis on mutual assistance among national and regional institutions.
- Advise the Director-General of FAO and the Executive Director of UNEP on critical issues relating to the conservation and management of animal genetic resources.

The Panel activities will cover the following fields:

- i. Genetic resources conservation and management activities at global, regional and subregional levels.
- ii. The design and implementation of selective breeding programmes for animal populations in harsh environments.
- iii. The establishment and operation of data banks on animal genetic resources.
- iv. The development and application of an in situ animal genetic resources conservation methodology.

- v. Public relations and collection and dissemination of information programmes for animal genetic resources conservation in developing countries.
- vi. The development and application of an in vitro conservation methodology on animal genetic material, including disease control aspects.
- vii. The development and maintenance of inventories of animal genetic resources and of a global register of such resources.

### III. Membership

The Panel will be a standing and authoritative body of experts, the total number not to exceed 40. The number of participants at specific meetings will depend on the topics dealt with, as well as on the budgetary allocations available.

Half of the members will be nominated by the Director-General of FAO and half by the Executive Director of UNEP. The nominations will be made through consultation between the two agencies to avoid overlapping and to make certain that subject coverage and geographic and linguistic distribution are adequately taken into account.

Responsibility for convening meetings of the Panel would rest with FAO after consultation with UNEP. Secretariat arrangements will be handled by FAO.

In view of the need to obtain the broadest possible involvement in the conservation of animal genetic resources, it is envisaged that other international agencies concerned, such as UNDP and the World Bank, will be encouraged to support the Panel.

### IV. Expected duration of the Panel

The problems relating to animal genetic resources conservation and management will require increasing attention over a long period of time. The problems are often complex and are usually not amenable to uniform "one time" solutions. The long generation intervals of the larger species of domestic animals increase the time span required for arriving at viable solutions. Therefore, a long term FAO/UNEP responsibility for the coordination of animal genetic resources conservation has to be accepted. Initially, a six-year duration of the Panel is foreseen, as if an extension, taking into account experiences gained during the initial period.

### V. Periodicity of sessions

It is proposed to have a minimum of one panel session every third year. The actual need for panel work is likely to be much higher. FAO and UNEP would, however, make efforts to hold panel meetings more frequently. The parties would also meet the need for expert advice, at least partially, by correspondence with the institutions and/or individuals involved in animal genetic resources conservation work, the world over.

## APPENDIX C

### MEMBERSHIP OF THE JOINT FAO/UNEP PANEL OF EXPERTS ON ANIMAL GENETIC RESOURCES CONSERVATION AND MANAGEMENT

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1 The term "farm animals" in this document includes all domesticated mammalian and avian species.