



THE STATE OF THE WORLD'S **ANIMAL GENETIC RESOURCES FOR FOOD AND AGRICULTURE**

- ▶ This brochure presents key findings of the first global assessment of animal genetic resources.
- ▶ Sustainable management of the world's livestock genetic diversity is of vital importance to agriculture, rural development and the environment.
- ▶ This assessment has led to a process of policy development and a *Global Plan of Action for Animal Genetic Resources*.

COMMISSION ON
GENETIC RESOURCES
FOR FOOD AND
AGRICULTURE



FIRST GLOBAL ASSESSMENT

The State of the World's Animal Genetic Resources for Food and Agriculture is the first global assessment of livestock biodiversity. Drawing on 169 Country Reports, contributions from a number of international organizations and twelve specially commissioned thematic studies, it presents an analysis of the state of agricultural biodiversity in the livestock sector – origins and development, uses and values, distribution and exchange, risk status and threats – and of capacity to manage these resources – institutions, policies and legal frameworks, structured breeding activities and conservation programmes. Needs and challenges are assessed in the context of the forces driving change in livestock production systems. Tools and methods to enhance the use and development of animal genetic resources are explored in sections on the state of the art in characterization, genetic improvement, economic evaluation and conservation.

Thousands of years of animal husbandry and controlled breeding, combined with the effects of natural selection, have given rise to great genetic diversity among the world's livestock populations. High-output animals – intensively bred to supply uniform products under controlled management conditions – co-exist with the multipurpose breeds kept by small-scale farmers and herders mainly in low external input production systems.

Importance to food security and sustainable development

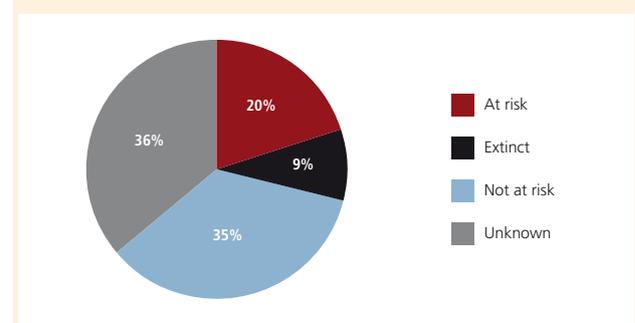
Effective management of animal genetic diversity is essential to global food security, sustainable development and the livelihoods of hundreds of millions of people. The livestock sector and the international community are facing many challenges. The rapidly rising demand for livestock products in many parts of the developing world, emerging animal diseases, climate change and global targets such as the Millennium Development Goals need to be urgently addressed. Many breeds have unique characteristics or combinations of characteristics – disease resistance, tolerance of climatic extremes or supply of specialized products – that could contribute to meeting these challenges. However, evidence suggests that there is ongoing and probably accelerating erosion of the genetic resource base.

Status

FAO's Global Databank for Animal Genetic Resources for Food and Agriculture contains information on a total of 7 616 livestock breeds. Around 20 percent of reported breeds are classified as at risk. Of even greater concern is that during the last six years 62 breeds became extinct – amounting to the loss of almost one

breed per month. These figures present only a partial picture of genetic erosion. Breed inventories, and particularly surveys of population size and structure at breed level, are inadequate in many parts of the world. Population data are unavailable for 36 percent of all breeds. Moreover, among many of the most widely used high-output breeds of cattle, within-breed genetic diversity is being undermined by the use of few highly popular sires for breeding purposes.

Proportion of the world's breeds by risk status category



Threats

A number of threats to genetic diversity can be identified. Probably the most significant is the marginalization of traditional production systems and the associated local breeds, driven mainly by the rapid spread of intensive livestock production, often large-scale and utilizing a narrow range of breeds. Global production of meat, milk and eggs is increasingly based on a limited number of high-output breeds – those that are most profitably utilized in industrial production systems. The intensification process has been driven by rising demand for animal products and has been facilitated by the ease with which genetic material, production technologies and inputs can now be moved around the world. Intensification and industrialization

have contributed to raising the output of livestock production and to feeding the growing human population. However, policy measures are necessary to minimize the potential loss of the global public goods embodied in animal genetic resource diversity.

Acute threats such as major disease epidemics and disasters of various kinds (droughts, floods, military conflicts, etc.) are also a concern – particularly in the case of small, geographically concentrated breed populations. Threats of this kind cannot be eliminated, but their impacts can be mitigated. Preparedness is essential in this context as ad hoc actions taken in an emergency situation will usually be far less effective. Fundamental to such plans, and more broadly to the sustainable management of genetic resources, is improved knowledge of which breeds have characteristics that make them priorities for conservation, and how they are distributed geographically and by production system.

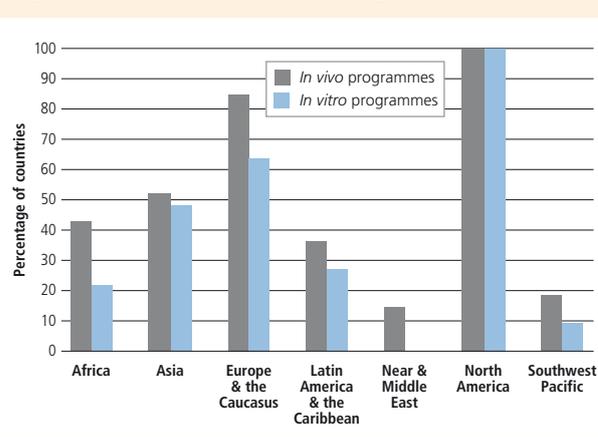
Policies and legal frameworks influencing the livestock sector are not always favourable to the sustainable utilization of animal genetic resources. Overt or hidden governmental subsidies have often promoted the development of large-scale production at the expense of the smallholder systems that utilize local genetic resources. Development interventions and disease control strategies can also pose a threat to genetic diversity. Development and post-disaster rehabilitation programmes that involve livestock should assess their potential impacts on genetic diversity and ensure that the breeds used are appropriate to local production environments and the needs of the intended beneficiaries. Culling programmes implemented in response to disease outbreaks need to incorporate measures to protect rare breeds; revision of relevant legislation may be necessary.

Needs and challenges

Where the evolution of livestock production systems threatens the ongoing use of potentially valuable genetic resources, or to safeguard against sudden disastrous losses, breed conservation measures have to be considered. *In vivo* conservation options include dedicated conservation farms or protected areas, and payments or other support measures for those who keep rare breeds within their production environments. *In vitro* conservation of genetic material in liquid nitrogen can provide a valuable complement to *in vivo* approaches. Where feasible, facilitating the emergence of new patterns of sustainable utilization should be an objective. Particularly in developed countries,

niche markets for specialized products, and the use of grazing animals for nature or landscape management purposes, provide valuable opportunities. Well-planned genetic improvement programmes will often be essential if local breeds are to remain viable livelihood options for their keepers.

Regional distribution of conservation programmes



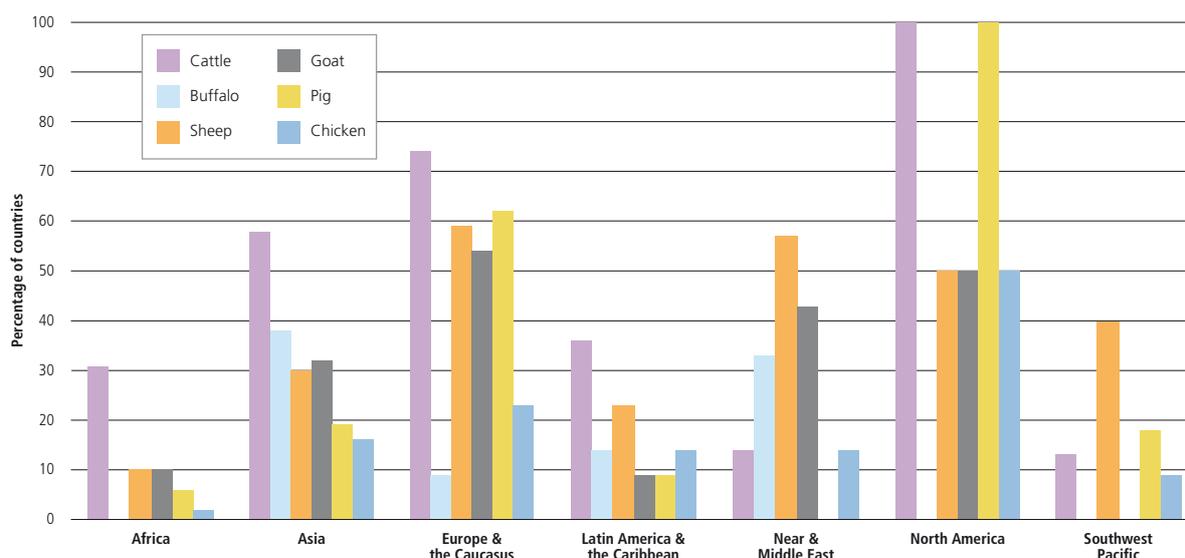
Implementing appropriate strategies for the low external input production systems of the developing world is a great challenge. Pastoralists and smallholders are the guardians of much of the world's livestock biodiversity. Their capacity to continue this role may need to be supported – for example by ensuring sufficient access to grazing land. At the same time, it is essential that conservation measures do not constrain the development of production systems or limit livelihood opportunities. A small number of community-based conservation and breeding programmes have begun to address these issues. The approach needs to be further developed.

Effective management of animal genetic diversity requires resources – including well-trained personnel and adequate technical facilities. Sound organizational structures (e.g. for animal recording and genetic evaluation) and wide stakeholder (particularly breeders and livestock keepers) involvement in planning and decision-making are also essential. However, throughout much of the developing world, these prerequisites are lacking. Forty-eight percent of the world's countries report no national-level *in vivo* conservation programmes, and sixty-three percent report that they have no *in vitro* programmes. Similarly, in many countries structured breeding programmes are absent or ineffective.

In a time of rapid change and widespread privatization, national planning is needed to ensure



Regional distribution of structured breeding activities



the long-term supply of public goods. Livestock-sector development policies should support equity objectives for rural populations so that these populations are able to build up, in a sustainable way, the productive capacity required to enhance their livelihoods and supply the goods and services needed by the wider society. The management of animal genetic resources needs to be balanced with other goals within the broader rural and agricultural development framework. Careful attention must be paid to the roles, functions and values of local breeds and to how they can contribute to development objectives.

The countries and regions of the world are interdependent in the utilization of animal genetic resources. This is clear from evidence of historic gene flows and current patterns of livestock distribution. In the future, genetic resources from any part of the world may prove vital to breeders and livestock keepers elsewhere. There is a need for the international community to accept responsibility for the management of these shared resources. Support

for developing countries and countries with economies in transition to characterize, conserve and utilize their livestock breeds may be necessary. Wide access to animal genetic resources – for farmers, herders, breeders and researchers – is essential to sustainable use and development. Frameworks for wide access, and for equitable sharing of the benefits derived from the use of animal genetic resources, need to be put in place at both national and international levels. It is important that the distinct characteristics of agricultural biodiversity – created largely through human intervention and requiring continuous active human management – are taken into account in the development of such frameworks. International cooperation, and better integration of animal genetic resources management into all aspects of livestock development, will help to ensure that the world’s wealth of livestock biodiversity is suitably used and developed for food and agriculture, and remains available for future generations.

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