



MOBILITY OF ANIMAL GENETIC MATERIALS

KEY MESSAGES

- *Animal mobility is a system of resilience of animals and livestock keepers.*
- *Regional AnGR transboundary agreements and frameworks can ensure conservation programmes for animal genetic resources.*

INTRODUCTION

Animal Genetic Resources (AnGR) that have evolved in the diverse African environments represent unique combinations of genes which define not only productive qualities, but also adaptive capability. These AnGR have been developed over many years and have also been exchanged or shared among livestock breeders, keepers and other stakeholders. The continent has some breeds with very special traits suited to the environment where they have been bred for centuries. Some of the traits include tolerance to disease, heat, water and nutritional stress. With the increased threat of climate change, it is highly likely that exchanges and sharing of AnGR, particularly those with special traits to withstand or tolerate the adverse effects of climate change, will increase. The biodiversity of animal genetic resources (AnGR) offers opportunities for livestock production to adapt to changing environments, particularly climate change.

For most livestock species in Africa, the management of breeding continues to lie largely in the hands of livestock keepers. Most exchanges take place on the basis of private contracts or informal arrangements between individuals or companies. Unless otherwise specified in the contracts, the assumption is normally that the owners of the animals (or other genetic material) acquired through such exchanges are permitted to use the genetic resources involved for further breeding as they wish. These loose-ended exchange agreements have contributed in no small way to a considerable crossbreeding between exotic germplasm and local indigenous breeds, resulting in some cases, composite breeds being formed. This inflow of genetic resources into Africa remains important for two reasons. Firstly, it plays an important role in improving the productivity of exotic breeds used in African livestock farming, especially in the dairy, pig and poultry sectors, but also for sheep, goats, rabbits and other species. Secondly, it leads to indiscriminate crossbreeding, thus causing genetic dilution of local breeds and populations. In general, the high level of breeding and trade organization in developed countries gives them a considerable advantage over developing countries in exploiting and spreading their genetic resources. Most flows of genetic material originate from developed countries and end up in developing countries, and occur in most cases without zoo-sanitary restrictions. The genetic flows into the developing world, including Africa, usually involve animals suited to high-input production systems. Furthermore, when expressed as a proportion of all global trade in livestock genetic material, the share moving from developed to developing countries increased from

20% in 1995 to 30% in 2005.

The acceleration of gene flows is a result of the globalization of trade, the standardization of livestock production systems, and new technologies such as artificial insemination, embryo transplantation and genomics. These flows have been dominated by a limited number of breeds, originating from temperate regions of the world. Some gene flows also occur among the countries of the South. Gene flows from the South to the North hemisphere are limited as compared with that from the South to the North. In addition to technological developments and demand from breeders and livestock keepers for high-output animals, gene flows are influenced by government policies in both importing and in exporting countries, and by zoo-sanitary regulations. There is currently limited demand for African AnGR in the mainstream international market. This is largely so because the production value and advantages of African AnGR have not been adequately recorded and validated.

The observations and trends made in the preceding paragraphs suggest that cross-border mobility of AnGR and germplasm need to be addressed within a comprehensive policy, legal and institutional framework that harmonizes national and regional legislation to secure genetic material mobility. Some African nations have stressed the importance of establishing national breeding laws and policies to control or monitor the importation of genetic material. Others have stressed the importance of policies and legislation aimed at the better use and development of local breeds. Similarly, some countries indicated the need to address legislative and policy barriers. Yet a few countries noted that policies are needed to ensure that investments made in livestock development are equitably shared among all those that benefit.

There are some key drivers which influence trends in sharing, exchange and transfers of AnGR, and these include globalization, biotechnology, climate change, emerging diseases and disasters. These drivers are already to a large extent, influencing the movement of AnGR across national, regional and international borders. There is slowly an emerging awareness that measures need to be taken to prevent or reduce the irreversible loss in animal genetic diversity. Issues that need urgent attention include the mobility and exchange of animal genetic resources materials. Other issues surrounding these drivers and related factors are described and discussed in the paragraphs below.

POLICY RELATED ISSUES

- There are ample international and regional legal guidance on potential measures to regulate the exchange and movement of AnGR, but a lack of national and local implementation and application occur. Exchanges are often not recorded and are difficult

to track. International exchange of AnGR is at present little affected by regulatory frameworks except in zoo-sanitary matters. Sector-specific national access legislation is rare and there is no legally binding international legal framework specifically for the AnGR sector. Many stakeholders appear to be satisfied with this state of affairs. Concerns, mostly related to the exchanges point that there are major differences in knowledge or market position between the suppliers and the recipients of genetic material. There are also concerns regarding the potentially harmful effects of importing AnGR that are unsuited to the receiving production systems. Some countries have sought to counter the latter problem by requiring impact assessments prior to the introduction of new exotic breeds.

- Intellectual property rights (IPR) are increasingly being exerted in animal genetics and breeding. The impacts of IPR on access and exchange have so far been limited, while the eventual consequences of such developments are uncertain and have given rise to major concerns among some stakeholders. National sovereignty, as re-affirmed by the Convention on Biological Diversity, also has to be taken into account. It is argued that international flows of AnGR are displacing the indigenous animal genetic resources of developing countries, and that the genetic wealth of the developing world is being expropriated by rich countries. Given the low volume of South to North exchange, it seems doubtful that sufficient revenues could be acquired through a “benefit-sharing mechanism” to have any substantial impact on in situ or ex situ conservation efforts, or to generate benefits for poor livestock keepers in developing countries.
- Breed conservation programmes are generally lacking in many countries. The same is true for structured breeding programmes, and for the policy and legal frameworks needed to support sustainable management of animal genetic resources. It is articulated by the Global Plan of Action for Animal Genetic Resources and Interlaken Declaration that the “area that requires development is the framework for the exchange of animal genetic resources among countries”. Given the predominant North to South gene flow, benefits potentially arising from the use of genetic resources accessed from the South may not be sufficient to encourage breed conservation in the South. Other measures may need to be explored to encourage these breeds’ conservation and sustainable use. As intensive production based on few transboundary breeds continues to supply the bulk of global production, and the threat of extinction for local breeds increases particularly in regions of fast structural change, defensive measures to reduce gene flow related threats to genetic diversity may be more appropriate. The usefulness and applicability of market-based tools such as a levy on international movement of animal genetic material to support developing-country communities, breeding associations, and breeding and conservation programmes could be investigated.
- Exchange of high value genetic material between developed countries has been dominant. Likewise high performing breeding stock is exported from developed to developing countries. Exchange of genetic material between developing countries has

also been significant, and has been important for livestock development. However, such exchanges have been much less well documented. Movements of livestock germplasm from developing to developed countries have been rare, and in most cases, the economic benefits to both developed and developing countries have been relatively small. It is estimated that the interest of the developed countries in genetic material from the developing countries will increase, serving as a resource for “lost genes” for adaptation, quality and disease resistance traits. There will be an increased impact of genetic material from a few globally acting enterprises on transfers from developed to developing countries and between developing countries, and an increased exchange of genetic material through networking in breeding programmes between developed countries. Yet, it can be inferred that new technologies to detect commercially interesting genes in local populations in the developing countries may ease the mobility of valuable genetic material from developing to developed countries.

LESSONS LEARNED

There is significant flow of animal genetic material (semen and eggs, embryos and live animals, as well as DNA molecules, RNA, proteins and other micro-physical genetic material) from countries to neighboring countries in the different African regions though most of the countries are importers of animal genetic material. Exchange of animal genetic materials across borders is chiefly live animal for consumption. The current system of exchange and movement of AnGR material is a mix of formal (subject to import-export regulations and internal trading laws) and informal, within communities and pastoralists both domestically and in transboundary areas. It should also be noted that in addition to the inter-regional movements, considerable exchange of AnGR takes place and are often unrecorded and are difficult to quantify. They may involve the movement of transhumant livestock keepers across national borders.

The formal modes of AnGR exchange are through trading, breeding programmes and bilateral collaborations, while the informal ones are cultural events, cross border movements of pastoral communities, common border trading and uncontrolled and illegal imports/exports of live animals through the common borders.

While imported AnGR have increased productivity, it has also led to genetic erosion of indigenous animal genetic resources in the region. There is limited flow of AnGR out of Africa but the possibility of live animals exported for consumption being used for breeding purposes is there. There are a few niche marketing and trading initiatives adopted by the countries to facilitate the exchange of AnGR (including organic trading of indigenous breeds in the region).

Major trading and exchange partners are regional for most of the east African countries. However, some countries like Burundi and Comoros import but do not export any AnGR. Community frameworks for AnGR exchanges include for dowry borrowing and other cultural norms such as blessing at events and resolving disputes among members of communities in South Sudan. Rwanda promotes the trading of indigenous breeds. In Northern Africa countries as well as other parts of the world, the types, sources and providers of genetic material are embodied either in live animals (in vivo) or in biological material – embryos, gametes (semen and oocytes) or somatic tissues – maintained outside the animal (in vitro).

SETTING THE POLICY AGENDA

The Agenda setting for policy discussions, formulation and communication of the eventual policies should consider:

Institute programmes to measure and record production values as ways to creating interest in local AnGR

African AnGR that have spread internationally have all done so on the basis of well-documented production advantages or genetic features of specialized interest. For example, the Red Maasai sheep for genetic resistance to internal parasites, Boer goats for high fertility under harsh conditions, Ostriches for high reproduction rates and low-fat meat, and the Naked-neck chickens for breeding broilers with fewer feathers, were documented and available in the public domain. It is likely that international users would take a far stronger interest in African AnGR if they were presented with hard statistical evidence of actual or potential value. Animal identification and recording systems are keys to securing this evidence. Once such systems are in place there is a lot of potential value in researchers collaborating with local communities to link phenotypes to genotypes, also for potential gene mining.

Formalize Access to Germplasm

The Convention on Biological Diversity, which provides incentives for countries to exercise sovereign rights over genetic resources in their territories, has led several countries to develop policies and strategies governing the conservation and use of genetic diversity, including conditions for its release. A system is required to facilitate the unhindered movement of genetic resources and the fair and equitable sharing of benefits derived from their use. Material Transfer Agreements (MTAs) are routinely used by for-profit organizations to transfer genetic material. Increasingly they have gained acceptance also among public not-for-profit laboratories. They are contracts that can be tailored to the specific needs of the parties that conclude them.

Institute measures for control over the flow of AnGR

Any system of control over the flow of AnGR should seek to address both positive and negative effects. One option could be to tax imports of exotic breed germplasm and use the proceeds to fund conservation of local AnGR breeds. In some cases it might also be feasible to require importers of germplasm to contribute to the transfer of breeding technologies, for example, by teaching artificial insemination techniques to local breeders or AnGR technicians.

Develop operational guidelines

Decrees, byelaws, etc., which set out the practical steps and modalities for the implementation of the substantive laws, including responsibilities of different actors, sanctions, etc. need to be developed with the full collaboration of all actors to ensure their legitimacy. They need to reflect local realities and specificities and they need to be accessible to all actors. It is essential to harmonize the wider institutional and development framework, largely focused on growth through the modernization of the agricultural sector, to ensure it complements and supports cross-border mobility.

Establish and monitor Regional Gene Banks

Key measures will be to monitor all breeds regularly and to make decisions based on this data regarding cryo-conservation measures. Ex-situ conservation of biological material (semen, ova, embryos, DNA) is organized at the national level. There is a need for African governments and their development partners to provide to enable countries to develop animal genetic resource gene banks. An important work regarding the legal status of collections need to be undertaken to establish precise conditions for the release of deposited material and to guarantee to depositors the right to its future utilization, the establishment of sampling protocols, guidelines and procedures to guide selection of donor animals at the breed level. The establishment of backup samples and the development of procedures for replenishment of genetic material taken from the gene banks are important work areas.

POLICY OPTIONS AND RECOMMENDATIONS

Proposed policy options and recommendations to promote responsible and more sustainable mobility of animal germplasm include the following:

- African Governments through their legislative organs should put in place mechanisms that ensure that exchanges of genetic materials under private arrangements conform to internationally recognized Access and Benefits Sharing (ABS) schemes, with the view to secure fairer exchange terms for local owners and stakeholders.
- In order to comply with internationally agreed protocols and agreements related to animal genetic resources, for example The Interlaken Declaration on AnGR and the

Global Plan of Action which seek to bridge the gaps in capacity needed to inventorize, monitor, characterize and sustainable use of AnGR, African Governments and their RECs are urged to develop comprehensive and realistic policies and strategies for the development and protection of local breeds. Concurrently, Ministries and Agencies responsible for the development and protection of local AnGR should be made to have a broader knowledge and awareness of the issues surrounding mobility of animal genetic material within countries and across country borders. Furthermore, these policies and strategies should aim at breeds and farming systems capable of maintaining the vigor and the potential to fulfil all conservation aims, including maintenance of genetic variability and, if applicable, the specific cultural, social, economic and environmental values. Laws and policies that control or monitor the importation of animal genetic material (semen, embryos, and cells) should be part of the overall governments' interventions. Complementary and integrated conservation strategies (in situ and ex situ) should be developed to conserve local breeds and develop and promote their use.

- Governments and their Ministries or Agencies responsible for AnGR matters should provide the required policy environments that encourage the development and operations of Breeders' Associations which can be charged to produce and multiply breeding stock in quantities and quality that can serve farmers on sustainable basis. The resulting friendly policy environments should promote meaningful involvement of local and indigenous communities in capacity building programmes, to empower them in the use of advanced reproductive techniques so as to improve their animal genetic materials, some which should be meant for export and trade within the region.
- Governments of African countries are urged collaborate among countries to store samples of AnGR. Areas of collaboration should include strategies to prepare and implement regional breed conservation plans, where appropriate, to ensure efficient use of scarce financial resources and to make best use of available expertise.

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