

## **FAO Commission on Genetic Resources for Food and Agriculture: what it does and how it supports the livestock sector**

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### **SUMMARY**

The Commission on Genetic Resources for Food and Agriculture was initially established by the FAO in 1983 to address plant genetic resources (PGR). It became the primary permanent international forum for governments to discuss, negotiate and decide on matters specifically relevant to genetic resources for food and agriculture (GRFA). Over time, the mandate of the Commission expanded, and now it deals with all sectors of GRFA – plant, animal, forest, aquatic, and microbial and invertebrate genetic resources, covering the vast scope of biodiversity for food and agriculture. The Commission also considers a number of cross-cutting topics, including food security, nutrition and human health, mitigation of and adaptation to climate change, access to genetic resources and benefit sharing (ABS), and digital sequence information (DSI) on GRFA and biotechnologies for the characterization, sustainable use and conservation of GRFA.

The work of the Commission on animal genetic resources (AnGR) initiated in 1997 resulted in preparation of the first-ever Report on the State of the World's AnGR in 2007 and led to negotiation and adoption of the Global Plan of Action for AnGR (GPA), also in 2007. The endorsement of the GPA by the FAO Conference provided for commitments at the national level. The Commission monitors progress in the implementation of the GPA and the status and trends of AnGR on a biennial basis. Preparation of the Second Report on the State of the World's AnGR in 2015 further strengthened the commitment to implement the 2007 GPA. The Commission plays an important role in supporting animal breeding and the livestock sector. It was instrumental in building the knowledge base on AnGR, creating a framework for action and supporting measures for its implementation. It has overseen important initiatives, including preparation of various technical guidelines and building



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global awareness of the importance of AnGR, as well as the specific characteristics of the AnGR sector. The work of the Commission is helping to ensure the conservation and sustainable utilization of GRFA, the genetic base for food production, thereby contributing to food security and agriculture development.

**KEY WORDS:** Commission on Genetic Resources for Food and Agriculture, animal genetic resources, policy development, conservation, sustainable use

## INTRODUCTION

Since 1997, the FAO Commission on Genetic Resources for Food and Agriculture has played a critical role in developments aimed to improve management of the global pool of animal genetic resources. Decisions taken by the Commission have led to the creation of an important knowledge base on the status of and trends in animal genetic resources, which paved the way for the preparation and adoption of the *Global Plan of Action for Animal Genetic Resources*. The Commission's work draws attention to the importance of the conservation and sustainable use of animal genetic resources providing the basis for production of food of animal origin worldwide. Despite its role, impacts, and achievements, the Commission is known mainly by people involved in its work, such as National Coordinators for Animal Genetic Resources and experts in animal genetics. We believe that the Commission itself and the key outcomes of its work, as well as the diverse and interesting useful technical publications prepared under its direction, should be promoted to a wider audience. Accordingly, we hope that this review will assist in addressing the awareness and communication gaps.

## INTRODUCTION – HISTORY OF THE COMMISSION

The Commission was originally established in 1983, as the Commission on Plant Genetic Resources for Food and Agriculture, addressing the conservation and sustainable use of plant genetic resources. Extremely important achievements during its 13-year existence included the publication of the first-ever Report on the State of the World's Plant Genetic Resources for Food and Agriculture (FAO, 1996a) and the adoption of the Global Plan of Action for the Conservation and Sustainable Use of Plant Genetic Resources for Food and Agriculture, at the International Technical Conference in Leipzig, Germany (17–23 June 1996) (FAO, 1996b).

An important impulse for intensification of activity to conserve and sustainably use agrobiodiversity, including AnGR, was the adoption by the international community of the Convention on Biological Diversity (CBD) (CBD, 1992). The Convention created a legal global framework for the conservation and sustainable use of biodiversity at the ecosystem, species and genetic levels and contained important provisions for access to genetic resources and benefit sharing. Early in their mandate the Parties to the Convention recognized the special nature of agricultural biodiversity (CBD, 1995), and that the long history of human development of genetic resources to produce thousands of cultivated plant varieties, as well as numerous breeds of farm animals with their specific features, required specific agricultural sector-led solutions. These included policies, laws and institutional arrangements to facilitate essential development of GRFA for the nourishment of humanity.

In 2000, Parties to the Convention adopted a programme of work on agricultural biological diversity and defined the scope of this term, which includes genetic resources for food and agriculture, components of agricultural biodiversity that provide ecological services, abiotic factors, and socio-economic and cultural dimensions (CBD, 2000). Many Parties to the Convention included genetic resources of crops and livestock, as well as wild species occurring in agro-ecosystems, in the scope of their National Biodiversity Strategies and Action Plans.

The Convention has also stimulated agriculture policy changes at the international level. For example, in the common agricultural policy of the EU, the second pillar of payments under agri-environmental programmes was introduced in 1992, with provision to support farmers keeping traditional varieties of crops and local breeds of livestock threatened with extinction (EEC, 1992).

The Convention also encouraged policy efforts with the FAO to enhance coordinated action on animal genetic resources for food and agriculture. In 1995, the highest decision-making body in the FAO, the Conference, reaffirming the crucial importance of genetic resources for agricultural production and food security, agreed to broaden the mandate of the Commission on Plant Genetic Resources to cover all components of genetic resources of relevance to food and agriculture (FAO, 1995). The Commission thereby became the Commission on Genetic Resources for Food and Agriculture, with the broadened mandate to be implemented in a step-by-step process, beginning with AnGR.

The Commission is the global permanent intergovernmental body that specifically addresses biological diversity for food and agriculture and provides a forum to achieve international consensus on policies for management of genetic resources important for food and agriculture, including crops, livestock, forests, aquatic genetic resources, microorganisms, and invertebrates. The policies cover the sustainable use and conservation of these resources and the fair and equitable sharing of benefits derived from their use. By fostering the use and development of the whole portfolio of biodiversity important to food security and rural development, the Commission plays an important role in achieving a world without hunger.

Since July 2014, 178 countries and the European Union have been Members of the Commission. Membership is open to all FAO Members and Associate Members, upon request. Poland became a Commission Member on 28 February, 1985 (<https://www.fao.org/3/I8638EN/i8638en.pdf>).

#### **The role and operation of the Commission**

From its inception, the Commission provided a forum for international debate and policy development. The major achievement in this area was the adoption of the International Treaty on Plant Genetic Resources for Food and Agriculture by the FAO Conference in 2001, after 7 years of extensive negotiations (FAO, 2001; <https://www.fao.org/plant-treaty/overview/texts-treaty/en/>).

Since its establishment, the Commission has overseen and guided the preparation of global sectoral and cross-sectoral assessments of GRFA and negotiated global plans of action that were later adopted by the FAO Conference and can be regarded as international soft law instruments.

The Commission holds one regular session biannually. It has convened extraordinary sessions as necessary, subject to the approval of the FAO Council. According to the Rules of procedure (<https://www.fao.org/3/I8635EN/i8635en.pdf>), the Commission elects, from among the representatives of its Members, a Chairperson and six Vice-Chairpersons, each from one of the seven FAO geographic regions: Africa, Asia, Europe, Latin America and the Caribbean, Near East,

North America and South-West Pacific. The elected representatives of the regions constitute the Bureau of the Commission. The Commission also elects a Rapporteur. The Bureau elected at the regular session of each biennium starts the term of office upon closure of the session at which they are elected.

The Chairperson presides at meetings of the Commission and exercises such other functions as may be required to facilitate its work. The most important role of the Bureau is to provide guidance to the Secretary with regard to the preparations for and conduct of sessions of the Commission. The Secretariat of the Commission prepares documents for regular and extraordinary sessions and follows up on the Commission's requests during the intersessional periods. The Secretariat also supports the work of the Commission's subsidiary bodies.

#### **Sectoral working groups and other subsidiary bodies of the Commission**

To support work during its sessions, over time the Commission has established four intergovernmental technical working groups (ITWG) to assist in specific sectors of genetic resources. The role of these sectoral working groups (animal, plant, forest and aquatic genetic resources) is to review the status of biodiversity and related issues in the areas under their respective competences and to advise and make recommendations to the Commission on these matters. The working groups also consider the progress made in implementing the Commission's programme of work and address other matters referred to them by the Commission. Working Groups are composed of the representatives of 28 member countries. Africa, Europe, Latin America and the Caribbean, and Asia are each represented by five countries, the Middle East by four countries, and North America and the South West Pacific by two countries each.

The Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization was adopted in 2010 by the Conference of the Parties to the CBD (CBD, 2010). To contribute to the implementation of the Nagoya Protocol, at its 2011 session the Commission decided to establish an Ad Hoc Technical Working Group on Access and Benefit-sharing for Genetic Resources for Food and Agriculture. This body held one session focusing on relevant specific features of GRFA. In 2013, the Ad Hoc Working Group was replaced by a Team of Technical and Legal Experts on Access and Benefit-Sharing (ABS Expert Team), which consists of up to two experts from each region.

To facilitate preparation of country reports on Biodiversity for Food and Agriculture, at its 14th Regular Session in 2013 the Commission invited countries to officially nominate a National Focal Point to lead this process at the national level. In 2017, the first meeting of the Group of National Focal Points for Biodiversity for Food and Agriculture (NFP BFA Group), consisting of three NFPs per region, was held. The NFP BFA Group was instrumental in preparing the Framework for Action on Biodiversity for Food and Agriculture, endorsed by the Commission and the FAO Council in 2021.

#### **National Focal Points for the Commission**

Over time, following the request of the FAO, in each sector of GRFA, National Focal Points/National Coordinators have been nominated by governments to initiate and coordinate work at the national level in the various sectors of genetic resources and to communicate with the respective FAO Global Focal Points. In 2015, the Commission decided to establish National Focal Points to the Commission itself (CGRFA, 2015), tasked with overseeing coordination and

facilitation of national contributions to the work of the Commission, including the preparation of country reports, monitoring implementation of the action plans and decisions adopted by the Commission, and communicating and reporting back to the Commission (<https://www.fao.org/cgrfa/overview/nfp/national-focal-points-to-the-commission/en/>). National Focal Points should also engage in raising awareness at the national level of the Commission's work and output.

#### **Operation of the Commission**

The Commission initiates preparation of global sectoral and cross-sectoral assessments of GRFA and oversees progress in their implementation. The assessments focus on the state of biodiversity and genetic resources in the plant, animal, forest and aquatic sectors, along with their uses, threats contributing to their erosion, and the challenges and opportunities related to their conservation and sustainable use. The global assessments are based on country reports and other sources of information ensuring that they are prepared in participatory, country-driven processes.

The findings of the global assessments have resulted in strong policy responses leading to the adoption of sector Global Plans of Action. Governments have agreed to these global frameworks and committed their countries to implementation at the national level. Progress reports on implementation of the GPAs at the national level enable monitoring of progress by the Commission.

The organization of the work of the Commission is provided for in its Strategic Plan, first adopted in 2007 (CGRFA, 2007). It contains the Commission's vision and mission statements, goals and objectives, and the Multi-Year Programme of Work (MYPOW). The mission statement states: 'Cognizant that genetic resources for food and agriculture are a common concern of all countries, in that all countries depend on genetic resources for food and agriculture that originated elsewhere, the Commission on Genetic Resources for Food and Agriculture strives to halt the loss of genetic resources for food and agriculture, and to ensure world food security and sustainable development by promoting their conservation and sustainable use, including exchange, and the fair and equitable sharing of the benefits arising from their use' (<https://www.fao.org/cgrfa/overview/how-we-work/en/>).

The Commission's MYPOW is a rolling ten-year plan of work addressing all elements of biodiversity for food and agriculture, including plant, animal, forest, aquatic, microorganism and invertebrate genetic resources. It also includes cross-sectoral areas, such as climate change, nutrition and health, biotechnologies, ABS, DSI, and management related to the Commission's operation (<https://www.fao.org/cgrfa/overview/the-strategic-plan-and-multi-year-programme-of-work/en/>).

The Commission meets every two years, with sessions of its ITWGs preceding the convening of the Commission. The 18th Regular session of the Commission was held from 27 September to 1 October 2021. Due to the COVID-19 pandemic, it convened on-line over these five days. The Commission discussed 14 substantial thematic areas, both cross-cutting and related to sectors of GRFA.

During Commission sessions, regions attempt to agree on and present regional positions on most agenda items. If positions are agreed by all countries of the region present at the meeting, the country which is the chair of the region delivers regional statements. At the last session of the Commission in 2021, Poland had the honour of chairing the European Regional Group.

### **Animal Genetic Resources in the work of the Commission**

Given the economic, social and cultural importance of farm animals, as well as genetic and scientific perspectives, it is surprising the first global assessment of these essential resources was not completed until 2007.

International work by the FAO aimed at the conservation of genetic resources of crops and at addressing issues of access to these resources, especially those stored in *ex-situ* banks, was undertaken in the 1980s (Hodges, 1990). However, it was not until 1993 that the first technical programme of work on AnGR was initiated by the FAO's Animal Production and Health Division. This first framework for advancing further work was developed and called the Global Strategy for the Management of Farm Animal Genetic Resources (Hammond, 1998; FAO, 1999).

### **Global Strategy for the Management of Farm Animal Genetic Resources**

In 1995, the FAO Conference approved the implementation of the Global Strategy. The elements of this technical programme were as follows:

- Establishment of an intergovernmental mechanism to ensure direct government involvement and provision of policy advice
- A planning and implementation structure (National, Regional and Global Focal Points) as an enabling framework for country action and regional and global support
- The technical programme of work, aimed at supporting the effective management of AnGR, including through the development and implementation of National Strategies and Action Plans
- A reporting and evaluation component to provide the critical data and information required for informed decision making. This included reporting on the state of AnGR diversity (Domestic Animal Diversity-Information System: DAD-IS, <https://www.fao.org/dad-is/en>), introduction of an Early Warning System to identify endangered breeds and breeds of critical population size, in danger of extinction (World Watch Lists: 1993, 1995, 2000), and the state of country capacity and state of the art in management of AnGR.

The Global Strategy provided a definition of farm animal genetic resources (AnGR), as 'those animal species that are used, or may be used, for the production of food and agriculture, and the populations within each of them. These populations within each species can be classified as wild and feral populations, landraces and primary populations, standardized breeds, selected lines, and any conserved genetic material' (FAO, 1999).

FAO member countries were formally invited to establish structures responsible for coordinating the conservation of animal genetic resources: National Focal Points for AnGR (NFP-AnGR) and National Coordinators. Poland responded to this request in July 1996, establishing NFP-AnGR in the Central Animal Breeding Office, and then, due to the institutional transformation of animal breeding and reproduction, in the National Animal Breeding Centre. Since 1 January 2002, the National Research Institute of Animal Production (IZ-PIB) has hosted the NFP-AnGR and the National Coordinator. In the latest law on animal breeding, these arrangements have been formalized (Article 34 of the *Act of 10 December 2020 on the organization of breeding and reproduction of farm animals*). The NFP-AnGR collaborates with the Ministry of Agriculture and Rural Development, the Ministry of the Environment and Climate, international organizations

(FAO and EU), and national entities such as breeders' associations, agricultural advisory centres, universities and research centres, and relevant non-governmental organizations.

### **Establishment of the ITWG-AnGR and preparation of the First SoW Report and Global Plan of Action**

The first debate on the modalities of expanded work of the Commission took place at its seventh regular session in 1997. The Commission decided to establish the ITWG-AnGR, which held its first session in September 1998 (CGRFA, 1998), with Poland elected as Chair. In its recommendations, the Working Group stressed the importance of enhancing understanding and awareness of the status of AnGR, determining the state of country capacity to manage AnGR, and the state of the art of methodologies and technologies available for the better use, development and conservation of these resources. The recommendations adopted at this first session helped the Commission to initiate preparation of the first Report on the State of the World's Animal Genetic Resources at its session in 1999.

Preparation of the first report took seven years, due to the need to train people at the national level and to establish processes for the development of Country Reports on AnGR. FAO guidelines for Country Reports were prepared, and numerous training workshops were undertaken to facilitate use of the guidelines. Workshops were carried out at the sub-regional level in multiple languages and resulted in the exceptional delivery of 169 Country Reports. These reports provided the major input for the preparation of the first Report on the State of the World's Animal Genetic Resources (FAO, 2007a).

Country Reports identified national priorities of action and international priorities for cooperation. Compilation of national and international priorities provided the basis for preparation and negotiation of the Global Plan of Action for Animal Genetic Resources for Food and Agriculture (FAO, 2007b), under the direction of both the ITWG-AnGR and the Commission. The Global Plan was subsequently finalized during the First International Technical Conference on AnGR in Interlaken, Switzerland, September 2007. The Technical Conference also adopted the Interlaken Declaration, which affirms countries' commitment to the implementation of the GPA and to ensuring that the world's livestock biodiversity is utilized to promote global food security and remains available to future generations.

The GPA was later approved in November, 2007 by the FAO Council, and subsequently by the FAO Conference. Thus, it has been accepted by the governments of the member states of the FAO and can be considered a soft instrument of international law.

### **Components of the Global Plan of Action**

The Global Plan of Action contains three main parts: I. Rationale, II. Strategic Priorities for Action, and III. Implementation and Financing. Part II includes 23 Strategic Priorities for Action, which are organized under four Strategic Priority Areas: I. Characteristics, inventory and monitoring of trends and changes (2), II. Sustainable use and development (4), III. Conservation (5), and IV. Strategies, Institutions and Capacity Building (12). The majority of strategic priorities for action are related to area IV, specifically capacity building, which is especially important in developing countries. They cover the need for national strategies and policy development, regulatory frameworks, and technical breeding programmes. Implementation requires institutional frameworks, division of tasks and responsibilities, and establishment of monitoring systems to

evaluate progress. All such actions will require cadres of experts, so building the knowledge base, conducting research, training professionals at all levels, and preparing farmers and other stakeholders to participate in AnGR-related activities are of utmost importance. The first recommended step in the implementation of the Global Plan of Action is the preparation of a National Strategy and Action Plan that adapts agreed global priorities to specific national needs and circumstances. FAO has developed voluntary guidelines to support countries in undertaking this work (FAO, 2009a). In 2009, the Commission also adopted the Funding Strategy for GPA implementation (CGRFA, 2009a).

#### **Monitoring the state of AnGR**

The publication of the first SoW-AnGR Report drew attention to the state of breeds, and in many instances the decline of the irreplaceable genetic base for the further development of the livestock sector. Monitoring of these essential resources was recognized as a permanent, ongoing need. Following ITWG-AnGR recommendations, the Commission decided to introduce monitoring of AnGR on a biannual basis and adopted the format and content of future status and trend reports on AnGR (CGRFA, 2009b). Since then, such reports have been based on the DAD-IS database and are prepared for every session of the ITWG-AnGR and for the Commission. They are available on the Commission's webpage, <https://www.fao.org/cgrfa/meetings/commission/en/>. Also, Members of the FAO were invited to submit progress reports on the national implementation of the GPA, as part of global monitoring and to measure the state of implementation of agreed strategic priorities at the national level.

#### **The Second SoW Report on AnGR and the follow-up**

Following a decision by the Commission to prepare sectoral State of the World Reports every ten years, the process for preparation of the second report for the AnGR sector was initiated in 2013. Owing to the mobilization and dedicated work of NCs, the second Report on the State of the World's Animal Genetic Resources for Food and Agriculture was prepared in only two years (FAO, 2015).

The Second Report focused on changes in the management of AnGR worldwide since the adoption of the GPA-AnGR. It was based on 129 Country Reports, reports provided by 15 international organizations, four Regional Focal Points, and two thematic studies. Preparation of the report involved the participation of 150 authors and reviewers, who were responsible for individual chapters. Substantial information and effort was provided by NCs, who prepared text-boxes sharing their countries various experiences in the implementation of the GPA. The status and trends of AnGR were analysed based on the DAD-IS data available June, 2014, when the total number of records in the database was 14,869. The second Report was presented to the 15th session of the Commission in January, 2015 (CGRFA, 2015).

After reviewing the second Report, Commission members decided that the 2007 GPA was still relevant and should be further implemented. A renewed commitment to implementation of the 2007 GPA was made at the 16th session of the CGRFA, 2017, which was then confirmed by FAO Conference Resolution 3/2017 (FAO, 2017).

#### **Increasing importance of the ITWG-AnGR**

Over the years, the ITWG-AnGR has been requested by the Commission to provide advice on numerous issues. At its first session in 1998, the agenda for ITWG-AnGR contained only four substantial items, all related to AnGR. At the 11th session of the ITWG in 2021, advice was sought



on a number sectoral issues and various cross-cutting topics: ABS, DSI, the role of AnGR in mitigation of and adaptation to climate change, and review of the work on biotechnologies for the conservation and sustainable use of AnGR, as well as options for the organization of the Commission's future intersessional work. In short, the ITWG-AnGR has clearly demonstrated the need for and value of providing key technical sector-specific recommendations for consideration by the Commission.

Over many years Poland has contributed substantially to the work of the Commission on AnGR, as a Member of the Commission, participating in all sessions of the ITWG-AnGR, and chairing two of them. Poland has also represented the ERG as a member of the Bureau of the Commission for three terms of office. Perhaps most importantly, Polish representatives have organized and participated in processes at the national level to contribute to the Commission's initiatives to conserve and sustainably use AnGR. Poland prepared Country Reports as contributions to both the first and the second global reports and the state of AnGR, as well as progress reports on implementation of the GPA. Poland also contributes to surveys and many other initiatives undertaken by the Commission Secretariat and work within the FAO AnGR unit.

#### **The current state of Animal Genetic Resources**

Since the inception of the Global Strategy and the official launch of this programme, National Coordinators have made substantive contributions to populate the DAD-IS with national data, initially on native breeds, and later on all breeds kept in their countries. In 1993, the DAD-IS database contained records on 2719 mammalian breeds alone. By 2020, the total number of records on mammalian breeds had grown to 11,409, and there were 3706 records for avian breeds (CGRFA, 2021a). As an intergovernmental body the Commission has been crucial to advancing policies and resolving issues to further enable monitoring of AnGR, such as obtaining global support for breed definitions that are essential to undertake status reports.

The DAD-IS database contains records on breeds used all over the world, some of them in many countries. Development of a monitoring system required agreement on definitions, to enable accurate estimation of the total number of breeds without any overlap in breed counting. The breed division that was established with much discussion and debate within the Commission and its ITWG-AnGR was as follows: local breeds, which occur only in one country, and transboundary breeds, which occur in more than one country, further differentiated as regional transboundary breeds, which occur only in one of the seven SoW-AnGR regions, and international transboundary breeds, which occur in more than one region. The evolution of the state of breeds between 2005 and 2020 is shown in Table 1.

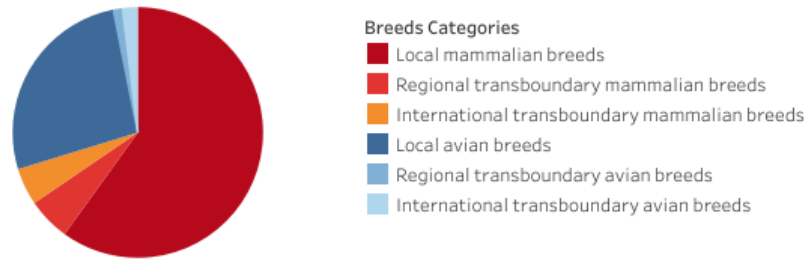
**Table 1.**

Changes in breed number and composition within mammalian and avian species (FAO status and trends reports on AnGR for successive ITWG-AnGR meetings and SoW-AnGR Reports)

Breeds \ Years	2005	2008	2010	2012	2014	2016	2018	2021
Local mammalian breeds	4127	4385	4446	4583	4772	4815	4929	4947
Regional mammalian breeds	430	415	419	426	427	416	431	418
International mammalian breeds	399	389	387	388	385	400	387	401
Local avian breeds	1728	1967	1931	1998	2303	2307	2222	2147
Regional avian breeds	85	79	79	78	80	80	80	84
International avian breeds	157	161	161	161	160	161	160	157
Total number of breeds in use	6926	7396	7423	7634	8127	8179	8209	8154
Source of data	1 <sup>st</sup> SoW Report				2 <sup>nd</sup> SoW Report			
Extinct breeds	690	695	631	628	647	643	600	619
Total number of known breeds	<b>7616</b>	<b>8091</b>	<b>8054</b>	<b>8262</b>	<b>8774</b>	<b>8822</b>	<b>8803</b>	<b>8771</b>

Continuous development and improvement of the DAD-IS, which functions as a global clearinghouse mechanism for AnGR, was critical for the preparation of the SoW-AnGR Reports and implementation of the GPA-AnGR.

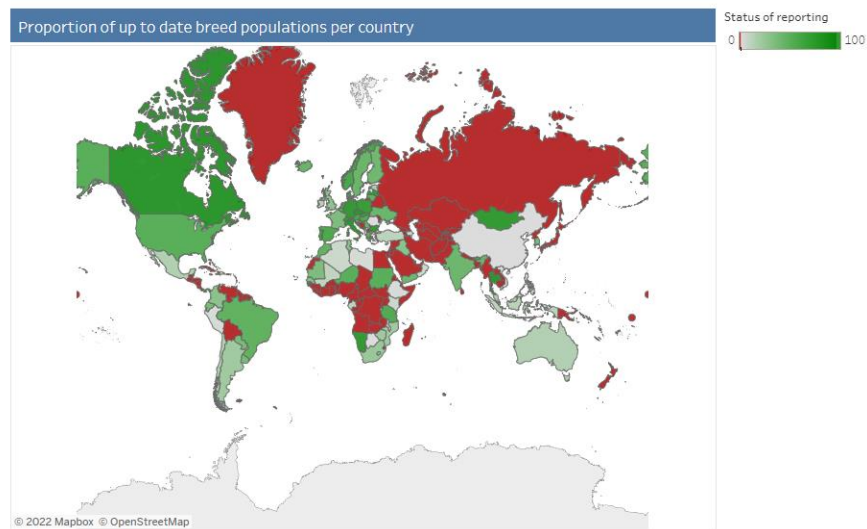
DAD-IS enables every country to regularly update their national data and allows users to obtain the most current data on breed status and composition. Fig. 1 presents the latest data on breed composition at the global level.



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**Figure 1.** Proportions of local, transboundary and international breeds of farm animals around the world in the DAD-IS database (as of 29 September 2022)

There are substantial differences in reporting by countries on their national breed populations, as shown in Fig. 2.



**Figure 2.** Status of country reporting in the DAD-IS database as of 29 September 2022

There are also substantial differences in the information available for each breed included in DAD-IS, especially regarding population size, which is the basis for estimation of the level of endangerment (Table 2).

**Table 2.**

Regional distribution of breeds and their endangerment status (DAD-IS, as of 29 September 2022)

	Africa	Asia	Europe (with Caucasus)	South America & Caribbean	Middle East	North America	South West Pacific	Total
Number of countries with data	17	10	35	10	4	2	1	79
Number of breeds at risk	50	80	1730	39	5	67	23	1994
Number of breeds not at risk	101	211	355	52	31	6	0	757
Number of breeds of unknown status	678	1587	1226	467	200	47	173	4378
Total number of breeds in use	829	1878	3311	558	236	120	196	7128
% of breeds of unknown status	82	85	37	84	85	39	88	61
% of breeds at risk	6	4	52	7	3	56	12	28
% of breeds not at risk	12	11	11	9	13	5	0	11

Monitoring and understanding of the status and trends of AnGR enables informed decisions on the actions necessary to manage these resources at the national and regional levels, to ensure that the wealth of diversity crucial for current and future needs of livestock breeding will be maintained. Evaluation of the endangerment status of breeds has evolved over time, and the categories described in the Global Strategy (extinct, critical, endangered, critical or endangered maintained, not at risk and unknown) (FAO, 1999) have been supplemented with two more, cryopreserved only and vulnerable (FAO, 2013).

Breeds can be also divided based on their origin; from this perspective, native, locally adapted, and exotic breeds are identified.

**Other areas of the Commission's work**

Over time, the Commission has further broadened the scope of its sectoral activities, addressing forest genetic resources for food and agriculture (FoGR) and aquatic genetic resources (AqGR). It has adopted a comprehensive approach to address all components of biodiversity for food and agriculture (BFA) with the first SoW Report on BFA (FAO, 2019a). Table 3 presents the timeline of various Commission activities.

**Table 3.** Commission's development of sectoral work on genetic resources

<b>Actions</b>	<b>PGR</b>	<b>AnGR</b>	<b>FoGR</b>	<b>AqGR</b>	<b>BFA</b>
Establishment of ITWG	1997	1997	2009	2015	not yet
First Report on the State of the World	1996	2007	2013	2019	2019
Second Report on the State of the World	2009	2015			
Global Plan of Action	1996	2007	2013	2021	Framework for Action 2021
Second Global Plan of Action	2011	not needed			

Beyond the work on the four major sectors of GRFA, as well as invertebrate and microbial genetic resources, the Commission has been debating various cross-cutting (horizontal) issues related to all sectors of GRFA. These include biodiversity for food and agriculture and biodiversity for food security, nutrition and human health. In the case of the latter, the Commission has shared the view that the One Health Approach has great potential for ensuring better levels of health. This strategy is based on a holistic approach to the health of both humans and animals, as well as the health of ecosystems at local, national and regional levels (WHO, 2019). The Commission endorsed future work in this area, including further monitoring of the relationships between human health, nutrition and biodiversity; balancing food production systems and expanding existing knowledge about the importance of genetic diversity; transformation of food production systems; and action plans to achieve optimum health results with consideration of the links between humans, animals, plants and their interactions (CGRFA, 2021b).

The second cross-sectoral area is climate and the role of GRFA in the mitigation of and adaptation to climate change. Changes in the cryosphere and biosphere resulting from human activities (IPCC, 2021), which have led to warming of the atmosphere, ocean and land, are a source of enormous problems within the agricultural sector, such as water shortages in some regions, lower crop production, desertification of pastures, and heat stress in livestock. Climate change will also influence the geographical and seasonal incidence of infectious animal diseases, especially vector-borne diseases spread by various species of insects and ticks. As climate change progresses and new environmental challenges emerge, some of the adaptive traits of local breeds will likely become even more important. Over the years, the Commission has been building awareness of the importance of maintaining genetic resources for adaptation to climate change and its mitigation.

This diversity is a crucial insurance policy enabling future adaptation within agriculture and other sectors.

There are two other areas of work that the Commission has initiated or enhanced in response to processes taking place at the international level in other forums, namely ABS and DSI. FAO and the Commission have a longstanding history of dealing with issues related to access to genetic resources and sharing of benefits derived from their utilization, including adoption of the International Undertaking on Plant Genetic Resources for Food and Agriculture (1983) and later the International Treaty on Plant Genetic Resources for Food and Agriculture (2001). The Treaty, which is the first legally binding and operational international instrument for ABS, covers all PGR used for food and agriculture. It recognizes Farmers' Rights and their contribution to maintaining crop diversity. The Treaty provides for a multilateral system to facilitate access to PGR crucial for plant breeding and research. Finally, it sets out rules to share the benefits derived from use of accessed plant genetic resources in a fair and equitable way.

The Commission decided to include work on ABS within its Multi-Year Programme of work in 2007. This was important in the context of the ongoing negotiation under the CBD of the 'international regime on access and benefit-sharing', and later the Nagoya Protocol. In 2009, the Commission provided the CBD negotiators with five background studies commissioned by its Secretariat on the use and exchange of GRFA, including two relevant for AnGR (FAO, 2009bc). A resolution was adopted by the FAO Conference on *Policies and Arrangements for Access and Benefit-sharing for Genetic Resources for Food and Agriculture* (Resolution 18/2009), which contributed to acknowledgment of the importance of GRFA for food security, the special nature of agricultural biodiversity, and its distinctive features and problems requiring distinctive solutions. However, the Nagoya Protocol provides little guidance as to how the special features of GRFA might adequately be reflected in domestic ABS measures, and therefore it remains important for the Commission to continue to contribute to discussion of ABS under other international mechanisms (Leskien, 2018).

Further work on ABS resulted in the development of the *List of distinctive features of genetic resources for food and agriculture requiring distinctive solutions for access and benefit-sharing* (Appendix B, FAO 2013a) by the *Ad Hoc* Technical Working Group on ABS for GRFA, which had met in September, 2013 in Longyearbyen (Svalbard).

The ABS Expert Team, established in 2013, was given the mandate to prepare voluntary tools to assist national governments in developing their domestic ABS legislative and administrative and policy measures. These guidelines, *Draft Elements to Facilitate Domestic Implementation of Access and Benefit-Sharing for Different Subsectors of Genetic Resources for Food and Agriculture* (ABS Elements), were initially adopted by the Commission in 2015, and later expanded to include 'explanatory notes' containing the distinctive features and specific practices of different subsectors of GRFA. The final document of the ABS Elements with explanatory notes, developed by the ABS Expert Team and based on the output of the International Workshop on Access and Benefit-Sharing for Genetic Resources for Food and Agriculture (FAO, 2018), was adopted by the Commission at its 17th session in 2019 (FAO, 2019b).

The term 'digital sequence information', in the context of access to DSI and benefit sharing derived from its utilization, was introduced to the international debate by the African region during the UN Biodiversity Conference in Mexico in 2016. The initial discussion focused on whether DSI

should be considered synonymous with genetic resources, and whether its application should entail the obligation of benefit sharing.

Over time, the CBD Secretariat commissioned a number of technical background studies related to various aspects of DSI and convened two meetings of the *Ad Hoc Technical Expert Group (AHTEG) on Digital Sequence Information*, in 2018 and 2020. DSI was also placed on the agendas of the CBD and the Nagoya Protocol. The chronological report on work to address this issue is available at <https://www.cbd.int/dsi-gr/whatdone.shtml>. Despite all these efforts, the Parties to the CBD have not agreed on the scope and definition of the term DSI, with discussion likely.

In 2017 the Commission, acknowledging importance of contributing to this work in the context of GRFA, decided to establish a new work stream within the MYPOW with the aim of considering the use of 'DSI on GRFA' and potential implications for the conservation, sustainable use and ABS of GRFA. As a first step, an Exploratory Fact-Finding Scoping Study on DSI for GRFA was prepared as a basis for discussion at the next Regular Session in 2019 (Heinemann et al., 2018).

After in-depth consideration of this issue in 2019, the Commission agreed to address, at its next session, the innovation opportunities that DSI on GRFA offers, the challenges of capacity to access and make use of it, implications for the conservation and sustainable use of GRFA, and the sharing of benefits derived from GRFA (CGRFA, 2019). At the Commission's session in 2021, it stressed that DSI offers innovative opportunities for research and development related to GRFA, noting that many countries face challenges in developing the technical, institutional and human capacity necessary to use DSI for research and development. The Commission also underlined that its work on DSI should in no way prejudice the outcome of ongoing discussions on DSI, including its scope and definition in other forums. Rather the Commission aims to contribute to international debate on this issue and provide information on the current and future importance of DSI for the characterization, conservation, sustainable use, and fair and equitable benefit-sharing of GRFA. To further analyse this issue, the Commission requested preparation of a document reflecting key practices and experiences on how DSI is generated, stored, accessed and used for research and development related to GRFA, including relevant information on intellectual property protection (CGRFA, 2021b). All outputs of the Commission's work in this area are being made available to the Parties to the CBD and other relevant instruments and organizations.

When the Commission adopted its first MYPOW (CGRFA, 2007), the task for its 13th session in 2011 was to 'review ways and means [of promoting][considering] [for] the application and integration of biotechnologies in the conservation and utilization of genetic resources [as a basis for future work such as, the development of guidelines, consideration of Codes of Conduct or other work]'. The fact that the Commission adopted the report with bracketed text indicates that Commission members had varying views regarding the proposed scope of work. When this topic was further discussed in 2011, the Commission requested the FAO to pursue this area of work, including to review, assemble and disseminate updated factual information on traditional, maturing and emerging biotechnologies for the characterization, sustainable use and conservation of GRFA, taking into consideration relevant benefits and risks, and on infrastructure and capacity requirements for the use of such biotechnologies (CGRFA, 2011).

The Commission emphasized the importance of supporting developing countries in the use and development of modern genetic and biotechnological tools for the characterization, sustainable use and conservation of animal genetic resources.

### **Contribution to other intergovernmental processes under the CBD, NP, and Agenda 2030**

Over the years, the Commission has worked in cooperation with the Secretariat of the ITPGRFA and the Secretariat of the CBD, jointly organizing various events, submitting technical information in response to CBD notifications, reflecting on specific GRFA circumstances, sharing background studies developed by the Commission to address issues under other instruments, and preparing resolutions for the FAO Conference when important matters needed to be conveyed to other international mechanisms by the highest level within the FAO.

Upon request, the FAO has agreed to take responsibility for monitoring the implementation of some Sustainable Development Goals under Agenda 2030 (SDGs), adopted by the Global Assembly of the United Nations in September 2015, through the evaluation of agreed global indicators of specific targets. From an AnGR perspective, two indicators of particular importance are aimed at assisting monitoring of implementation of Target 2.5: 'By 2020, maintain the genetic diversity of seeds, cultivated plants and farmed and domesticated animals and their related wild species, including through soundly managed and diversified seed and plant banks at the national, regional and international levels, and promote access to and fair and equitable sharing of benefits arising from the utilization of genetic resources and associated traditional knowledge, as internationally agreed'. The two indicators for which the DAD-IS database enables calculations are Indicator 2.5.1, which is the number of (a) plant and (b) animal genetic resources for food and agriculture secured in either medium- or long-term conservation facilities; and Indicator 2.5.2, which is the proportion of local breeds classified as being at risk, not at risk, or at an unknown level of risk of extinction.

### **Commission impact on and support for the livestock sector**

There are many areas in which the Commission's contributions were instrumental to the development of the livestock sector worldwide.

#### **Building the knowledge base**

The Commission supervised the preparation of the first SoW-AnGR Report, which provided a comprehensive overview of the state of farm animal diversity for the first time. It documented how many breeds are used all over the world, their specific distribution, and their population size, and provided levels of endangerment status essential to implementation of conservation measures as required. Understanding of the global status of AnGR is a major achievement of the Commission and FAO AnGR technical unit.

Beyond reporting on and monitoring the status and trends of AnGR, over the years the Commission has requested preparation of numerous important background studies, many of them overseen by the Global Focal Point for AnGR hosted within the FAO's Animal Production and Health Division. Many aspects of AnGR management were addressed in these studies, and all of these and other background studies, addressing other sectors of GRFA, are available at <https://www.fao.org/cgrfa/resources/background-study-papers/en/>. A number of these studies focused on cross-cutting issues relevant to all sectors of GRFA, supporting the work of the Commission and others.

#### **Frameworks for action (GPA)**

The SoW-AnGR reporting process required inputs from Commission members. Preparation of Country Reports created much-needed awareness of the roles and values of AnGR at the global, regional and national levels, providing essential analysis of the status and trends of these critical



resources. It established a basis for improved management of AnGR at the national level as well as for preparation of policies and technical guidelines at all levels. National contributions to the first SoW-AnGR Report resulted in identification of national priorities for action, as well as revisions and development of national policies and programmes often based on strategic directions contained within the Global Plan of Action for AnGR. Adoption of the GPA was a game changer, a milestone in global efforts to improve the overall management of AnGR from national to global levels. The framework has mobilized contributions of international organizations and donors in addition to supporting and encouraging country efforts to undertake further actions at the national level.

#### **Supporting implementation of the GPA – the Funding Strategy**

The Commission recognized the need for capacity building, especially in developing countries, to better manage AnGR in a sustainable way. Capacity building is a key aspect of the Global Plan of Action, with 12 of the 23 Strategic Priorities for Action devoted to various aspects of capacity building. The Commission adopted the Funding Strategy for the Implementation of the Global Plan of Action, with the objective 'to enhance the availability, transparency, efficiency and effectiveness of the provision of substantial and additional financial resources, and to strengthen international cooperation to support and complement the efforts of developing countries and countries with economies in transition in the implementation of the Global Plan of Action for Animal Genetic Resources' (CGRFA, 2009a).

The Funding Strategy aims to seek and further mobilize necessary financial resources from all possible sources to provide timely support for developing countries and those with economies in transition, to complement their national efforts to implement the GPA. Financial sources include the regular programme resources of the FAO; bilateral, regional and multilateral channels; voluntary contributions from countries; foundations; the private sector; non-governmental organizations; and other sources. The Funding Strategy also aims to strengthen international cooperation for the provision of capacity building, including training and technology transfer, to provide technical assistance and facilitate collaboration and partnerships among countries and relevant international organizations and institutions.

#### **A normative role: enhancing management of AnGR through voluntary guidelines**

While Background Study Papers provide up-to-date, extensive information on given topics, other products of the Commission are normative in nature and support the undertaking of common technical approaches to various aspects of management of GRFA. Such guidelines have been beneficial in the AnGR sector in building the capacity to initiate or enhance national efforts for the conservation and sustainable use of AnGR, as well as to improve inventories and the characterization of livestock breeds and their genetic diversity.

The GPA on AnGR contains requests to the FAO to provide technical guidance and assistance to countries in their work on AnGR. In response, the FAO has prepared a series of guideline publications on various technical aspects related to AnGR management.

Guidelines were drafted and reviewed by technical experts appointed by the Animal Production and Health Division, and then submitted for consideration by the ITWG-AnGR. The final documents were submitted to the Commission for endorsement. All guidelines can be found at <https://www.fao.org/animal-genetics/resources/guidelines/en/>.

Available guidelines include 'Preparation of National Strategies and Action Plans for AnGR' (2009); 'Breeding strategies for sustainable management of AnGR' (2010); 'Developing the

institutional framework for the management of AnGR' (2011); 'Surveying and monitoring of AnGR' (2011); 'Molecular genetic characterization of AnGR' (2011); 'Phenotypic characterization of AnGR' (2012); 'Cryoconservation of AnGR' (2012); 'In vivo conservation of AnGR' (2013); 'Development of integrated multipurpose animal recording systems' (2016); and 'Developing sustainable value chains for small-scale livestock producers' (2019).

With the advancement of knowledge and experience with implementation of the GPA in various areas of AnGR management, some of the guidelines have required updating. At the 2021 session of the Commission, two such updated guidelines were endorsed: 'Draft practical guide on innovations in cryoconservation of animal genetic resources' and 'Draft practical guide on genomic characterization of animal genetic resources' (CGRFA, 2021a).

#### **Contributing to food security**

There is growing recognition of the need to rethink the way food is produced in the light of climate change, including increasing temperatures, systematic draughts, fires, floods and other catastrophic events that affect agriculture and livestock production (World Economic Forum /FAO, 2022). Mitigation action will be especially important for communities inhabiting areas with extreme climate/terrain conditions, where livestock provides a unique source of food and livelihoods (HLPE, 2016).

The FAO is making efforts to draw the attention of the international community to the need for transformation in agriculture, initiating discussion, organizing webinars, such as the one prepared jointly with the CBD Secretariat (Transforming Agri-Food Systems for Biodiversity and Sustainable Development; 13 April 2021), and publishing various materials. The shift towards more reliable agriculture was the main subject of the Food System Summit of the UN in September 2021 (<https://www.un.org/en/food-systems-summit>). Transformation of food production, a paradigm change, will require a broad diversity of GRFA, especially in light of the wild biodiversity crisis confirmed by Global Biodiversity Outlook 5 and the WWF report (SCBD, 2020, WWF, 2020).

The Commission should be recognized here for its efforts to ensure that a broad genetic base for the future needs of plant and animal breeding and production is maintained and conserved. Without these resources it will not be possible to address the challenges faced by agriculture and the livestock sector.

#### **Building awareness of the importance of AnGR and their specific characteristics**

Animals have accompanied humans for more than 10,000 years, used for food and for materials for clothing and other products that have supported the development of human societies. The essential role of domestication of animals in human development rarely receives the attention it deserves. The value of the diversity and various roles and values of farm animals is generally insufficiently understood and appreciated.

With this in mind, the Commission and FAO Technical Unit on AnGR have worked to better understand, document and promote the various contributions of AnGR to human societies and their agroecosystems. Work under the Commission is helping to enhance global understanding of the many contributions of farm animals in food production and the generation of livelihoods (FAO, 2015), as well as in providing ecosystem services: provisioning, regulating, supporting and cultural. In some countries, the presence of livestock supports the functioning of agroecosystems, nutrient cycling, seed dispersal, and conservation of habitats. Livestock economic valorization takes into

account both direct and indirect values. Moreover, livestock differs substantially in many aspects from other GRFA, including plant, forest and aquatic genetic resources (FAO, 2019b).

Generating, providing and disseminating information on the crucial roles, values and contributions of AnGR in order to build awareness among policymakers, as well as all other stakeholders in animal breeding, will continue to be very important.

### **CONCLUSIONS**

This article was prepared to introduce readers interested in animal genetic resources and their management to the broad range of activities and products developed under the guidance of the FAO Commission on Genetic Resources for Food and Agriculture. These initiatives contribute in many ways to the sustainable use and conservation of GRFA, combating loss of biodiversity for food and agriculture, directly supporting food security efforts, and drawing attention to the need for fair and equitable sharing of the benefits arising from utilization of GRFA. More recent efforts by the Commission address adaptation to climate change and the use of modern biotechnologies and DSI in various areas of GRFA management, such as inventory, characterization, breeding and cryo-conservation.

The work of the Commission and the technical divisions of the FAO have been and will continue to be instrumental in the multiple aspects of AnGR management and in further enhancing global understanding of the status of these resources and their distinctive features, roles and values. This will further assist development of many important policies, tools and programmes aimed at better management of these resources, ensuring the crucial development of the livestock sector and its contributions to food security and rural development.

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