



联合国  
粮食及  
农业组织

Food and Agriculture  
Organization of the  
United Nations

Organisation des Nations  
Unies pour l'alimentation  
et l'agriculture

Продовольственная и  
сельскохозяйственная организация  
Объединенных Наций

Organización de las  
Naciones Unidas para la  
Alimentación y la Agricultura

منظمة  
الغذية والزراعة  
للأمم المتحدة

# COMMISSION ON GENETIC RESOURCES FOR FOOD AND AGRICULTURE

## Item 4 of the Provisional Agenda

### TEAM OF TECHNICAL AND LEGAL EXPERTS ON ACCESS AND BENEFIT-SHARING

#### Fourth Session

Rome, 29–31 October 2018

### INPUTS BY MEMBERS AND OBSERVERS ON ACCESS AND BENEFIT-SHARING FOR GENETIC RESOURCES FOR FOOD AND AGRICULTURE

#### TABLE OF CONTENTS

I.	Introduction .....	2
II.	Inputs by Members .....	3
i.	Brazil .....	3
ii.	Canada .....	3
iii.	Czech Republic .....	10
iv.	Ecuador .....	21
v.	Germany .....	22
vi.	India .....	23
vii.	Norway .....	23
viii.	United States of America .....	25
ix.	ABS Task Force of the European Regional Focal Point on Animal Genetic Resources .....	29
III.	Inputs by observers .....	40
i.	ARCADIA on behalf of the Consortium in charge of the Preparatory Action on Genetic Resources .....	40
ii.	CABI .....	40

## I. INTRODUCTION

1. The Commission on Genetic Resources for Food and Agriculture (Commission), at its last session, “requested the Secretariat to continue working on access and benefit-sharing (ABS) for genetic resources for food and agriculture (GRFA), with the aim of raising the awareness of Members, their diverse authorities involved in ABS and other stakeholders, to assist Members in reflecting in their ABS measures the importance of GRFA, their special role for food security and the distinctive features of the different subsectors, with a view to contributing to the achievement of SDG Targets 2.5 and 15.6, and to enable the subsectors to engage in a meaningful way and promote communication in relevant processes at local, national, regional and international levels”.<sup>1</sup>

2. The Commission requested the Secretariat to convene, in collaboration with the Secretariats of the International Treaty on Plant Genetic Resources for Food and Agriculture (Treaty) and the Convention on Biological Diversity (CBD), an international workshop to assist countries to raise awareness of distinctive features and specific practices of subsectors of GRFA in the context of the Elements to facilitate domestic implementation of access and benefit-sharing for different subsectors of genetic resources for food and agriculture (ABS Elements). The Workshop was held from 10 to 12 January 2018. The outcomes of the Workshop and the proceedings are available.<sup>2</sup>

3. The Commission also agreed to produce non-prescriptive explanatory notes describing, within the context of the ABS Elements, the distinctive features and specific practices of different subsectors of GRFA, to complement the ABS Elements. It invited Members, observers and other stakeholders to provide relevant inputs for such explanatory notes, including on:

- their practical experiences in implementing national ABS measures related to GRFA; and
- distinctive features and specific practices of different subsectors of GRFA.

4. This document compiles inputs submitted by Members and observers for the non-prescriptive explanatory notes describing, within the context of the ABS Elements, the distinctive features and specific practices of different subsectors of genetic resources for food and agriculture. The submissions are presented in alphabetical order and in the language in which they were received.

---

<sup>1</sup> CGRFA-16/17/Report Rev.1, paragraph 25(i).

<sup>2</sup> See [Proceedings of the International Workshop on Access and Benefit-sharing for Genetic Resources for Food and Agriculture](#) (2018); CGRFA/TTLE-ABS-4/18/Inf.3.

## II. INPUTS BY MEMBERS

### i. Brazil

- *Practical experiences in implementing national ABS measures related to GRFA*

Law 13.123 of 20 May 2016, which revoked provisional measure No. 2.186-16/2001, regulates access to genetic resources, including differentiates measures for those related to food and agriculture.

- In favour of procedure facilitation, access to the genetic resources of traditional or locally adapted varieties and breeds, whenever used exclusively for food and agriculture, does not depend on the prior informed consent (PIC) of the indigenous population, the traditional or local community or traditional farmer that created, developed, holds or preserves that variety or race.
- The benefits resulting from the economic exploitation of any product derived from access to genetic resources for food and agriculture are to be shared only upon the commercialization of the reproductive material. In consequence, all previous or subsequent links in that same production chain (for example the sale of food to the final consumer) are exempt. This measure aims to avoid excessive encumbrances in food and agriculture chains.

- *The distinctive features and the specific practices of different subsectors of GRFA.*

On the grounds of Law No. 13.123 of 2015, the only differentiation that is made is the purpose of use and origin (native or exotic) of a given genetic resource – whether for food and agriculture, or for other industrial activities.

As such, there is no different procedure for obtaining access to genetic resources of any subsector, be it plants, animals, forests, aquatic genetic resources, micro-organisms or invertebrates. The same is valid for benefit-sharing rules: the same percentage is applicable to any subsector.

### ii. Canada

#### **Input on distinctive features of animal genetic resources for food and agriculture**

In the report of its 16th Regular Session, the Commission on Genetic Resources, in paragraph 25(iv), “invited Members, observers and other stakeholders to provide relevant inputs for such explanatory notes by electronic means, including on ... the distinctive features and the specific practices of different subsectors of GRFA”. This note is to respond in part to that invitation with regard to animal genetic resources for food and agriculture (AnGR).

In 2012, the Report of the First Session of the “Ad Hoc Technical Working Group on Access and Benefit-Sharing for Genetic Resources for Food and Agriculture” (document CGRFA-WG-ABS-1/12/Report, Appendix B) described distinctive features of genetic resources for food and agriculture in seven clusters.

Canada considers that the Commission, its Team of Technical and Legal Experts (TTLE), and the International Workshop should recognize the ABS Elements specific to AnGR. Many of these were already described in document CGRFA-14/13/7 (especially Table 1) and document CGRFA-15/15/Report, Appendix B Annex. We emphasize that:

- ✓ AnGR are embodied either in live animals or in biological material (i.e. embryos, gametes [semen and oocytes] or somatic tissues) that are maintained outside the animal;
- ✓ the AnGR most frequently exchanged are live animals and semen, with interest in some sectors for embryos;

- ✓ most AnGR are held privately. An important part is conserved on-farm. Many AnGR are NOT held in *ex situ* collections. Also, the role of wild habitats for *in situ* conservation of AnGR can probably be considered negligible;
- ✓ plant, animal, invertebrate and micro-organism GRFA form an interdependent network of genetic diversity in agricultural ecosystems;
- ✓ the degree and manner of human influence on the evolution of GRFA differ considerably between subsectors and species within subsectors. It is certainly most pronounced for AnGR (and plant genetic resources [PGR]), that have been subject to domestication and systematic genetic improvement for about 10 000 years. The development of molecular genetic tests and reproductive technologies has influenced the breeding management of animal breeds during the last 60 years, e.g. the first bull semen was successfully preserved in the 1950s;
- ✓ the maintenance and genetic changes in many AnGR (and PGR) depend on continued human intervention over time, and their sustainable utilization in research, development and production is an important instrument to ensure conservation and genetic improvement;
- ✓ unlike plant genetic resources, the sourcing of genetic material from wild animal populations can be regarded as negligible, as many wild ancestors of domesticated livestock species have become extinct. There are some exceptions – some bison producers have incorporated wood bison genetics into plains bison to obtain some phenotypical traits (improving meat production). Other examples are related to game meat, as wild animals were used to develop this industry;
- ✓ unlike forest genetic resources, livestock production in most regions of the world today utilizes genetic resources that originated or were developed elsewhere. AnGR have been extensively exchanged over the last 10 000 years;
- ✓ the innovation process for AnGR is of an incremental nature;
- ✓ AnGR can be incorporated in different phases of the genetic improvement process and directly contribute their parts and components to the genetic set-up of the resulting products;
- ✓ elite animals represent the majority of germplasm exchanges. This could increase inbreeding and reduce genetic diversity in some breeds, so the international exchange of AnGR is essential to the functioning of the sector, and its importance is likely to increase in the future;
- ✓ AnGR are held and used by a broad range of very diverse stakeholders. There are distinct communities of providers and users contrasted to other GRFA;
- ✓ transfer of GR has been overwhelmingly North to South, seen from North America;
- ✓ imports of foreign dairy cattle germplasm into North America over the past 50 years have not often significantly contributed to the improvement of a breed for dairy cattle (e.g. the US Jersey genepool). Significant progress in production was therefore essentially due to the efforts of North American scientists, breeders and ranchers. This is however not the case in North America for the small ruminant sector and pure-bred commercial chickens – small ruminant livestock managers still rely on germplasm importation to maintain or improve genetic diversity;
- ✓ most of the products derived from the use of AnGR comprise genetic material containing functional units of heredity and, at least theoretically, could be reproduced and used for further research and development based on their genetic make-up. It is common practice in agricultural research and development to make use of products as an input to further innovation processes. Every recipient of genetic material will usually also act as a provider if his or her products are used by others;
- ✓ having a national regulatory process to recognize specific breeds, like Canada's Animal Pedigree Act, is a very useful tool to help maintain genetic diversity.

At present, there is no internationally legally-binding agreement for ABS for AnGR – transactions are almost always contractual between a willing provider and a willing participant who establish mutually agreed terms. Therefore, Canada encourages the Commission to put greater emphasis and priority for work on ABS for AnGR than for other sub-sectors of GRFA within the scope of the Commission. It would be a very positive contribution if Members of the Commission can eventually incorporate the distinctive features of ABS for AnGR into a “soft law” solution recognizing these successful existing ABS practices. Such a solution could incorporate possible adjustments of ABS authorization procedures reflecting special features or needs of the subsector, such as exceptions or privileges for

(specific uses of) genetic resources, for example for taxonomic research, and/or the exchange of AnGR among small-scale farmers or research and development for food and agriculture.

Such an approach would be consistent with the Nagoya Protocol. The Protocol obliges Contracting Parties to consider, in the development and implementation of their ABS legislation or regulatory requirements, “the importance of genetic resources for food and agriculture and their special role for food security”. According to Article 4.3, Contracting Parties shall, in the implementation of the Protocol pay “due regard to useful and relevant ongoing work or practices under such international instruments and relevant international organizations, provided they are supportive of and do not run counter to the objectives of the CBD and the Protocol”. While the provision does not further specify the international instruments and organizations or the kind of ongoing work or practices, the Preamble of the Protocol provides some guidance in this regard, as it refers to the fundamental role of the Commission.

Canada points out that practical application of the concept of “country of origin” for AnGR is not always clear. In most AnGR, the history of incremental improvement goes back several thousand years, and most farm animal breeds are the products of the efforts of many people in places that are sometimes geographically very distant from each other. This would make the identification of a “country of origin” of AnGR, and its usefulness for ABS in this subsector, problematic at best. However, some breeds can be developed within a specific country and derive unique traits not found in other countries. If they are distinguished from the original breed (e.g. by a different name), that country could be considered the country of origin.

In document CGRFA/TTLE-ABS-3/16/2 (paragraph 34), it was suggested that selection of semen-donor bulls and of livestock offspring for multiplication may or may not be considered as “utilization” where the purpose is genetic herd improvement as much as dairy and meat production. Canada considers that this activity could be classified as “utilization”. Because of our Animal Pedigree Act, recognized Canadian breed associations can control the genetics of their particular breed and ensure a constant genetic background. Semen is sold on a regular basis and passed on to other producers to obtain genetic gain in their production. To officially recognize the animal as a specific breed, the pedigree is required, and genetic testing could be requested by some breed associations.

However, this practice is not observed for poultry breeds, especially the heritage breeds produced in Canada, and information (especially pedigrees) is not accessible for commercial breeds. So, it becomes hard in this case to differentiate between production and breeding management. Our first analysis of poultry breeds has revealed a lot of admixture. So, the term “utilization” becomes difficult to apply to birds. The selection of birds is only based on phenotype and the poultry breeds have no records of their pedigree.

Although Canada has a national Pedigree Act, this may not be the case for other countries and it could be hard for them to recognize the practice of “utilization” of AnGR with the selection of semen-donor bulls. Producers could claim that these animals are for production, which is not a case of “utilization” under the Nagoya Protocol.

### **Input on distinctive features of forest genetic resources for food and agriculture**

In the report of its 16<sup>th</sup> Regular Session, the Commission on Genetic Resources, in paragraph 25(iv), “invited Members, observers and other stakeholders to provide relevant inputs for such explanatory notes by electronic means, including on ... the distinctive features and the specific practices of different subsectors of GRFA”. This note is to respond in part to that invitation with regard to forest genetic resources (FGR).

In 2012, the Report of the First Session of the “Ad Hoc Technical Working Group on Access and Benefit-Sharing for Genetic Resources for Food and Agriculture” (document CGRFA-WG-ABS-1/12/Report, Appendix B) described distinctive features of genetic resources for food and agriculture in seven clusters.

In 2016, the Working Group on FGR (document CGRFA/WG-FGR-4/16/Report, para 24) recalled its work during previous sessions on access and benefit-sharing, in particular:

- the distinctive features of forest genetic resources (document CGRFA/WG-FGR-2/13/Report, paras. 20-21, which drew upon document CGRFA/WG-ABS-1/12/3); and
- aspects of forest genetic resources that should be considered by countries when dealing with access to genetic resources and benefit-sharing, at the national level (document CGRFA/WG-FGR-3/14/Report, paras. 30-36 and especially Appendix D on page 16).

Canada considers the Commission, its TTLE, and the International Workshop should recognize ABS elements specific to FGRs. These are described in document CGRFA/WG-FGR-3/14/Report Appendix D and include:

- ✓ FGRs are often undomesticated species and populations.
- ✓ FGRs migrate on their own (albeit slowly) and do not recognize borders.
- ✓ There is a long history of moving species around the world. Many plantation programmes depend on exotic species (pines, eucalyptus, gmelina, etc.).
- ✓ Many of the benefits derived from forests are a wide range of “environmental services” and are difficult to value. Unlike production crops, it is difficult to put a monetary value on what may result from a breeding or restoration programme.
- ✓ The benefits derived from tree breeding take decades to realize – breeding intervals from 10 to 15 years, plantation ages ranging from 8 to 40 years. A temperate forest tree-breeding programme would need approximately 35 years to see any real economic value from a transfer of genetic resources (maybe less if the seed could be sold for increased value, but the economic benefit of the seed would be minimal).
- ✓ Unlike agricultural crops, a forest does not need a new crop every year; there is no large market for seed sales as is the case for corn, beans, rice, etc.
- ✓ Disease resistance is a key trait for which many need exotic germplasm. Aspects to consider:
  - o Sometimes the benefit is simply establishment of a healthy forest, with no plans for harvest in some cases.
  - o Often the disease for which researchers are breeding resistance comes from the same region where researchers obtained the germplasm (i.e. the problem originated from the source of the resistance).

In document CGRFA/TTLE-ABS-3/16/2 (paragraph 34), it was suggested that provenance trials of forest trees may or may not be considered as “utilization” of genetic resources when they help to identify seed sources best adapted to the conditions of a specific planting site with the purpose of reforestation and wood production and, at the same time, breeding. Canada considers that provenance trials should NOT be classified as “utilization” at this point in time. It is premature to include provenance trials given the wide scope of the unique aspects of FGRs. In considering provenance trials, there can be uncertainty pertaining to ownership of the resource. The trials are the result of seed collected from many sites and often from different countries. In some cases there are no records of whom or what agency collected the seed and where seed was collected. Trials are often planted across national borders and sometimes worldwide. The organization that established the trial may or may not

have been the one that collected the seed, and could be different from those who have invested in the establishment and maintenance of the trial (over decades).

### **Input on distinctive features of plant genetic resources for food and agriculture**

In the report of its 16th Regular Session, the Commission on Genetic Resources, in paragraph 25(iv), “invited Members, observers and other stakeholders to provide relevant inputs for ... explanatory notes by electronic means, including on ... the distinctive features and the specific practices of different subsectors of GRFA”. This note is to respond in part to that invitation with regard to plant genetic resources (PGRFA).

In 2012, the Report of the First Session of the “Ad Hoc Technical Working Group on Access and Benefit-Sharing for Genetic Resources for Food and Agriculture” (document CGRFA-WG-ABS-1/12/Report, Appendix B) described distinctive features of genetic resources for food and agriculture in seven clusters.

In 2015, the Commission requested its Technical Working Groups to continue elaborating subsector-specific elements for ABS, bearing in mind the ongoing activities or processes under the *International Treaty*, for consideration by the ABS Expert Team established by the Commission. The Working Group on Plant Genetic Resources met on 8–10 June 2016.

The Working Group recommended:

- that with regard to the utilization and distinctive properties of PGRFA, the TITLE-ABS review and analyse existing use and exchange practices typical of the plant sector under existing frameworks, including model contractual clauses, codes of conduct, guidelines, best practices, community protocols and standards;
- to collect country experiences with existing ABS frameworks providing special provisions for GRFA, including those held by indigenous peoples and local communities, and traditional knowledge associated with PGRFA;
- that the Commission request FAO to support countries, upon request from governments, in the development of awareness-raising, capacity building and policy implementation activities addressing access and benefit-sharing for PGRFA;
- that the Commission invite the Governing Body of the Treaty, in its continued governance of PGRFA according to Article 3 of the Treaty, to continue to closely coordinate with the Commission, in order to address in a complementary way the distinctive features and specific uses of PGRFA, bearing in mind the ongoing activities and processes under the Treaty; and
- that the Commission invite the Governing Body to inform the Commission at regular intervals on the process to enhance the Treaty’s Multilateral System of Access and Benefit-Sharing (MLS) with a view to avoid duplication of efforts.

Canada emphasizes that the Governing Body of the International Treaty is the sole inter-governmental forum that has the authority to take decisions on the terms and conditions for ABS for plant genetic resources for food and agriculture. This is a distinguishing subsectoral feature for PGRFA. According to Treaty Art. 3 “Scope”, “This Treaty relates to plant genetic resources for food and agriculture”, i.e. all of them, not only those in its Multilateral System of ABS. Canada wants the authority of the Treaty to be recognized and respected in any recommendation by the Commission regarding PGRFA. The Commission must defer to the Governing Body of the Treaty concerning ABS for PGRFA. The onus is on the Commission and its Secretariat to avoid duplicating the work of the Governing Body of the Treaty.

Under the Treaty, the “centre of origin” (not “country” of origin) means a geographical area where a plant species, either domesticated or wild, first developed its distinctive properties. Therefore any discussion of the applicability of this concept to PGRFA must be addressed by the Treaty’s Governing Body, not the Commission. Practical application of distinctive properties is clear for cultivars of PGRFA. For example, distinctive properties are one of the criteria for awarding a Plant Breeders’

Right. The country where a cultivar was bred is its centre of origin. For example, the centre of origin of Marquis wheat is Canada.

Many plant crops that fall under the Treaty are so far removed from their progenitors that their relationships are hardly recognizable. The bulk of genetic resources transfers is seed of highly selected plants. When plant breeders are looking for sources of, for example, resistance to some diseases, they are likely to start with existing genebanks such as Plant Gene Resources of Canada that already respect the Treaty's ABS mechanisms.

Canada emphasizes the importance of breeding in accruing benefits arising out of the utilization of PGRFA, and the need to promote it. The results of such breeding are in themselves a major benefit of the utilization of PGRFA. Canada agrees with the *ABS Elements* (para. 70) that the sharing of benefits is "a major challenge for most subsectors of GRFA, including aquatic and forest genetic resources, where breeding technologies play an increasingly important role. Depending on the extent to which GR and associated traditional knowledge contribute to a final product, it may become difficult to determine the fair and equitable sharing of benefits with the different countries and indigenous and local communities that contributed genetic resources and/or traditional knowledge".

In para. 53 of document CGRFA/TTLE-ABS-3/16/2, various options for accommodating the incremental nature of the innovation process typical of many GRFA were proposed:

- pooling benefits in a benefit-sharing fund, and disbursements in line with agreed policies and criteria – *already an element of the funding strategy of the PGR Treaty*;
- sharing of benefits through research partnerships – *can be negotiated on a project-by-project basis*;
- decoupling access and benefit-sharing – *done through the Treaty's Multilateral System (except for benefits of commercialization)*;
- standardized terms and conditions under which benefits are shared – *done through the Treaty's Multilateral System*.

### **Input on distinctive features of micro-organisms and invertebrate genetic resources**

In the report of its 16th Regular Session, the Commission on Genetic Resources, in paragraph 25(iv), "invited Members, observers and other stakeholders to provide relevant inputs for such explanatory notes by electronic means, including on ... the distinctive features and the specific practices of different subsectors of GRFA." This note is to respond in part to that invitation with regards to Micro-organisms and Invertebrate Genetic Resources (MIGR).

In 2012, the Report of the First Session of the "Ad Hoc Technical Working Group on Access and Benefit-Sharing for Genetic Resources for Food and Agriculture" (document CGRFA-WG-ABS-1/12/Report, Appendix B) described distinctive features of genetic resources for food and agriculture in seven clusters.

Canada considers that the Commission, its Team of Technical and Legal Experts (TTLE), and the International ABS Workshop, should recognize the distinctive features of MIGR related to ABS. Some of these were already described in document CGRFA-14/13/7 and document CGRFA-15/15/Report, in particular, Appendix B Annex, the Elements to Facilitate Domestic Implementation of Access and Benefit-Sharing for Different Subsectors of Genetic Resources for Food and Agriculture. We emphasize that:

- MIGR (except honey bees) are undomesticated species and populations;
- MIGR migrate on their own (albeit slowly) and do not recognize political borders;
- there is a long history of humans moving MIGR species around the world;
- plant, animal, invertebrate and micro-organism GRFA form an interdependent network of genetic diversity in agricultural ecosystems.



### *Distinctive Features of Genetic Resources of Micro-organisms*

- micro-organisms are essential to: the improvement of food and agricultural production systems and contribute to energy production and waste management (FAO Background Study Paper No. 46); identification and quantification of the microbiota in the rumen (FAO Background Study Paper No. 61); use by agro-industry such as for bio-fertilizers and bio-inoculants: Effective Micro-organisms (EM) technology, bio-pesticides and bio-remediation indicators (FAO Background Study Paper No. 64); and food biotechnology, particularly through basic understanding of mechanisms by which fermentation improves food safety and stability, which has contributed to the use of live microbial strains for bio-preservation (FAO Background Study Paper No. 65);
- soil micro-organisms contribute to the delivery of ecosystem services that are essential for human society, such as: transport, storage and provision of clean groundwater; storage of carbon and trace gas emissions critical to climate control; provision of nutrients; pest and pathogen regulation; and supporting plant growth and above-ground biodiversity (FAO Background Study Paper No. 63);
- micro-organisms are important genetic resources used as agents for biological control (BC) of pests to ensure global sustainability of food and agriculture;
- micro-organisms (e.g. mushrooms, truffles, reishi) may be cultivated or harvested from the environment as foods or nutraceuticals and in either case may require symbiosis with plants involving intensive cultivation; or arise spontaneously in the wild; or may be saprotrophic and sometimes can be used to convert waste products to food;
- when a scientific paper is published, many journals require that the author(s) must make the micro-organism available to other research institutes for legitimate research purposes;
- international guidelines have been developed by the World Federation for Culture Collections of the International Union of Microbiological Societies (IUMS) and the International Union of Biological Sciences to promote and develop collections of cultures of microorganisms and cultured cells (WFCC 2010) and for their responsible use (OECD 2007);
- professional societies (e.g. American Society for Microbiology) have established best practices to ensure “microbiologists will work for the proper and beneficent application of science and will call to the attention of the public or the appropriate authorities misuses of microbiology or of information derived from microbiology... to discourage any use of microbiology contrary to the welfare of humankind, including the use of microbes as biological weapons.” ([http://jvi.asm.org/site/misc/journal-ita\\_edi.xhtml#01](http://jvi.asm.org/site/misc/journal-ita_edi.xhtml#01));

### *Distinctive Features of Genetic Resources of Invertebrates*

#### *Pollinators*

- wild and domestic (honey bees) pollinators are critical to global agriculture and their services has been estimated at US\$235-577 billion, representing 5-8% of the current global crop production in 2015 (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) 2017);
- the vast majority of pollinator species are wild, including more than 20,000 species of bees, some species of flies, butterflies, moths, wasps, beetles, thrips, birds, bats and other vertebrates (IPBES 2017);
- a few species of bees are widely managed, including the western honey bee (*Apis mellifera*), the eastern honey bee (*Apis cerana*), some bumble bees, some stingless bees and a few solitary bees (IPBES 2017);
- wild, native bees also provide the majority of pollination that helps maintain natural plant communities which contribute to a variety of valuable ecosystem services, including carbon sequestration, water filtration, and erosion control (Pollinator Health Task Force 2015).

#### *Biological control agents*

- invertebrates are important genetic resources used as agents for biological control (BC) of pests to ensure global sustainability of food and agriculture;
- there is a long history, including in Canada, of unrestricted use and exchange of invertebrates for classical biological control of invasive alien species affecting agricultural crops (FAO Background Study Paper No. 47);

- professional societies (e.g. International Organization for Biological Control) have proposed best practices, implemented in Canada, “to demonstrate due diligence in responding to access and benefit sharing requirements, and to reassure the international community that biological control is a very successful and environmentally safe pest management method based on the use of biological diversity.”

At present, there is no internationally legally-binding agreement specifically for ABS of MIGR – exchanges are almost always contractual between a willing provider and a willing recipient who establish mutually agreed terms. Therefore, Canada encourages the Commission to put greater emphasis and priority for work on ABS of MIGR, taking into account their capacity for free movement in the environment, the ecosystem services provided, and the public good outcomes stemming from their use and exchange. Canada also encourages the Commission to build on international guidelines and best practices for use and exchange of MIGR.

Such an approach would also be consistent with the Nagoya Protocol. The Protocol obliges Contracting Parties to consider, in the development and implementation of their ABS legislation or regulatory requirements, “the importance of genetic resources for food and agriculture and their special role for food security.” According to Article 4.3, Contracting Parties shall, in the implementation of the Protocol pay “due regard to useful and relevant on-going work or practices under such international instruments and relevant international organizations (our emphasis), provided they are supportive of and do not run counter to the objectives of the CBD and the Protocol.” The Preamble of the Protocol provides some guidance about relevant international instruments and organizations or the kind of ongoing work or practices in this regard, as it refers to the fundamental role of the Commission.

### **iii. Czech Republic**

In terms of EU ABS legislation, the Czech Republic is guided by EU law, especially EU Regulation No. 511/2014 on compliance measures for users from the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization in the Union, and the subsequent implementing Commission Regulation No. 2015/1866 laying down detailed rules for the implementation of Regulation (EU) No 511/2014 of the European Parliament and of the Council as regards the register of collections, monitoring user compliance and best practices. In addition, the European Commission works in close cooperation with national ABS experts and various stakeholder representatives on non-binding ABS guidance documents for different sectors, including, e.g. plant breeding, animal breeding, biotech, biocontrol, etc. Once these guidelines will be approved by the European Commission, they will become an important and handy tool in terms of practical implementation of ABS obligations.

As far as the national legislation, the ABS Act has been prepared by the Ministry of the Environment in cooperation with other ministries and stakeholders, and is now in the Parliament for further consideration. At this time and point, the Czech Republic is not going to put in place any access provisions to our own genetic resources; the whole ABS law (at the EU as well as at the national level) relates to obligations of users of genetic resources.

For the **plant genetic resources** domain:

The International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) was ratified by the Czech Republic on 18 March 2004 and came into force on 29 June 2004. Access to genetic resources within the Multilateral System covers the plant genetic resources for food and agriculture listed in Annex I. To facilitate the access to all plant genetic resources for food and agriculture, the Czech Republic extended the use of the Standard Material Transfer Agreement (SMTA) to non-Annex I genetic resources for the purposes set out under the ITPGRFA.

For the **animal genetic resources** domain:

The transfers of animal genetic resources are covered by the provisions of MTA, with one exception for the reproduction material that is governed by the Reproduction Material Transfer Agreement. The genebanks accept the material for long-term storage and conservation under the conditions of the Material Acquisition Agreement (see Box A).

For the **genetic resources of micro-organisms**:

The exchange of genetic resources of micro-organisms is based on cooperation between culture collections and users of genetic resources. The access to the material is provided on the basis of the MTA only in minor part of collections (e.g. Collection of Dairy Microorganisms – see Box B). However, the Ministry of Agriculture, in cooperation with culture collections, is preparing model MTAs that we expect to be used soon by all collections of micro-organisms.

### **Box A: Material Acquisition Agreement**

#### **MATERIAL TRANSFER AGREEMENT (GENEBANK TO A THIRD PERSON)**

##### **Preamble**

This is a document governing conditions for the transfer of genetic material, hereinafter referred to as the “material,” and any information relating thereto, hereinafter referred to as the “information,” from the National Genebank to the requesting party. The material covered by this Material Transfer Agreement (MTA) was obtained under the conditions of the Material Acquisition Agreement (MAA) and will be used in a bona fide and sustainable way, in full respect of the principles laid down in the Convention on Biological Diversity (CBD).

*The provider:* National Genebank..... (Address)...., hereinafter referred to as the “provider“

*The requesting party* hereinafter referred to as the “recipient.”

<b>Name of recipient</b>	
<b>Address</b>	
<b>Identification Number</b>	
<b>End User</b>	

##### **B. Material (to be filled by the provider)**

<b>Amount and nature of the material provided</b> (semen, embryo, tissue type, DNA etc., and form – lyophilized, deep frozen etc.,)
<b>Minimum identification data</b> (species, breed, sex of the donor animal, accession number of the gene bank, )
<b>Description</b> (origin, place and date of acquisition from in situ conditions,)
<b>PIC</b> (copy of, or a reference to)

##### **C. Objectives of use of genetic resources provided under this agreement**

The material and related information is intended for use in non-profit research, development, testing and/or evaluation, control, reference and education purposes only.

The recipient will use the material for ..... (specified by the recipient)

##### **D. Conditions of transfer of the material**

The material and information are provided on the following conditions:

- 1) The recipient agrees neither to claim ownership over the material nor to seek intellectual property rights over them or information passed along.
  - 2) The recipient will not sell, distribute or otherwise made available the material and/or information to any other party for any purpose, or use this material and/or information in any way for the commercial purposes.
  - 3) The recipient will use the material and the information exclusively for the purpose described under Section C above.
  - 4) The recipient will ensure that the material will at all times be used and handled in compliance with all relevant laws, rules and regulations applicable, and for the purposes of testing will follow the protocols of standard test and reference procedure.
  - 5) The recipient agrees to furnish relevant data arising from the evaluation of the material to the provider. Upon request of provider or recipient these data will only be made publicly available after an embargo period of.....years.
  - 6) Any other information and/or research results obtained using the material, will be considered proprietary to the recipient. Prior to publication of such results, the recipient will provide the provider with a copy of such intended publication. All such intended publications will contain an acknowledgement of the provider.
  - 7) The recipient is free to file patent application(s) claiming inventions made by the recipient through the use of the material but agrees to inform the provider prior to applying for any intellectual property rights related to the use of any received material and notify the provider upon filing a patent application claiming method(s) of manufacture or use(s) of the material.
  - 8) The material is provided at no cost, the recipient will – will not\* undertake to reimburse the provider for costs associated with distribution of the material to the recipient.
  - 9) Except to the extent prohibited by law, the recipient assumes all liability for damages, which may arise from its use, storage or disposal of the material. The provider will not be liable to the recipient for any loss, claim, damage, illness, or injury to person or property whatever the cause may be arising out of or pertaining to recipient's use of the materials, except to the extent permitted by law when caused by the gross negligence or willful misconduct of the provider.
  - 10) This agreement shall only be capable of change by written amendment executed by duly authorized officers of the parties.
  - 11) The relevant signatories must sign each of three copies of this Agreement, one of which retained by the National Coordinating Center for Farm Animal Genetic Resources (NCC), one retained by the recipient and one by the provider.
- 8) \* not accordant text be crossed out

**Approval by the NCC:**

I hereby warrant that I, as an Authorized Official of the NCC hereby certify my approval of the transfer of the material to the recipient.

Name of Authorized Official (NC): \_\_\_\_\_

\_\_\_\_\_  
Signature of Authorized Official

\_\_\_\_\_  
Date

Provider (the gene bank from whom the material will be released)

Name: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_  
Signature of Authorized Official of the gene bank

\_\_\_\_\_  
Date

I hereby certify that as the Responsible Administrative Authority of the recipient, I have read and understood the conditions outlined in this Agreement and I agree to abide by them in the receipt and use of the material. I hereby warrant that I have the full authority to execute this Agreement and to thereby bind the recipient.

Name of Authorized Official: \_\_\_\_\_

\_\_\_\_\_  
Signature of Authorized Official

\_\_\_\_\_  
Date

**REPRODUCTION MATERIAL TRANSFER AGREEMENT (GENEBANK TO A THIRD PERSON)**

**Preamble**

This is a document governing conditions for the use of genetic material, hereinafter referred to as the “material” distributed from the National Genebank to the Requesting Party. The material covered by this Material Transfer Agreement (MTA) was obtained under the conditions of the Material Acquisition Agreement (MAA) and will be used in a bona fide and sustainable way, in full respect of the principles laid down in the Convention on Biological Diversity (CBD).

**A. Parties to this agreement:**

*The provider:* Genebank..... (Address)...., hereinafter referred to as the “provider“

*The requesting party* hereinafter referred to as the “recipient.”

<b>Name of Recipient</b>	
<b>Address</b>	
<b>Identification Number</b>	

**B. Material Information (to be filled by the gene bank)**

<b>Nature and amount of the material provided</b> (semen dose, embryo)
<b>Minimum identification data</b> (species, breed/line, accession number of the gene bank, identification of the provider)
<b>Description</b> (origin, place and date of acquisition from in situ conditions)
<b>PIC</b> (copy of, or a reference to)

**C. Objectives of use of genetic resource provided under this agreement**

The distribution of the material is carried out according to the breed reconstruction regulations of the National Program on Farm Animal Genetic Resources, (reference number....., dated ..... ) hereinafter referred to as the “National program”.

**D. Conditions of Transfer of the material**

The material is provided on the following conditions:

- 1) The recipient will use the material exclusively for the purpose described under Section C above and will not produce any offspring for other purposes without the permission from the provider.
- 2) Progeny born with the use of the material becomes a property of recipient. The recipient agrees that the progeny will be handled according to the Breed Reconstruction Project (Annex No.1 to the Agreement).
- 3) The recipient will not sell, distribute or otherwise made available the material to any other party for any purpose or use this material and/or information in any way for the commercial purposes.
- 4) Any remaining quantities of the material that was not used for any reason for the objective indicated under Section C above will be returned to the provider.
- 5) The recipient will ensure that the material will at all times be used and handled in compliance with all relevant laws, rules and regulations applicable.
- 6) Except to the extent prohibited by law, the recipient assumes all liability for damages, which may arise from its use, storage or disposal of the material. The provider will not be liable to the recipient for any loss, claim, damage, illness, or injury to person or property whatever the cause may be arising out of or pertaining to recipient’s use of the materials, except to the extent permitted by law when caused by the gross negligence or willful misconduct of the provider.
- 7) The recipient agrees to collaborate in the conservation program by future provision of genetic material of similar type and amount originated from the progeny born according to Breed Reconstruction Project (Annex No.1 to the Agreement) and by provision of scientific information relevant to conservation and sustainable utilization of the genetic material provided.
- 8) Information provided by the recipient to the provider under, or in connection with, this Material Transfer Agreement, which could be considered as trade secrets of the recipient, would be treated by the provider as confidential and proprietary to the recipient for a period of .....(5) years after the disclosure of such information to the provider.
- 9) The material is provided at no cost, the recipient will – will not\* undertake to reimburse the gene bank for costs associated with distribution of the material to the recipient.
- 10) This agreement sets forth the entire understanding between the parties and supersedes any prior agreements, written or verbal. It shall only be capable of change by written amendment executed by duly authorized officers of the parties.

11) The relevant signatories must sign each of three copies of this Letter of agreement, one of which retained by the National Coordinating Center for Farm Animal Genetic Resources, (NCC) one retained by the recipient and one by the gene bank from whom the material will be obtained.

9) \* not accordant text be crossed out

**Approval by the NCC:**

I hereby warrant that I, as an Authorized Official of the NCC hereby certify my approval of the transfer of the material to the recipient.

Name of Authorized Official (NC): \_\_\_\_\_

\_\_\_\_\_

Signature of Authorized Official

Date

Provider (the gene bank from whom the material will be released)

Name: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

Signature of Authorized Official of the gene bank

Date

I hereby certify that as the Responsible Administrative Authority of the recipient, I have read and understood the conditions outlined in this Agreement and I agree to abide by them in the receipt and use of the material. I hereby warrant that I have the full authority to execute this Agreement and to thereby bind the recipient.

Name of Authorized Official: \_\_\_\_\_

\_\_\_\_\_

Signature of Authorized Official

Date

**MATERIAL ACQUISITION AGREEMENT (DONOR TO A GENE BANK)**

**Preamble**

This is a document, which expresses a prior informed consent of the donor with the provision of genetic material to the National Genebank and governing conditions for the further use of this genetic material, hereinafter referred to as the “material”.

**A. Parties to this agreement:**

*The supplier*, hereinafter referred to as the “donor”

<b>Name of donor</b>	
<b>Address</b>	
<b>Participant Number of the National Program</b>	

**The recipient party:** Genebank, hereinafter referred to as the „recipient”

<b>Name of the Genebank</b>	
<b>Address</b>	
<b>Corporation Identification Number</b>	

**B. Material Information**

<b>Nature and amount of the material provided</b> (semen dose, embryo)
<b>Minimum identification data</b> (species, breed/line, identification of the donor’s animal(s), date of acquisition from in situ conditions) – in an attached list

The donor grants material and related information to the recipient under the terms and conditions of this agreement. The material being provided is identified in the attached list, which forms part of this agreement. The donor asks that the recipient agree to the following before the recipient receives the material:

- 1) The above material is the property of the donor and is made available as a service to the National Program on Farm Animal Genetic Resources, Decree of the Ministry of Agriculture No.20139/2006-13020 hereinafter referred to as the “National Program”(NP), only.
- 2) Donor warrants that it is legally free to provide the material.
- 3) The recipient will hold the material in trust in its gene bank, periodically check it, and provide long-term conservation in compliance with all applicable statutes and regulations.
- 4) After placing into the gene bank, this material becomes a sample without market value.
- 5) The material will be used for not-for-profit research, education or for the breed reconstruction projects under the terms of the NP. To the extent supplies are available; the provider agrees to make the material for purposes mentioned in the paragraph 3) under a separate Material Transfer Agreement having terms consistent with the terms of this Agreement, and refer any transfer of the material to the donor.
- 6) Unless prohibited by law, recipient assumes all liability for claims for damages against it by third parties, which may arise from the use, storage or disposal of the material except that, to the extent permitted by law, the donor shall be liable to the recipient when the damage is caused by the gross negligence or willful misconduct of the donor.
- 7) The material is provided at no cost - with a transmittal fee\* solely to reimburse the donor for its preparation and distribution costs.  
(If a fee is requested, the amount will be indicated here: [..... insert fee].)
- 7) \* not accordant text be crossed out

The recipient must sign both copies of this Agreement and return one signed copy to the donor. The donor will then supply the material.

Recipient information and authorized signature

Recipient: .....

Address: .....

Name of Authorized Official: .....

Title of Authorized Official: .....



Signature of Authorized Official: .....
Date: .....

**Box B: Collection of Dairy Microorganisms**

[Sem zadejte text.]

[Sem zadejte text.]

**Laktoflora<sup>®</sup> Culture Collection of Dairy Microorganisms**


---

## TRANSFER AGREEMENT TO ACCEPT RESTRICTIONS ON USE OF CULTURES

### TERMS AND CONDITIONS

1. The PROVIDER is willing to transfer the MATERIAL to RECIPIENT and to grant RECIPIENT a limited non-exclusive license to use the MATERIAL under the terms and conditions specified in this Material Transfer Agreement (MTA). The RECIPIENT accepts the terms and conditions of this MTA by placing an order with the PROVIDER.
2. This MTA applies, among other things, to the use, handling, supply, distribution, sale, and any disposition of the MATERIAL supplied by the PROVIDER.
3. The RECIPIENT shall not sell, lease, license, lend, supply, distribute or otherwise transfer the MATERIAL to any others, save those involved in LEGITIMATE EXCHANGES.
4. The RECIPIENT agrees that the MATERIAL is to be used under the responsibility of the RECIPIENT, in compliance with all applicable laws and regulations.
5. Subject to the terms and conditions of this Agreement and any statutory, regulatory or other restriction imposed by law or any third party interest, RECIPIENT may use the MATERIAL in any lawful manner for academic research, teaching or quality control purposes. Any COMMERCIAL USE of the MATERIAL requires the prior written authorization of the PROVIDER. Such approval will not be unreasonably withheld.
6. The RECIPIENT agrees to provide appropriate acknowledgement of the provenance of the MATERIAL and of the PROVIDER's reference in all publications, such as recommended by the Convention on Biological Diversity and in the code of conduct MOSAICC, taking also into account specific national laws and international regulations regarding TRIPS article 29 as to the conditions on patent applicants concerning invention disclosure.
7. Use of the MATERIAL may be subject to intellectual property rights. No express or implied licenses or other rights are provided herein to the RECIPIENT under any patents, patent applications, trade secrets or other proprietary rights. In particular, no express or implied licenses or other rights are provided to use the MATERIAL or any related patents for COMMERCIAL USE.
8. RECIPIENT shall have the sole responsibility for obtaining any intellectual property licenses necessary for its use of the MATERIAL. The RECIPIENT agrees, in advance of such use, to negotiate in good faith with the intellectual property rights owner(s) to establish the terms of a commercial license; taking also into account specific national laws regarding article 15.7 of the Convention on Biological Diversity as to conditions concerning benefit sharing.
9. The use of the MATERIAL may be subject to specific restrictions which are mentioned in the catalogue description for the particular MATERIAL and are hereby acknowledged by RECIPIENT.
10. Any MATERIAL delivered pursuant to this MTA is understood to be experimental in nature and may have hazardous properties. The PROVIDER makes no representations and extends no warranties of any kind, either expressed or implied. There are no express or implied warranties, including any warranty of merchantability or fitness for a particular purpose, or that the use of the MATERIAL does not or will not infringe any patent, copyright, trademark, or other proprietary rights.



[Sem zadejte text.]

[Sem zadejte text.]

11. The PROVIDER will process, package and ship the MATERIAL in accordance with applicable laws and regulations. RECIPIENT is responsible for ensuring that all permits required for RECIPIENT to receive its order are obtained.
12. Except to the extent prohibited by law, the RECIPIENT assumes all liability for damages, which may arise from its use, storage or disposal of the MATERIAL.. The PROVIDER will not be liable to the RECIPIENT for any loss, claim or demand made by the RECIPIENT, or made against the RECIPIENT or the PROVIDER, by any other party, due to or arising from the use of the MATERIAL by the RECIPIENT, except to the extent caused by the wilful misconduct of the PROVIDER. Except to the extent prohibited by law or to the extent caused by the wilful misconduct of the PROVIDER, the RECIPIENT shall indemnify and hold the PROVIDER harmless against any such claims or demands which are made against PROVIDER.
13. Neither this Agreement nor any rights or obligations contained herein are assignable, whether by operation of law or otherwise, without the prior written consent of the PROVIDER.
14. The version of the MTA applicable to any MATERIAL ordered by the RECIPIENT shall be the version in effect at the time of order placement.
15. Czech laws (with exclusion of its conflict of law provisions) shall govern this Agreement. Czech laws will preempt any conflicting or inconsistent provisions in this Agreement. The Brussels Courts will be exclusively competent to judge any conflict arising out of this Agreement.
16. Invoices are payable at thirty days from invoice date.

## DEFINITIONS

- a. PROVIDER: CCDM (Culture Collection of Dairy Microorganisms)
- b. RECIPIENT: See purchaser on invoice and end user on delivery note if different of purchaser.
- c. DEPOSITOR: legal entity or individual that deposits ORIGINAL MATERIAL in the custody of the PROVIDER.
- d. RESEARCH GROUP: Entitled scientists working in a same laboratory, or contractually bound to work on the same research topic.
- e. MATERIAL: ORIGINAL MATERIAL, PROGENY, and UNMODIFIED DERIVATIVES. The MATERIAL shall not include MODIFICATIONS. The description of the MATERIAL being transferred is on delivery note and invoice.
- f. ORIGINAL MATERIAL: that which was supplied to the PROVIDER by the DEPOSITOR.
- g. PROGENY: Unmodified descendant from the ORIGINAL MATERIAL, such as cell from cell, or organism from organism.
- h. UNMODIFIED DERIVATIVES: Substances created by the RECIPIENT which constitute an unmodified functional subunit of the MATERIAL.
- i. MODIFICATIONS: Substances created by the RECIPIENT using the MATERIAL, which are not ORIGINAL MATERIAL, PROGENY or UNMODIFIED DERIVATIVES, and which have new properties.
- j. LEGITIMATE EXCHANGE: The transfer of the MATERIAL within the Research Group. LEGITIMATE EXCHANGE also includes the transfer of MATERIAL between named culture collections/biological resources centres for accession purposes, provided that further distribution by the receiving culture collections/biological resources centre is under MTA provisions compatible and equivalent as those in place at the supplying collection.



[Sem zadejte text.]

[Sem zadejte text.]

- k. COMMERCIAL USE: the use of the MATERIAL for the purpose of profit. COMMERCIAL USE shall include the sale, leasing, exchange, license, or other transfer of MATERIAL for profit purposes. COMMERCIAL USE shall also include uses of MATERIAL to establish service business activities, to manufacture products, to perform contract research, or to conduct research activities for profit purposes.

Date:

Signature:

#### iv. Ecuador

It is important to mention that a series of projects related to benefit-sharing are being implemented through FAO Ecuador. Thus, we have projects related to:

1. Strengthening of the inclusion process of public purchase from family farming.
2. Technical assistance for the sustainable intensification of quinoa production and strengthening of the food system in the Andean region.
3. Natural resources management in the province of Chimborazo.
4. Conservation and sustainable use of the forest, soil and water in order to achieve the concept of living well in the Napo Province.
5. Use and conservation of agrobiodiversity in public policies through integrated strategies and implementation of in situ conservation in three high Andean provinces.
6. Integrated management of marine and coastal spaces of high biodiversity value in continental Ecuador.
7. Promotion of sustainable livestock management, integrating the reversal of land degradation and reducing the risk of desertification in vulnerable provinces.

Universities, public and private research institutes, non-governmental organizations (NGOs), second-level organizations and local governments are engaged in these projects managed by FAO Ecuador, and are committed to provide counterpart financing for the implementation.

With regard to access to genetic resources, Ecuador has regional laws such as the Andean Community Decision No. 391 establishing the Common Regime on Access to Genetic Resources, and the National Regulation regulating the Common Regime on Access to Genetic Resources in accordance with the Decision of the Andean Community No. 391 (Executive Decree No. 905, 3 October 2011).

#### **Distinctive features and specific practices of the different subsectors of the GRFA**

No progress has been made in Ecuador with regard to this issue, due to the fact that Decision No. 391 and Regulation No. 905 make no distinction on genetic resources in general in terms of access. We agree with the distinctive characteristics in the seven thematic groups identified in the document "Elements to facilitate domestic implementation of access and benefit-sharing for different subsectors of genetic resources for food and agriculture". However, we believe that a more climate-sensitive group should be added, since GRFA permanently contribute to climate change adaptation, and it would be interesting to define some clearly distinct characteristics within the animal, forest and plant genetic resources in order to achieve a better balance between all subsectors of food and agriculture.

With reference to the Annex included in the aforementioned document, we would like to make some suggestions. In the thematic group A, on the role of GRFA in food security, we consider that under paragraph A.1, the animal and plant genetic subsectors should have "+"<sup>3</sup> and the forest genetic subsector should have "-", as the first two represent a bigger contribution to food security. In the thematic group B, on the role of human management, we consider that under paragraph B.2, both animal and plant genetic resources should have "+", since the influence of humans in the domestication of plants is permanent. In the thematic group E, on owners and users of GRFA, we consider that under paragraph E.1, plant genetic resources should have a "+" since these resources are in the hands of many people and institutions. In the thematic group G, on benefits derived from the use of GRFA, under paragraph G.2, forest genetic resources should have a "+", since they generate significant non-monetary benefits such as environmental benefits.

---

<sup>3</sup> Particularly relevant characteristics indicated with a "+" sign and the less (or not) relevant characteristics indicated in the table with a "-" sign.

## v. Germany

The Nagoya Protocol recognizes the interdependence of all countries with regard to GRFA and their importance for achieving food security worldwide and for sustainable development of agriculture in the context of poverty alleviation and climate change.

Germany therefore is of the opinion that national ABS measures for GRFA should support conservation and sustainable use of genetic diversity in all subsectors, especially by:

- facilitating continuous and enhanced exchange of GRFA;
- facilitating international agricultural research collaboration and joint efforts to improve GRFA;
- mutually supportive implementation of the International Treaty on Plant Genetic Resources for Food and Agriculture and of the Nagoya Protocol on ABS;
- being simple, transparent and light in structure (with low transaction costs);
- building upon existing practices of exchange;
- considering the creation of common goods (in public domain);
- considering standardisation of procedures;
- providing a maximum of legal certainty for users.

### **Germany – Practical experiences in implementing national ABS measures related to GRFA:**

As a Contracting Party to the Plant Treaty, Germany provides PGRFA under its management and control under the conditions set out in the SMTA of the Plant Treaty.

Germany has been a Contracting Party to the Nagoya Protocol since 20 July 2016. Germany did not develop specific regulations on access to plant genetic resources on its territory within the scope of the Convention on Biological Diversity and its Nagoya Protocol. Instead, Germany recognizes the private property and relevant legislation for plant genetic resources, such as nature conservation laws. There is no requirement for a PIC by the Federal Government or need to draft mutually agreed terms.

As an EU Member State, Germany is bound by the Regulation (EU) No 511/2014, that entered into force on the same day as the Nagoya Protocol (12 October 2014). The EU ABS Regulation implements in the EU those international rules (contained in the Nagoya Protocol) that govern user compliance – i.e. what users of genetic resources have to do in order to comply with the rules on ABS established by the countries providing genetic resources. In Germany, the EU legislation is supplemented by the Act Implementing the Obligations under the Nagoya Protocol and Transposing Regulation (EU) No 511/2014, which entered into force on 1 July 2016.

The German competent national authority has developed and is implementing various capacity building and awareness raising measures, such as stakeholder meetings and information materials.

The main aspects of feedback by users of GRFA are:

- There is need for further training because of the complexity of different ABS measures around the globe and many details that still need to be clarified.
- Uncertainty in the case of domesticated species: it is often unclear which country has to be regarded as the country of origin, since not in all cases it is clear how to determine which is the country where a GRFA has developed its distinctive properties (CBD, Article 2).
- Utilization of commercial varieties for plant breeding: it is unclear whether and how countries can exercise sovereign rights over such resources especially when these countries are members of the International Union for the Protection of New Varieties of Plants (UPOV).
- It is often unclear to what extent privately-held genetic resources are included in the existing ABS measures of the country of origin.
- Work with commodities is often hampered by a lack of information about their country of origin and applicable ABS legislation.
- Uncertainties concerning activities preceding research and development, e.g. large-scale screenings in order to select target resources for further research and development.

Even at the European level, despite Regulation (EU) No 511/2014 and Implementing Regulation (EU) 2015/1866 being in force, many questions regarding a balanced and feasible implementation of the Nagoya Protocol are still in discussion and basic questions are not sufficiently clear. This continues to create legal uncertainty among users and hampers the conservation and sustainable use of GRFA, especially in international cooperation projects and for smaller companies and research institutions without comprehensive legal capacity and sufficient financial resources to enter into potential legal disputes.

With a view to achieving a mutually supportive implementation of the Nagoya Protocol and the ITPGRFA, we think all Parties involved could benefit from learning from existing experiences. The German Development Cooperation together with the CBD Secretariat and partners has convened several workshops with African National Focal Points for the CBD and/or the Nagoya Protocol as well as for the ITPGRFA. We plan to inform participants about the approaches, outcomes and lessons of these workshops at the forthcoming international ABS workshop convened by the CGRFA.

## **vi. India**

More awareness on the concept of access and benefit-sharing in view of special situation of genetic resources for food and agriculture is required. In the case of PGRFA, the International Treaty provides guidance on policy, principles and considerations but other than for PGRFA no such guidance is available. The successful use of the Standard MTA under the Treaty is a useful model but does not specifically address ABS on components other than PGRFA.

In pursuance of the Nagoya Protocol on access to genetic resources and the fair and equitable sharing of benefits arising from their utilization, the national Biodiversity Authority notified regulations called Guidelines on Access to Biological Resources and Associated Knowledge and Benefit Sharing Regulations, 2014.

Through the mechanism of plant variety registration enshrined in the Protection of Plant Varieties and Farmers' Rights Act (PPV&FRA), 2001, the Authority encourages individual farmers and community groups to seek intellectual property protection for the plant varieties that they have developed or conserved. This process is mentored by State Agricultural Universities/ ICAR Institutes/KVKs etc.

The procedure for a grant of an intellectual property right (IPR) generates a morphological description of the variety and will be helpful for the gene pool for future plant breeding. Apart from this, there are several provisions in the PPV&FRA, 2001, and statutory guidelines to identify use of such varieties in the plant breeding activities.

Annual fees payable by the plant breeders are deposited in the National Gene Fund under Section 45 of PPV&FRA 2001 including provisions for benefit sharing proceeds for access to genetic resources.

Authorities regularly interact with the National Biodiversity Authority, which is the nodal department to implement the ABS mechanism in India, and provide inputs and details of plant varieties registered under the Act so that benefit-sharing can be invoked in cases where access is sought for such varieties to use as genetic resources in plant breeding leading to commercialization.

PGR – Action through Ad Hoc Working Group in the Treaty.

## **vii. Norway**

The Commission considered access and benefit-sharing (ABS) for genetic resources for food and agriculture and, *inter alia*, agreed to produce non-prescriptive explanatory notes describing, within the context of the *Elements to facilitate domestic implementation of access and benefit-sharing for different subsectors of genetic resources for food and agriculture* (ABS Elements), the distinctive

features and specific practices of different subsectors of genetic resources for food and agriculture, to complement the ABS Elements. It invited Members, observers and other stakeholders to provide relevant inputs for such explanatory notes by electronic means, including on: (i) their practical experiences in implementing national ABS measures related to genetic resources for food and agriculture; and (ii) the distinctive features and the specific practices of different subsectors of genetic resources for food and agriculture.

In brief, Norway's main experiences regarding national ABS measures are:

- Nature Diversity Act, which was adopted in 2009, is the main national legal instrument to implement the CBD and the Treaty. Section 58 (collection and utilization of genetic material obtained from the natural environment) in Chapter VII (access to genetic resources) provides an exemption for GRFA from access regulation: "Collection for use in public collections and for use and further breeding or cultivation in agriculture or forestry does not require a permit".
- IPRs: Both the patent act and the plant breeders' rights act have requirements for disclosure of origin.
- Access: Plant genetic resources: The Nordic Genetic Resource Centre (NordGen) is the genebank maintaining germplasm of Nordic origin as well as material relevant for the Nordic region. NordGen is under common Nordic control and management. The seed material stored at NordGen is available upon request for plant breeders, plant researchers, museums and other bona fide users. Germplasm is available in small quantities for research, breeding, conservation or similar purposes. All PGR stored at NordGen – Annex 1 and non-Annex 1 – are being distributed under the conditions of the SMTA, as a result of the so-called 'Kalmar Declaration' of 2004. The Norwegian use of MTA's corresponds with the Nordic approach: all PGR regardless of Annex 1 and for research, breeding and training for food and agriculture are handled with SMTA. All PGR for any other professional use are handled with Nordic/(Norwegian) MTA mirroring the SMTA and encouraging to contribute voluntarily to the Treaty on equal terms as the SMTA. All use for private hobby purposes is handled with Hobby MTA or equivalent information.  
<http://www.nordgen.org/ngdoc/plants/AccessandAcquisitionGuidelines.pdf>. The private breeding company, Graminor, is encouraged to include their varieties in the MLS when the plant variety protection (PVP) has expired. NordGen has also encouraged companies to include their material in NordGen in agreement that NordGen only will provide access to that material after the expiry of PVP. Community seed bank/user gene bank: Norway has established a national community seed bank with traditional varieties with easy access to farmers. [http://www.skogoglandskap.no/filearchive/bruksgenbanken\\_for\\_korn1.pdf](http://www.skogoglandskap.no/filearchive/bruksgenbanken_for_korn1.pdf)
- Access AnGR: Most of the gene banks for AnGR are owned by breeding associations organized as farmers' cooperatives. Genetic material (mainly semen) from these gene banks is available for purchase under the same conditions as other semen sold from the same companies.
- Benefit sharing: PGA: Since 2009, Norway has given an annual contribution to the Benefit Sharing Fund (BSF) equal to 0.1 percent of seed distribution in Norway. The annual contribution in 2017 constituted about USD 90 000. In addition, Norway donated another 40 million NOK to the BSF in 2013.

Specific practices of different subsectors of genetic resources for food and agriculture:

- Plants: In short, the approach established by the Multilateral System of the Treaty is guiding the way of access for all PGRFA.
- Animals: The main users are farmers' cooperatives having their own well-established rules for accessing and selling AnGR. The main organizations are: Geno, which is the breeding organization of Norwegian Red, the main dairy breed in Norway. The cooperative system gives the farmer members the power to influence the development of the Norwegian Red breeding programme. While Norsvin is Norway's pig breeding organization, the cooperative slaughterhouse (Nortura) and the private slaughterhouses respectively own the Duroc and Hampshire breed. Therefore, in Norway, pig producers who wish to use these breeds have to be a member of the relevant slaughterhouse entity to have access to the breeding material. Breeding material of the Norwegian Landrace (owned by Norsvin) does not have



corresponding restrictions. Norsk sau og geit (NSG) is the organization for Norwegian sheep and goat farmers and NSG is also the breeding and semen organization for sheep and goat in Norway. The Norwegian experiences are included in the submission of the European Regional Focal Point for Animal Genetic Resources (ERFP) to the ITWG-AnGR in 2014 (<http://www.fao.org/3/a-at600e.pdf>).

- Forests: Relevant studies describing the sector in Norway:
  - Seeking appropriate Legislation Regulating Access and Exclusive Rights to Forest Genetic Resources in the Nordic Region (FNI Report 9/2011; [https://www.nordgen.org/wp-content/uploads/2017/02/Report\\_ABS\\_ForestGR\\_2011.pdf](https://www.nordgen.org/wp-content/uploads/2017/02/Report_ABS_ForestGR_2011.pdf)).
  - Access and rights to forest genetic resources in the Nordic region – Current situation and future perspectives (Myking, T. *et al.*, 2012; (Chapter 2 is particularly relevant: *What is special about forest trees?*) [https://www.nordgen.org/wp-content/uploads/2017/02/2012520\\_press\\_TemaNord\\_Access\\_and\\_rights.pdf](https://www.nordgen.org/wp-content/uploads/2017/02/2012520_press_TemaNord_Access_and_rights.pdf)).
  - Protection of forest genetic resources by intellectual property rights – exploring possibilities and conceivable conflicts (Myking, T. *et al.*, 2017; Scandinavian Journal of Forest Research).

These studies state that open and flexible solutions for the exchange of forest genetic resources (FGR) are essential for sustainable forest management and for mitigation and adaptation to climate change. The development and use of vegetative propagation techniques in breeding, hereunder somatic embryogenesis, may increase the likelihood of patenting FGR and could call for other measures on ABS also in the Nordic countries. Consideration could therefore be given to which extent the increased use of biotechnological methods in the forest sector for production of forest reproductive material should have an impact on the regulation of access and benefit-sharing in the future.

We hope that these inputs will be useful for the preparations of the study on food security and further work on ABS. Please do not hesitate to contact us for further information or clarifications.

## **viii. United States of America**

### **USA Animal and Aquatic Genetic Resources**

The following provides an overview of practices and issues as they relate to access and benefit sharing for animal and aquatic genetic resources. While many of the points are derived from information on livestock, they are equally applicable to aquaculture.

Terrestrial and aquatic livestock genetic resource development and use in the United States underpin food security and economic growth on a global scale. Over time U.S. livestock producers have accumulated extremely diverse populations or breeds within species. Over the last three centuries, breeds have been imported from Europe, Asia, and Africa. Once imported the populations have been modified extensively through genetic selection to where 66% of the top five breeds (in terms of countries where they are located) for cattle, pigs and chickens originated in the United States. Active breeding programs led by the private sector have resulted in increasing demand for U.S. germplasm.

Key points:

- The animal and aquatic subsectors are characterized by private ownership of livestock and their genetics, with more than 900,000 private livestock owners in the United States.
- Terms of sale for animal genetic resources are determined between buyer and seller. Price is based upon supply and demand and mutually agreed upon terms of sale. There are a number of informational sources that buyers and sellers can use to estimate market value.
- The United States leads the world in exports of bovine, swine and poultry genetics. For example:
  - At least 50% of the global broiler market utilizes genetics from U.S.-based companies

- *Figure 1* illustrates the market value of dairy and beef cattle semen exports, imports, and domestic use; for 2016, the value of U.S. exports of dairy cattle semen was seven times larger than domestic use. (NAAB, 2017)
- The US is a major exporter of eyed salmonid eggs, however, the United States also imports genetic resources from Canada and Denmark.
- Canada is the principal source of livestock genetic resources imported to the United States, followed by European countries.
- In 2016, Bovine imports only accounted for 0.01% of the total value of livestock genetic resource exchange in the United States.
- Non-Canadian imported livestock genetic resources have largely been ineffective and typically disappear from the population after two or three generations.
- Imports of non-OECD animals face the challenge of coming from environments and management systems that may differ greatly from U.S. systems. In general, this means that a successful import would need to be genetically superior for multiple traits — not just for a single trait. Meishan pig (China) and Tuli cattle (Southern Africa) importations are examples of breeds that had interesting characteristics in the countries of origin but have not proven successful under US production and market conditions. The Meishan example demonstrates that importing animals for the incorporation of a single trait is not an effective strategy for the livestock industry, although it is commonly used in plant breeding.
- The main impediment to introgressing genes from non-OECD breeds has been – and will likely continue to be – the large genetic correlations between desirable and undesirable traits. As a result, U.S. breeders have been more effective by selecting within their current pool of genetic resources rather than importing new breeds or lines.
- It has recently been shown that U.S. *Bos taurus* cattle (e.g., Hereford) have genetic diversity that can be used to adapt to climate change. In addition, the United States already has many *Bos indicus* breeds that are known for heat tolerance. Therefore, it is unlikely that U.S. breeders will need to obtain genetic resources from outside the country to adapt to changes in climate and other associated factors.
- Sharing information, such as information on genetic merit and performance in country of origin, can assist exporting and importing countries to build stronger markets for genetic resources.
- Tracking the exchange/dissemination of imported or exported germplasm is difficult, costly and impractical. For some breeds it would require tracking the exchange of genetic resources among thousands of producers and animals. Genetic material from a single animal can be used to produce thousands of offspring around the world, for example, the U.S. bull JENNY-LOU MRS HL TOYSTORY-ET, born in 2011, has fathered 155,740 daughters in 28 countries.

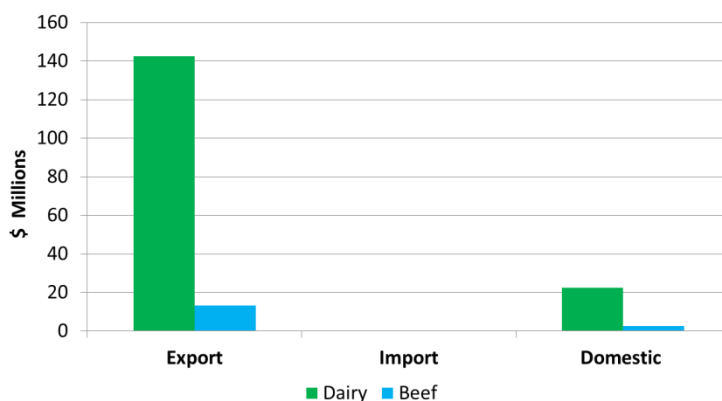
#### Features defining exchange of animal and aquatic GRFA:

- Domestically:
  - Exchange is based upon a mutually agreed upon price by buyer and seller
  - No Federal or state regulations control the exchange of animal genetic resources
  - Buyers and sellers have access to market information to assist in determining price point
- Internationally:
  - US breeders and breeding companies are free to develop international markets
  - Private owners are free to export genetic resources, even if it might be detrimental to U.S. domestic breeders or producers
  - Exchange is based upon a mutually agreed upon price by buyer and seller
  - The United States does not have regulations governing the export of animal genetic resources, other than international health regulations developed at the World Organization for Animal Health (OIE)

#### Concerns regarding development and implementation of national ABS measures:

- ABS mechanisms should not be used as a way to erect trade barriers. The following are current and typical examples of mechanisms that have been used to protect domestic industries:
  - Switzerland had a 5 CHF (~\$5.00) tariff on each unit of bull semen imported (a typical price per unit of semen ranges from \$15 to \$25). USDA/FAS worked with Switzerland to remove the tariff resulting in an increase of US sales in Switzerland by 50% and raised the value of US exports to \$2.5 million.
  - Other non-tariff barriers exist. For example, introduction or increase of fees for registration or breeding index calculation of imported livestock genetics, which can hinder export of genetic resources.
- A recent study shows that ABS regulations may inhibit the international exchange of genetic resources (Welch, 2017). Researchers from developing and developed countries were surveyed about their experiences accessing genetic resources since the introduction of the FAO International Treaty on Plant Genetic Resources for Food and Agriculture and Nagoya Protocol. In general survey results suggest that these ABS instruments have been more inhibitory than stimulative in their effect on research.
- If genetic resources are not used, they are doomed to disappear, so breeders should be encouraged to exchange genetic resources on the domestic and international levels. For example:
  - The U.S. population of Large Black pigs is small. Breeders partnered with a non-governmental organization (NGO) and the U.S. Department of Agriculture's Agricultural Research Service (UADS/ARS) to import semen from the United Kingdom, where the breed originated, to introduce new genetic variation into the U.S. population. As a result of this effort a fruitful series of discussions have been initiated between UK and U.S. breeders and their respective NGOs on how they might work together and be mutually supportive in conserving Large Black genetics in both countries.

**Figure 1. Exports, Imports, and Domestic Sales of Dairy and Beef Cattle Semen in 2016.** (from NAAB)



Relevant literature:

**Blackburn, H. & Gollin, D.** 2009. Animal genetic resource trade flows: the utilization of newly imported breeds and the gene flow of imported animals in the United States of America. *Livestock Science*, 120: 240–247.

**Blackburn, H.D. et al.** 2017. A fine structure genetic analysis evaluating ecoregional adaptability of a *Bos taurus* breed (Hereford). *PLoS One* (available at <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0176474>).

**Gollin, D., Van Dusen, E. & Blackburn, H.** 2009. Animal genetic resource trade flows: Economic assessment. *Livestock Science*, 120: 248–255.

**NAAB (National Association of Animal Breeders).** 2017. *NAAB Electronic Resource Guide*. (available at <http://www.naab-css.org/sales/table37.html>).

**USDA Foreign Agricultural Service.** 2016. *Gain Report: global agricultural information* (available at [https://gain.fas.usda.gov/Recent%20GAIN%20Publications/U.S.%20Bovine%20Semen%20Exports%20Grow%20with%20Removal%20of%20Trade%20Barrier%20Geneva%20WTO%20Mission%20Switzerland\\_1-25-2016.pdf](https://gain.fas.usda.gov/Recent%20GAIN%20Publications/U.S.%20Bovine%20Semen%20Exports%20Grow%20with%20Removal%20of%20Trade%20Barrier%20Geneva%20WTO%20Mission%20Switzerland_1-25-2016.pdf)).

**Welch, E.W., Fusi, F., Louafi, S. & Siciliano, M.** 2017. Genetic resource policies in international collaborative research for food and agriculture: a study of USAID-funded innovation labs. *Global Food Security*. (In Press)

## USA Forest Genetic Resources

### Key points:

- Among those organizations that typically send forest tree seeds overseas, such as the US Forest Service facilities and university cooperatives, there are two common experiences:
  - Most wild collections from public lands only deal with payment for collection and phytosanitary issues. Access and benefit-sharing agreements are not typically required.
  - University cooperatives and private industry freely move clones across country national borders, but within their existing networks (i.e., coop members or the company in question). In these cases, the genetic resources are already considered the property of an entity.
- The USDA/ARS National Plant Germplasm System (NPGS) has several sites that include germplasm of forest genetic resources. These include:
  - Woody Landscape Plant Germplasm Repository, Washington, DC
  - National Clonal Repository, Davis, CA
  - National Clonal Repository, Corvallis, OR
  - National Clonal Repository, Hilo, HI
  - National Clonal Repository, Riverside, CA
  - North Central Regional Plant Introduction Station, Ames, Iowa
  - National Pecan, Hickory and Chestnut Repository, Brownwood, TX
  - Plant Genetic Resources Unit, Geneva, NY
  - National Germplasm Repository, Miami, FL
  - National Germplasm Repository, Mayaguez, PR
- All of these sites follow NPGS policies on acquisition and distribution of germplasm, presented below. The germplasm at these sites has been collected from across the United States and from around the world.
  - Distribution: Germplasm in the NPGS is available for distribution for use in research, breeding and education. No MTAs are required unless the accessions are covered by the SMTA of the International Treaty on Plant Genetic Resources for Food and Agriculture. The required phytosanitary authorizations must be obtained before distribution.
  - Acquisition: Only germplasm that can be distributed according to the NPGS distribution policy is accepted into the NPGS collections. Some germplasm is acquired through the NPGS Plant Exploration Program. For explorations in other countries, USDA/ARS requests prior informed consent from the National ABS Authorities. If the authorities require limitations on use or distribution of germplasm, NPGS does not collect the germplasm. The NPGS cannot accept claims on profits that may arise from future commercialization of germplasm as it lacks the legal

authority and managerial capacity to monitor or enforce such claims. In the US, germplasm is collected for the NPGS with the permission of the landowner.

- The NPGS promotes and provides benefit sharing in the form of non-monetary benefits through capacity building activities, such as sharing collected germplasm and herbarium specimens, transfer of information and technology, collaboration in publication of research results, training of host country scientists, and support for projects on ex situ and in situ conservation in the country.
- The USDA Forest Service distributes forest genetic resources on an occasional basis, typically through the USDA Forest Service National Seed Lab. The seed is typically wild-collected from federal lands. As with the NPGS, seed is available for distribution for use in research, breeding and education, with no MTAs required.
- The USDA Forest Service occasionally works with entities from other countries to assist in wild collections for research purposes. There are no MTAs associated with these collections.

The United States supports the points covered in Appendix D of the report of the third meeting of the Intergovernmental Technical Working Group on Forest Genetic Resources for Food and Agriculture (CGRFA/WG-FGR-3/14/Report), which are reiterated below:

Aspects of forest genetic resources to consider when dealing with access and benefit-sharing:

- FGR are often undomesticated species and populations.
- Forest species migrate on their own (albeit slowly) and do not recognize borders.
- There is a long history of moving species around the world. Many plantation programs depend on exotic species (e.g. Pinus, Eucalyptus, Gmelina, etc).
- Many of the benefits derived from forests are “ecosystem services” and are difficult to value. Unlike production crops, it is difficult to put a monetary value on what may come from a breeding or restoration program.
- The benefits derived from tree breeding take decades to realize. Breeding intervals range from 10 to 15 years, plantation ages can range from 8 to 40 years. A temperate forest tree breeding program would need close to 35 years to see any real economic value from a material transfer (maybe less if the seed could be sold for increased value, but the economic benefit of the seed would be minimal).
- Unlike agricultural crops, a forest does not need a new crop every year; there is no large market for seed sales as is the case for corn, beans, rice, etc.
- Disease resistance is a key trait for which exotic germplasm is often needed. Aspects to consider:
  - Sometimes the benefits are simply establishment of a healthy forest, with no plans for harvest in some cases;
  - Often the disease for which resistance is sought through breeding programmes originates from the same region of the germplasm (i.e., the problem originated from the source of the resistance).

## **ix. ABS Task Force of the European Regional Focal Point on Animal Genetic Resources**

**Elżbieta Martyniuk<sup>1</sup>, Beate Berger<sup>2</sup>, Danijela Bojkovski<sup>3</sup>, Sipke Joost Hiemstra<sup>4</sup>, Alwin Kopše<sup>5</sup>, Vera Matlova<sup>6</sup>, Nina Sæther<sup>7</sup>**

<sup>1</sup> Warsaw University of Life Sciences/National Research Institute of Animal Production

<sup>2</sup> AREC Raumberg-Gumpenstein, Institute of Organic Farming and Biodiversity of Farm Animals

<sup>3</sup> University of Ljubljana, Biotechnical faculty

<sup>4</sup> Centre for Genetic Resources, the Netherlands (CGN), Wageningen University and Research

<sup>5</sup> Unit for International Affairs, Sustainable Development, Food Systems, Federal Office for Agriculture, Switzerland

<sup>6</sup> National Centre for Animal Genetic Resources, Institute of Animal Science Praha Utrineves, Czech Republic

<sup>7</sup> Norwegian Genetic Resource Centre, Norwegian Institute of Bioeconomy Research

The submission describes the distinctive features and specific practices related to animal genetic resources for food and agriculture (AnGR). It provides an analysis of a number of descriptors included in the seven clusters of the distinctive features of Genetic Resources for Food and Agriculture (GRFA) that require distinctive solutions for ABS (FAO, 2016a – Annex to the the ABS Elements document) and their relevance for AnGR.

Further detailing of AnGR subsector-specific features will provide input to the non-prescriptive explanatory notes that the Commission on Genetic Resources for Food and Agriculture decided to develop at its last session in 2017. These notes are meant to describe, within the context of the ABS Elements, the distinctive features and specific practices of different subsectors of GRFA.

### **A. The role of GRFA for food security**

**A.1 GRFA are an integral part of agricultural and food production systems and play an essential role in achieving food security and the sustainable development of the food and agriculture sector.**

A highly relevant feature. Animal genetic resources play a key role in food production systems. Herbivore species transform vegetation of pastures, rangelands and marginal areas that would not be otherwise used as human food into a high-value nutritional products such as milk and meat. Livestock also utilize by-products from the crop production that otherwise would be wasted. This role of livestock is highly relevant in extensive and mixed farming systems.

Moreover, in some regions of the world, livestock production is the only viable agriculture option, supporting sustainable development, providing livelihoods for many pastoral communities, herders and ranchers and contributing to their food security.

The rapid increase of global livestock production observed since the end of the twentieth century has been fuelled by growing demand for products of animal origin. It is estimated that, by 2050, the world's population will reach 9.1 billion, and this will require a substantial increase in global food production, 70 percent by 2050 (FAO, 2009). Annual cereal production will need to rise to about 3 billion tonnes and annual meat production will need to reach 470 million tonnes (FAO, 2009). Total milk consumption is predicted to increase from 487 million tonnes in 2002, to 880 million tonnes in 2050 (Thornton, 2010). Livestock production has to deliver demanded animal origin products.

It is also estimated that meat consumption per capita in developing countries would increase from 28 kg in 2002 to 44 kg in 2050, and milk consumption from 44 kg to 78 kg respectively (Thornton, 2010). In developed countries, the respective values in the years 2002 and 2050 for meat per capita consumption are 78 kg and 94 kg, while for milk consumption 202 kg and 216 kg. Growing livestock production has contributed to enhanced global food security and the better nutrition of billions of people and will do so in future.

It is important to underline, that food products of animal origin are characterized by high nutritional value and are a complete source of protein. They contain all essential amino acids needed for human growth and maintenance, as well as providing water-soluble vitamins, especially B12.

**A.2 Plant, animal, invertebrate and micro-organism GRFA form an interdependent network of genetic diversity in agricultural ecosystems.**

A highly relevant feature. Livestock species are further along the food chain so their survival and production depends on the quantity and quality of fodder of a plant origin. Also livestock grazing is shaping landscape of various types of rangelands, forests and marginal areas and preventing succession

through vegetation control. Livestock movement over grazing areas and during annual migration supports spreading of seeds and livestock dung creates habitats for various insect species. Moreover, livestock add value to non-human-edible plants and products.

Livestock manure is the most valuable organic fertilizer that enriches soil, improving its structure and oxygen capacity, and provides nutrients for plants and habitats for numerous species living in the soil.

## **B. The role of human management**

**B.1 The existence of most GRFA is closely linked to human activity and many GRFA can be regarded as human-modified forms of genetic resources.**

This is a feature super-relevant to AnGR. The last analysis of the status of AnGR in 2016 (FAO, 2016a) indicates a global total of 8 822 breeds; 7 761 are local breeds and 1 061 are transboundary breeds (including 499 regional transboundary breeds and 562 international transboundary breeds). Seven percent of these 643 breeds were classified as extinct.

The wealth of existing breeds, lines and varieties of AnGR has been developed over centuries with the contribution of generations of farmers, breeders and pastoral peoples. These AnGR departed far away from their domesticated wild ancestors that in many cases no longer exist.

Breed development has followed two patterns. In the case of livestock kept in diverse and often quite difficult environmental conditions, when potential for human intervention was limited, the major issue was adaptation to these conditions. This development pattern was typical for most of the world's AnGR. Over a long period of time, local breeds became adapted to many differing, very specific and unique environments, including temperature, precipitation, altitude and food resources, as well as husbandry conditions.

The second development pattern was observed in the case of a small number of mainstream breeds that are used in commercial production. Over time, breeders and livestock scientists made many efforts to understand the various needs of these animals (including feeding, housing, prophylactics and welfare) and have selected individuals able to use most efficiently good production conditions. Continuous enhancement of understanding of livestock needs and fulfilling these needs led to development of highly performing mainstream breeds, which became international breeds and provided the genetic base for the development of livestock revolution.

Continuous human activity resulted in the creation of extremely diverse phenotypes within the same species, for example small cattle breeds in India (Keral, body weight of 230 kg) and huge beef breeds in Italy (Chianina, body weight of 2 000 kg; (Flanders and Gillespie, 2015). Successful selection programmes led to diverse performance, for example the typical milk yield of local Massai cattle is around 1 000 kg per year, while some Holstein cows can produce over 15 000 kg, and many herds reach on average over 10 000 kg of milk per cow per year.

**B.2 The maintenance and evolution of many GRFA depend on continued human intervention, and their sustainable utilization in research, development and production is an important instrument with which to ensure conservation.**

This is also a crucially relevant feature of AnGR. Modern, mainstream breeds are highly dependent on human management, and some are fully dependent in many aspects of their welfare and survival. For example, dairy breeds require a well-balanced diet to support high production, and will express metabolic disorders when challenged by inadequate feeding. Laying hens kept in intensive production systems have lost their brooding instinct. The heaviest lines of turkeys are unable to reproduce without artificial insemination (AI), as selection towards high meat production has led to the establishment of huge changes in body weight of males and females that prevent natural mating.

Most of the mainstream breeds will not express their potential for production and may suffer, for instance, from disturbed resource allocation, disturbed immunocompetence or metabolic defects when human management does not meet their needs, developed over generations of selection.

Research is instrumental in improving husbandry conditions (especially feeding, housing and health) and the development of more effective selection methods and programmes. Research is also fundamental in the development of conservation methods, both improving efficiency of *in-situ* conservation and development of *ex-situ* through establishment of animal genebanks.

### **C. International exchange and interdependence**

C.1 Historically, GRFA have been widely exchanged across communities, countries and regions, often over long periods of time, and a relevant part of the genetic diversity used in food and agriculture today is of exotic origin.

A relevant feature of AnGR. In the Second Report on the State of the World's Animal Genetic Resources, the global exchange of AnGR is divided into three main phases (FAO, 2015). During the first one, from prehistory until the eighteenth century, livestock movement between regions resulted from migration, warfare, exploration, colonization and trade, and gene flow occurred via gradual diffusion.

During the second phase, from the nineteenth century until the first half of the twentieth century, genetic improvement programmes, based on pedigree and performance recording, were gradually established in Europe and North America, and international gene flow occurred predominantly within these regions, fuelled by technological developments (transportation and communication), demand for high-producing animals and the growing commercialization of animal breeding.

The third phase, from the mid-twentieth century onwards, is characterized by acceleration of gene flow resulting from the growing demand for livestock products, standardization of livestock production systems, globalization of trade, and new technologies such as AI, embryo transfer and genomics.

As domestication of key livestock species took place mainly in Europe, Asia and Africa, the breeds developed there are native to their countries of origin. In both the Americas and in Southwest Pacific, most breeds are locally adapted, as originally they were introduced from Europe.

However, some international breeds/crossbreds developed and managed by the breeding industry are of a mixed origin, and their genetic make-up is often considered as a trade secret. For instance, recent research in pigs shows that there is a clear admixture of 'Asian alleles' and 'non-Asian-alleles' in European commercial pig breeding lines (Bosse *et al.*, 2014).

C.2 Countries are interdependent with regard to GRFA and act both as providers of some GRFA and as recipients of others.

A highly relevant feature of AnGR. Availability of high-performing, mainstream AnGR that ensured enhanced output and profitability in commercial production resulted in growing demand for such breeding stock. Over time, countries have become increasingly dependent on imported AnGR, especially for intensive production systems.

Accelerated exchange was supported by commercial aviation that enables the fast movement of animals and their reproductive material all over the world.

While theoretically countries can act both as providers of some AnGR and as recipients of others, the major gene flow of AnGR is very specific, quite stable and is mainly focused on international mainstream breeds and crossbreds.



At present, the gene flow in AnGR is mostly between developed countries (North–North) and from developed countries to developing countries (North–South), so progress achieved in selected populations is transferred to recipient countries through consecutive generations of acquired breeding stock. Currently, gene flow South–South is rather low or less documented, while the flow South–North is negligible (Mathias and Mundy, 2005; Zárata *et al.*, 2006; Gollin *et al.*, 2008; FAO, 2015).

However, exchange of AnGR for research purposes is more complicated and does not necessarily follow the patterns above.

**C.3 The international exchange of GRFA is essential to the functioning of the sector, and its importance is likely to increase in future.**

A super-relevant feature of AnGR. The international trade in highly-performing AnGR, especially in poultry, pigs and dairy cattle, is fundamental for further development of intensive production systems all over the world to meet growing market demand for animal origin products. The breeding industry plays an instrumental role in providing AnGR of high genetic potential for milk, meat and egg production.

International exchange of AnGR is very important for research in light of future challenges, such as climate change and potential epidemics of animal diseases. As a first step, a comprehensive characterization of AnGR at the phenotypic and genetic levels is required to be able to match future livestock production needs with globally availability of AnGR.

In this context, future exchange between South–South and South–North may increase. There are already examples of climate change related changes in breeds and species distribution and utilization (e.g. a growing interest in camel utilization in Kenya: <https://www.newsdeeply.com/womenandgirls/articles/2016/07/13/in-kenya-women-find-freedom-in-camel-milk> ).

#### **D. The nature of the innovation process**

**D.1 The innovation process for GRFA is usually of incremental nature and the result of contributions made by many different people, including indigenous and local communities, farmers, researchers and breeders, in different places and at different points in time.**

This feature was indeed relevant in the past, but its importance is changing at present. In many local populations, breed development and improvement have been incremental in nature and included contributions made over a long period of time by generations of farmers, breeders, pastoral communities and researchers and it continues to be like that at present.

Since the 1980s, in mainstream breeds, and especially in the pig and poultry sectors as well as in a part of the dairy sector, the contribution of the breeding industry became increasingly important in carrying out breeding work and providing stock for their customers. Most breeding companies are working on their own populations, lines and strains of AnGR and are solely responsible for the outcome of their selection and crossbreeding programmes.

**D.2 Many GRFA products are not developed out of an individual genetic resource, but with the contributions of several GRFA at different stages in the innovation process.**

The relevance of this feature is generally limited to crossbreeding schemes.

Selection in livestock breeds is usually carried out within purebred populations, and genetic progress is being cumulated over many generations of selection. Sometimes, upgrading is also used in breeding programmes of purebred populations in order to bring some desirable traits present in other breeds. Backcrossing is used to gradually replace a given breed by another, usually an imported breed that is

more productive. Nevertheless, generally, breeding programmes are based on continuous improvement of purebred populations and do not involve several different AnGR.

Development of synthetic lines and breeds involves at least two and sometimes several other breeds, but this breeding method, often used in the past, has a rather limited application at present.

However, this feature is very relevant in livestock when animals are used for meat or egg production. In intensive production systems, crossbreds of at least two parental and often four grandparental components are being commonly used. Recently, rotational crossbreeding schemes are being applied for milk production in dairy cattle.

In animal breeding, utilization of bastards (crossbreds between species) is also very limited; mules provide such examples.

**D.3 Most products developed with the use of GRFA can in turn be used as genetic resources for further research and development, which makes it difficult to draw a clear line between providers and recipients of GRFA.**

A relevant feature for AnGR entering the market place as live animals. While animals are sold for slaughter most of them can still be used for reproduction and for research and further development.

Animal-origin products such as milk, meat, eggs, skins and fibre cannot in general be used as GR directly. It is however possible to develop clones of animals providing such products when sophisticated techniques such as somatic cell nuclear transfer are applied.

For some animal breeding stakeholders, their role as providers (breeding industry) and recipients (livestock commercial producers) is clearly defined, while it is difficult to draw a clear line between providers and recipients of GRFA in the communities of breeders/farmers or pastoral communities when they can be both providers and recipients of AnGR.

**D.4 Many agricultural products reach the market place in a form in which they may be used both as biological resources and as genetic resources.**

As explained above, it is not a relevant feature for most animal products (food of animal origin/wool/skins, etc.). It is also not relevant for reproductive material such as semen, oocytes or embryos unless used in reproduction to generate progeny.

However, it is relevant for live animals sold for slaughter, a trade that has a substantial share of the meat market.

## **E. Holders and users of GRFA**

**E.1 GRFA are held and used by a broad range of very diverse stakeholders. There are distinct communities of providers and users with respect to the different subsectors of GRFA.**

A highly relevant feature for AnGR, a range of very diverse stakeholders are involved in this sector, keeping and using AnGR. Some stakeholders belong to distinct communities, playing a single role, either as providers (e.g. breeding industry, breeding organizations) or users of AnGR (e.g. commercial producers), while others (e.g. farmers, breeders, pastoral communities) may play both roles.

**E.2 The different stakeholders managing and using GRFA are interdependent.**

A relevant feature, as in general different stakeholders manage and use AnGR on their own and make independent decisions.

Breeders participating on a voluntary basis in breeding programmes have to fulfil all requirements related to their role and contribution to pedigree control, performance recording and breeding value estimation. The same applies for participation in any quality assurance schemes, when use and management of AnGR have to follow specific rules to ensure the required quality of any products of animal origin.

There are also examples where within cooperative types of breeding organizations, individual members have to obey additional rules established by their organization; for instance, they are not allowed to sell breeding stock abroad without authorization (e.g. GENO).

In many cases, commercial producers are bound by contracts with breeding companies that are providing their reproductive material or animals for production (e.g. eggs for hatching/one-day-old chicks, young gilts and boars/weaners). Such contracts may prescribe how this material should be used (e.g. feeding) and managed (e.g. housing and prophylactics) and the contract may indicate if the material can be used for any other purpose by a producer or by a third party.

Growing vertical integration (including breeding, intensive commercial production and the processing/wholesale sector) may further limit the independence of individual stakeholders regarding management of AnGR.

### E.3 A significant amount of GRFA is privately held.

A highly relevant feature. In terms of ownership and property rights, most jurisdictions do not differentiate AnGR into the genetic material and the genetic information contained therein.

The majority of AnGR is privately owned, including animals owned by individual farmers, breeders and pastoral communities, as well as breeding organizations (animals belong to member breeders). Breeding companies/breeding industry can be family owned or have many other forms of private ownership, including corporations, that are on the stock exchange. Animal populations under selection programmes are owned by these entities.

Only a very limited part of the AnGR sector is under public ownership, which includes livestock kept in facilities belonging to various types of public research institutions and at breeding stations belonging to the state/regional administrations. Some herds/flocks can be also kept at farms belonging to public educational institutions, such as vocational schools/colleges and agricultural universities. Also AnGR gene banks usually have a public perspective and public funding.

### E.4 An important part of GRFA is held and can be accessed *ex situ*.

At present, it is not a typical feature of AnGR. Due to the development in reproduction biotechnology, frozen semen and to some extent frozen embryos, mainly in the dairy cattle sector, are subject of trade. However, such cryopreservation is used to support reproduction, and thus, cannot be considered as animal genebanking.

The interest to develop animal genebanks or banks of animal biological material has increased at the beginning of twenty-first century. Such genebanks were established mainly for conservation purposes and they include material both from rare breeds and from mainstream breeds used in commercial production. Their role in supporting mainstream animal breeding is very limited/non-existent so far. However, they play increasingly important roles in providing material for research and supporting *in-situ* conservation programmes of endangered breeds.

According to the second Report on the State of Animal Genetic resources (FAO, 2015), 86 percent of European countries and 55 percent of 129 countries that provided country reports are carrying out *ex-situ in-vitro* conservation programmes.

To support the *ex-situ* conservation and sustainable use of AnGR and various developments related to cryoconservation, in 2015 under the umbrella of the European Regional Focal Point on AnGR (ERFP),

the European Genebank Network for animal genetic resources (EUGENA) was established (Hiemstra *et al.*, 2014). EUGENA will support collaboration between European genebanks enabling the sharing of technical developments and fostering joint activities.

Another development in this area is the Horizon 2020 research project IMAGE (Innovative Management of Animal Genetic Resources in Europe: <http://www.imageh2020.eu/>), initiated in March 2016. The project should deliver knowledge about status of European genetic collections and genomic collections. It should also enhance the state of the art in collecting, storing and using biological resources through the application of the latest developments in DNA technology and reproductive physiology and provide various tools to upgrade animal genebank management.

#### E.5 An important part of GRFA is conserved *in situ* and on farm under different financial, technical and legal conditions.

A super-relevant feature. *In-situ* conservation is the most important method in the case of AnGR. Keeping local breeds on farms, in typical production systems and in regions where they originated from is the best way to ensure maintenance of their specific characteristics and further development, as well as enable their continuous adaptation to environmental conditions. Moreover, *in-situ* conservation creates conditions to maintain and further develop traditional knowledge related to different AnGR.

*In-situ* conservation allows expression of typical roles and functions provided by a given breed. Direct contact with animals enables their further characterization and other research studies, and provides opportunities for using them for education.

As implementation of *in-situ* conservation programmes may face various challenges, it is important to ensure its complementarity with *ex-situ* conservation measures.

In recognition of the importance of *in-situ* conservation, many countries introduced support systems for farmers that are keeping local endangered breeds. In the EU REGULATION (EU) No 1305/2013 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 17 December 2013 (*on support for rural development by the European Agricultural Fund for Rural Development (EAFRD) and repealing Council Regulation (EC) No 1698/2005*) in Article 28 (Agri-environment-climate) there are provisions to support farmers rearing local breeds in danger of being lost to farming, with the maximum payment of 200 euro for Livestock Unit (Annex II). The system is meant to compensate lost profits when farmers use local breeds of lower performance instead of higher performing mainstream breeds.

In the EU Animal Breeding Regulation (REGULATION (EU) 2016/1012 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 8 June 2016 on zootechnical and genealogical conditions for the breeding, trade in and entry into the Union of purebred breeding animals, hybrid breeding pigs and the germinal products thereof and amending Regulation (EU) No 652/2014, Council Directives 89/608/EEC and 90/425/EEC and repealing certain acts in the area of animal breeding ('Animal Breeding Regulation'), some special measures are foreseen to support conservation of endangered breeds.

The EU Animal Breeding Regulation defines endangered breeds as local breeds, recognized by a Member State to be endangered, genetically adapted to one or more traditional production systems or environments in that Member State and where the endangered status is scientifically established by a body possessing the necessary skills and knowledge in the area of endangered breeds. It promotes preservation of endangered breeds or autochthonous breeds and the preservation of the genetic diversity within and between breeds.

In Article 29, the EU Animal Breeding Regulation provides provisions for the European Commission to designate, if required, the European Union reference centres responsible for the scientific and technical contribution to the establishment or harmonization of methods for the preservation of endangered breeds or the preservation of the genetic diversity existing within those breeds. In this

context, the role of a European Regional Focal Point for Animal Genetic Resources might be very important.

#### **F. GRFA exchange practices**

**F.1 The exchange of GRFA takes place in the context of customary practices and existing communities of providers and users.**

A highly relevant feature. Ways and means to exchange AnGR are well established at the local, national and international levels. They are based on a range of practices from customary exchange in pastoral communities and simple oral agreements between farmers or breeders, through formal written agreements between buyer and seller up to very detailed contracts between a breeding company and its customers.

A common feature of most of these exchanges (with some exceptions related to customary exchange) is establishment of a price accepted by both parties, seller and buyer of AnGR, which reflects the value of these resources (live animals, semen, embryos).

**F.2 Extensive transfer of genetic material between different stakeholders along the value chain occurs in research and development.**

It is not a relevant feature in case of AnGR. Research and development in AnGR sector is mainly carried out within purebred populations. Much research is carried out by public institutions or public–private consortia. In the breeding industry, research and development are carried out within populations belonging to the organization (or its members). There is no extensive transfer of genetic material along the value chain between different stakeholders to support research and development of AnGR.

In some cases, the genetic make-up of purebred population of a given breed might be enhanced by upgrading (limited crossing with individuals from other breed).

#### **G. Benefits generated with the use of GRFA**

**G.1 While the overall benefits of GRFA are very high, it is difficult to estimate at the time of the transaction the expected benefits of an individual sample of GRFA.**

This is not a typical feature of AnGR. In the case of a transaction involving live animals of mainstream breeds, usually their breeding value, based on the phenotype, pedigree and performance, is evaluated and available for potential buyers. In well advanced breeding schemes, a breeding value estimated for any animal (using traditional selection index, progeny testing, estimated genomic value, etc.) indicates the expected advantage in performance of progeny obtained by this sire/dam.

With the trade in semen or embryos, the value and benefits coming from using given reproductive material is evaluated by the buyer on the basis of the estimated breeding value of donor sire/donor parents.

In the case of local breeds, especially of small and endangered populations, there might be no information on breeding value or even performance, but the value of a given animal and benefits coming from bringing it to the herd is usually estimated by a buyer breeder, for instance on the basis of its phenotype and pedigree.

So, in the case of AnGR, it is generally possible to judge, at the time of the transaction, the expected benefits coming from using a given breeding animal or the sample of its reproductive material.

**G.2 The use of GRFA may also generate important non-monetary benefits.**

A relevant feature for AnGR. Monetary benefits result from various contributions of AnGR to food production, livelihoods and economic output that include production of animal-origin food, raw materials for light industry (wool, hair, hides, pelts and leather), transport and agricultural draught power, manure and fuel, as well as capital assets and reserves (savings and insurance).

Moreover, AnGR play an important role in poverty alleviation and livelihood development, as they provide almost unlimited opportunities to develop new and attractive diverse products that will generate incomes. Such products include leisure opportunities, such as horse or camel riding.

The list of non-monetary benefits is equally long. It includes socio-cultural roles of AnGR that are regarded as historical witnesses and custodians of local traditions through their roles in maintaining handicrafts, folklore, gastronomy and specific landscapes. In pastoral and other indigenous and local communities, socio-cultural roles includes specific roles of various livestock during social and religious celebrations. Animals also contribute to development of tourism and agro-tourism.

Other important non-monetary benefits result from the ecological roles of AnGR and the provision of regulating and habitat ecosystem services. Grazing of high-nature-value areas contributes to nature protection and biodiversity management, while grazing of marginal areas and other rangelands transforms vegetation into animal products, controls succession and assists in the management of various landscapes, from river valleys to mountain meadows.

Human management of animals over centuries has generated a wealth of traditional knowledge, specific for given breeds, husbandry systems and environmental conditions, closely linked with the purpose of utilization of given AnGR. This traditional knowledge was followed by continuous development of animal science, rapidly enhanced after the Second World War. The availability of a diverse pool of AnGR for various research studies can be also considered as a non-monetary benefit.

### G.3 The use of GRFA may lead to external effects going far beyond the individual provider and recipient.

A highly relevant feature. Use of a single AnGR that has a specific valuable feature (such as a beneficial mutation) may contribute to genetic progress in a selected population and, as a result, contribute to the development of the livestock sector. A beneficial mutation might include genes related to performance, adaptation or resistance to parasites and diseases.

So theoretically, use of a single AnGR over time may have a global impact, resulting in increased food production, efficiency of production and profitability. For instance, a beneficial mutation found in a single cock in a pure chicken line may be transmitted to millions of progeny, broilers or layers used in commercial production.

This impact may be especially profound in intensive production systems due to globalization of animal breeding and relying in commercial production on genetics provided by the breeding industry. The wider impact will be observed in the poultry and pig sectors due to their reproductive potential, as well as in the dairy sector if AI is being used.

Enhanced output and efficiency of livestock production contributes to global food security, better diet and cheaper food, highly important to consumers.

### Literature

**Bosse, M., Megens, H-J. Frantz, L.A.F., Madsen, O., Larson. G., Paudel. Y., Duijvesteijn. N., Harlizius. B., Hagemeyer. Y., Crooijmans. R.P.M.A & Groenen, M.A.M.** 2014. Genomic analysis reveals selection for Asian genes in European pigs following human-mediated introgression. *Nature Communications*, 5: 4392. |DOI: 10.1038/ncomms5392 (available at [www.nature.com/naturecommunications](http://www.nature.com/naturecommunications)).

- FAO.** 2009. How to feed the world in 2050. High Level Expert Forum, Rome, 12–13 October 2009 (available at [http://www.fao.org/fileadmin/templates/wsfs/docs/expert\\_paper/How\\_to\\_Feed\\_the\\_World\\_in\\_2050.pdf](http://www.fao.org/fileadmin/templates/wsfs/docs/expert_paper/How_to_Feed_the_World_in_2050.pdf)).
- FAO.** 2015. *Second Report on the State of the World's Animal Genetic Resources for Food and Agriculture*. B.D. Scherf & D. Pilling, eds. FAO Commission on Genetic Resources for Food and Agriculture Assessments. Rome (available at <http://www.fao.org/3/a-i4787e/index.html>).
- FAO.** 2016a. CGRFA/WG-AnGR-9/16/Inf.3: Status of Animal Genetic Resources – 2016. Intergovernmental Technical Working Group on Animal Genetic Resources for Food and Agriculture, Ninth Session Rome, 6– 8 July 2016.
- FAO.** 2016b. Commission on Genetic Resources for Food and Agriculture. ABS Elements. Elements to facilitate Domestic Implementation of Access and Benefit-Sharing for Different Subsectors of Genetic Resources for Food and Agriculture, Rome.
- Flanders, F. & Gillespie, J.R.** 2015. *Modern livestock & poultry production*, 9th edition, Cengage Learning, p. 242/
- Gollin, D., Van Dusen, E. & Blackburn, H.** 2008. Animal genetic resource trade flows: economic assessment. *Livestock Science*, 120 (3): 248–255.
- Hiemstra S.J., Martyniuk E., Duchev Z., Begemann F. et al.** 2014. European Gene Bank Network for Animal Genetic Resources (EUGENA). Proceedings, 10th World Congress of Genetics Applied to Livestock Production, Vancouver, Canada, 17– 22 August 2014 (available at [https://asas.org/docs/default-source/wcgalp-posters/437\\_paper\\_8691\\_manuscript\\_289\\_0.pdf?sfvrsn=2](https://asas.org/docs/default-source/wcgalp-posters/437_paper_8691_manuscript_289_0.pdf?sfvrsn=2)).
- Mathias, E. & Mundy P.** 2005. Herd movements: the exchange of livestock breeds and genes between North and South. League for Pastoral Peoples and Endogenous Livestock Development, Ober-Ramstadt, Germany (available at <http://www.pastoralpeoples.org/docs/herdmovements.pdf>).
- Thornton, P.K.** 2010. Review. Livestock production: recent trends, future prospects. *Phil. Trans. R. Soc. B*, 365, 2853–2867 doi:10.1098/rstb.2010.0134
- Zárate, AV., Musavaya K. & Schäfer C.** 2006. *Gene flow in animal genetic resources. A study on status, impact and trends. institute of animal production in the Tropics and Subtropics*. University of Hohenheim, Germany. Commissioned by GTZ, FAO and Federal Ministry of Economic Cooperation and Development. 518 p. (available in the annex to *The State of the World's Animal Genetic Resources for Food and Agriculture* at <ftp://ftp.fao.org/docrep/fao/010/a1250e/annexes/Thematic%20Studies/Geneflow/GeneflowStudy.pdf>).

### III. INPUTS BY OBSERVERS

#### i. **ARCADIA on behalf of the Consortium in charge of the Preparatory Action on Genetic Resources**

**ARCADIA** on behalf of the Consortium in charge of the Preparatory Action on Genetic Resources that was carried out from 2014 to 2016 on behalf of the European Commission.

Based on the conclusions of the Commission on Genetic Resources for Food and Agriculture, which at its 16th Regular Session, held from 30 January to 3 February 2017, invited Members, observers and other stakeholders to provide input to various milestones of the Commission's Multi-Year Programme of Work (see communication C/CBD), we would appreciate the Commission considering the conclusions of the Preparatory Action on Genetic Resources that was carried out from 2014 to 2016 on behalf of the European Commission.

The results of this Preparatory Action can be found at:

[https://ec.europa.eu/agriculture/external-studies/2016-preparatory-action-eu-plant-and-animal-genetic-resources\\_en](https://ec.europa.eu/agriculture/external-studies/2016-preparatory-action-eu-plant-and-animal-genetic-resources_en)

Final report: [https://ec.europa.eu/agriculture/sites/agriculture/files/external-studies/2016-preparatory-action-eu-plant-and-animal-genetic-resources/final-report\\_en.pdf](https://ec.europa.eu/agriculture/sites/agriculture/files/external-studies/2016-preparatory-action-eu-plant-and-animal-genetic-resources/final-report_en.pdf)

#### ii. **CABI**

##### **Executive summary**

CABI (Centre for Agriculture and Biosciences International) is an international not-for-profit organization that improves people's lives worldwide by providing information and applying scientific expertise to solve problems in agriculture and the environment. Our approach involves putting information, skills and tools into people's hands. CABI's 48 member countries guide and influence our work, which is delivered by scientific staff based in our global network of centres. CABI's access and benefit-sharing policy is built around the principle that CABI delivers benefits to farmers around the world through its mission-driven activities by helping them grow more and lose less of what they produce. CABI uses biological and genetic resources of plant, animal or microbial origin in its work and aims to engender trust, to facilitate science and to ensure that benefits are shared from this work. When accessing or transferring biological and genetic resources, CABI seeks to provide recipients with legal clarity in use.

To ensure CABI operations are in compliance with ABS measures it has:

- implemented policy on access and benefit-sharing compliance (see Annex 1).
- ongoing negotiations with its Member Countries and the provider countries of the genetic materials CABI uses to agree the benefits it will share from use and put in place mechanisms that reduce the administrative burden of managing access and benefit sharing processes;
- is undertaking ABS assessments on its global projects and ensuring they comply with the monitoring and reporting requirements of the countries in which CABI operates;
- drafting best practices for staff with a view to submission to the CBD;
- raising awareness of ABS requirements with collaborators and clients.

CABI's first priority is to comply with National Law that implements the Nagoya Protocol on Access and Benefit-sharing and the requirements of provider countries.

##### **CABI's policy statement**

In the use of genetic resources, CABI will put in place best practices to comply with national legislation on ABS including those to implement the Nagoya Protocol and will perform due diligence regarding access and benefit-sharing in all its activities involving those resources. CABI's aims are to engender trust, to facilitate science and to ensure that benefits are shared.



**CABI's common understanding on the use of genetic resources for food and agriculture:**

- Research is aimed at losing less and feeding more, thus underpinning a key sustainable development goal.
- In the most part the benefits of the research is shared by making the outputs public and providing the tools to the farmer to improve output and livelihoods,
- Commercial opportunities/products rarely develop and when they do, appropriate terms on benefit sharing can be negotiated.

**Recommendation**

A global simplified approach that reduces the administrative burden on all sides is required. When most countries are Party to the Nagoya Protocol, the regulatory environment should be more easily coped with. However, at present we are amidst an ever-changing environment of regulation and best practice that is difficult to deal with. The ABS Clearing House provides a platform for exchanging information on access and benefit-sharing but leaves the choice of action to the individual. FAO should take a view on all approaches and negotiate a single compliant position for access and appropriate and equitable benefit-sharing for genetic resources for food and agriculture.

**Some CABI observations and concerns**

Countries, organisations and institutions are responding to the ever shifting regulatory environment around access and benefit-sharing for genetic resources. All are struggling to balance compliance and impact on our ability to do the science and deliver the necessary resources. It would be hoped that in the long-run when all (or most) countries are Parties to the Nagoya Protocol and have implemented regulation to enforce users to honour their benefit-sharing commitments, the regulatory environment will be more easily coped with. At present there are many best practices appearing but importantly the country specific approaches and individual pieces of legislation are complicating what should be straightforward processes. The FAO goal to identify the distinctive features and specific practices of different subsectors of genetic resources for food and agriculture is a huge challenge when countries and organisations are still in the process of deciding the approach that suits them best. In Europe the EU Regulation is implemented differently throughout the European States, for example some claiming sovereign rights over their genetic resources but most not. The practitioner is faced with each country's different set of procedures and requirements.

Europe are issuing sector guidance to help users of genetic resources understand what falls in and out of scope of the European Regulation (this guidance is in draft and has recently been opened for public consultation). However, it should be emphasised that countries outside the EU may well have different interpretations and requirements. Users of genetic resources need to be made aware that they should be looking at provider country needs to ensure they have the appropriate ABS measures in place not the simply focus of what is deemed to be in or out of scope by the country in which they carry out the work.

**CABI's approach**

CABI has defined the full range of potential uses and the benefits that arise from these uses and is seeking single country agreements to allow CABI staff to collect and use resources within the defined parameters thus avoiding the negotiation for each separate collecting trip. This approach reduces the transactional burden. This is based upon CABI ABS Policy provided at annexe 1 below.

CABI is aligning its practices in the conservation and use of genetic resources (GR) in all its projects, to comply globally with the Nagoya Protocol on ABS requirements, as well as working within the spirit of the CBD and ensuring compliance with national laws and regulations of all countries within which CABI works. This includes surveys of organisms; exporting GR for identification or research; the use of GR for control of pests (including invertebrates, vertebrates, weeds and diseases), screening for useful compounds, and more. The process of ensuring compliance presents difficulties particularly when countries, policy makers and practitioners have their own different interpretations.

**Annexe 1. CABI's Policy on Access and Benefit Sharing Compliance**

CABI is an international not-for-profit organization that uses genetic resources in its mission to improve people's lives by providing information and applying scientific expertise to solve problems in

agriculture and the environment. This is achieved through knowledge sharing and the application of scientific research to improve global food security and safeguard the environment. In doing so CABI:

- will deliver the benefits described below to its member countries but requires open access to genetic resources to do so; in this context “open access” is a 'blanket' approval from its member countries to allow its scientists to access the genetic resources it needs in its work outlined below (mainly invertebrates, insects, microorganisms) without having to apply for individual approval each time such access is needed to reduce administrative burden for both CABI and provider country. Access excludes resources covered by the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) or other overriding international conventions and will be compliant with National Law.
- will not exploit genetic resources for monetary gain without involving the provider country; direct contact with the NFP will be made and for those countries that have no access procedures in place and do not want arrangements they will not be further contacted, and
- will be transparent in all its uses, reporting at least annually what materials CABI holds for each country and what use they are being put to.

In its work, CABI accesses biological and genetic resources and undertakes sampling and collection of biological materials for:

- diagnosis and identification of pests and diseases, so that appropriate management recommendations can be made;
- rapid identification of newly introduced alien species to facilitate containment and management; CABI is aware of sensitive issues around finding new pests, invasives pathogens and work with national authorities on such issues;
- studies to assess impact of land-use and climate change on biodiversity and ecosystems services which often involves finding species new to science;
- developing microbial solutions to improve health and nutrition security;
- combatting threats to livelihoods, agriculture and the environment from pests and diseases;
- developing biological control agents for the management of invasive species, reduction of crop losses and minimisation of unnecessary pesticide use; and
- increasing and improving access to agricultural and environmental scientific knowledge.

CABI delivers benefits to farmers around the world through its mission-driven activities by helping them grow more and lose less of what they produce. CABI's aims in the use of biological and genetic resources of plant, animal or microbial origin are to engender trust, to facilitate science, and to ensure that benefits are shared. When accessing or transferring biological and genetic resources CABI seeks to provide recipients with legal clarity in use. CABI will perform due diligence regarding access and benefit sharing in all its activities involving those resources. Commercial opportunities/products rarely develop in this work but if this is the intention or the potential arises during CABI's work, CABI will return to the provider country to negotiate new use and agree terms on benefit sharing, if this is not already addressed in MAT.

Member countries agreed at [CABI's 13<sup>th</sup> Review Conference](#) in 1996 that CABI's obligations for Access and Benefit Sharing in accordance with the Convention on Biological Diversity is met by CABI devoting any proceeds from commercialisation of genetic resources collected from its member countries to support the not-for-profit mission driven activities of the organisation. In addition, CABI's activities result in significant non-monetary benefits or contributions to the local economy for its member countries, including:

- sharing of research and development results relevant to country priority needs;
- collaboration in education, training, scientific research, development programmes and individual training related to use of genetic resources;
- joint authorship of publications and joint ownership of intellectual property rights;
- access to *ex situ* facilities and to databases;
- transfer of scientific information, knowledge and technology; and
- institutional capacity-development to help build or maintain local collections

In light of the Nagoya Protocol CABI wishes to ensure it complies with any additional measures which may be needed. CABI will negotiate an agreement with each Member and/or Provider Country to ensure its ABS policy and practices are compliant with national law and ABS requirements. This agreement could take the form of a Memorandum of Understanding or other preferred document.

In providing samples to third parties in the course of CABI's work or service provision, CABI does not assign rights for commercial applications and requires the recipient to comply with the terms and conditions of the provider country through a Material Transfer Agreement (MTA) containing reference to the original MAT.

### **Overview of CABI best practice**

Consistent with Article 20 in the Nagoya Protocol, CABI has developed and adopted Best Practices for Access and Benefit-Sharing. CABI staff understand their rights and responsibilities are defined under the national laws implementing appropriate treaties and relationships with Providing Countries of biological material and will abide by relevant laws and regulations in their work; that biological material is to be obtained with appropriate legal certainty; and that CABI shares appropriate benefits for access with the provider country of the Genetic Resources. Biological material is acquired in two main ways: collecting in the field (*in situ*) and from *ex situ* sources such as collaborating scientists, institutions or collections in a Providing Country.

### **CABI Guidance:**

Applicable to all CABI staff in all work with biological and genetic resources; appropriate compliant procedures to implement this guidance will be integral to day to day operations; materials can only be used by non-CABI staff in accordance with the agreed provider terms and subject to appropriate consortium agreements or contracts.

#### ***Collecting genetic resources for use***

- All CABI dealings with biological resources will comply with ABS requirements
- At Project concept check all relevant requirements for approvals needed
- At project, study or visit proposal stage ascertain whether the provider country is a Party to the Nagoya Protocol and also CBD
- Check the ABS measures of the country being visited and ensure correct protocol is followed; Visit [www.cbd.int](http://www.cbd.int) for general ABS measures under the CBD and <https://absch.cbd.int/> for measures implemented under the Nagoya Protocol.
- If possible, acquire Prior Informed Consent (PIC) and Mutually Agreed Terms (MAT) with an Internationally Recognised Certificate of Compliance (IRCC) BEFORE submitting project proposals; where time does not allow this or where the process is unclear at least make a statement in the project application that it will be secured before work begins-
- Acquire PIC and MAT before collecting and agree MTA (Material Transfer Agreement) before exporting
- Work with countries to help establish in country collections or designated/approved collections for duplicate repositories
- If acquiring strains from trusted collections follow requirements in line with the country's regulations
- Where there is no national legislation in place
  - Work with the National Focal Point to establish what procedure should be followed.
  - If there is no National Focal Point, work with an appropriate Ministry and/or government agency to openly address the ABS issues.
  - CABI will provide staff with MAT agreements based on good practice and encourage their use where practical.
- Where national legislation does not regulate access to the genetic resources that CABI wishes to access, then CABI will still document what we are doing for future accountability.

- Staff should be aware that other legislation and international agreements are relevant for access to and export of GR, e.g. CITES, contract or property law, collecting in protected areas, phytosanitary requirements, airline regulations, etc., but these are not addressed here.
- Check that intended use of genetic resources accessed falls within the scope of CABI's work outlined above
- If it is the intention to take a product to market from the beginning or there is a serendipitous discovery of a new use, access for this purpose must be negotiated before the project starts or when the new use is discovered
- All projects should work with a local partner unless agreed otherwise and at least the relevant CABI Regional Centre or CABI Country Office
- Notify the relevant Regional Centre or CABI Country Office of planned collection trips; each centre will post (on Sharepoint) a list of intended country projects to facilitate transparency CABI is seeking open access under standard MAT accepting any specific national or international measures and requirements that may be in place; until this is in place use the CABI policy on ABS as a basis to negotiate PIC for access with MAT based on the benefits CABI offers in this document
- CABI will consider placing its collections on the EU registered collections list and comply with the requirements when they have been finally agreed. The EU registered collection list is a mechanism to enable users (academic and industrial etc.) to undertake "due diligence" in sourcing organisms for their use.
- Register all collections with CABI providing details of where collected, permit and other legal agreements, where the samples are held and their intended use
- All CABI staff handling the samples must add information to the database or record system where the samples are, who in CABI is handling them and what is being done with them
- CABI will introduce reporting mechanisms back to National Authorities of provider countries and meet requirements for the ABSCH
- Deposit samples of materials to be utilised in CABI collections
- If there is a change in the use specified in the MAT, negotiate change of use with the National Authority of provider country
- Record generated data
- Information on genetic resource use and benefits shared is to be reported to the country of origin, in line with MAT
- Transfers to third parties is not permitted unless specifically stated in the MAT

***Receiving biological and genetic resources from collaborators, collections or other providers***

- Ensure the materials have been collected in compliance by asking for evidence e.g. the IRCC, ABS Clearing House UID, copy of PIC and MAT

***Supplying biological and genetic material outside CABI***

- Materials will only be supplied outside CABI if the MAT allows and only under an MTA laying down all conditions agreed in the MAT

***Monitoring sharing of benefits***

- Best practices outlined above involve sample tracking through CABI this will enable monitoring of genetic resource use and enable timely and appropriate reporting to provider countries

***Provision of country reports to include:***

- lists of biological/genetic resources accessed and their use;
- relevant research and development results; and
- reports on sharing the benefits via partnerships, access and outcomes from CABI work.

***Include Provider Country in work programmes***

- collaboration and cooperation in scientific research and development programmes, including joint authorship of publications following good scientific practice;
- collaboration and cooperation in education and training;
- knowledge and technology transfer;
- institutional capacity-building;

- training related to genetic resources, e.g. supporting post graduate studies leading to legacy capacity development and formal training courses.
- CABI where possible to support establishment of *ex-situ* facilities including policies and legislative development?
- Support in projects developing best practices

***Provision of access to***

- scientific information;
- *ex situ* facilities and databases;
- joint ownership of relevant intellectual property rights.

**Enforcement and compliance**

CABI will monitor access and use and ensure compliance with provider country requirements; it will be transparent in all its activities, facilitate audits of processes and report annually or as required on all collection and use activities, including provider country and use. CABI Member Countries will be asked to support this policy and the implementation procedures at CABI's Review Conference. CABI will ensure it has records all materials in commercial use.

The actions CABI will take to enforce the policy are as follows:

***Internally:***

- a. CABI staff have been made aware of their responsibilities
- b. Breach of CABI policy will be dealt with as all other policy breaches are in CABI through staff disciplinary measures
- c. The outline best practice has been prepared and the country information on national practices made available to staff

***Externally:***

- a. All collection and use data will be recorded regardless of a source country's status regarding the Nagoya Protocol (a party or not)
- b. Reports on access and use of all genetic resources will be made regularly to MCs and on request as needed
- c. Materials will exchanged under a Material Transfer Agreement that will include all terms and conditions specific to the resource (different country permissions can be accounted for); a recipient will not be allowed to distribute further, strains supplied from the CABI collection
- d. Currently CABI is in the process of contacting each source country even if they have no specific Access requirements under the Nagoya Protocol

**Examples of community best practices that CABI adopts in its access and use of genetic resources**

- [MIRRI Policy and Best Practise for ABS](#) (MIRRI)
- [Commission on Generic Genetic Resources for Food and Agriculture](#) (CGRFA)
- [Global Genome Biodiversity Network](#) (GGBN)
- [International Organisation for Biological Control of Noxious Animals and Plants](#) (IOBC)
- [Consortium of European Taxonomic Facilities](#) (CETAF)