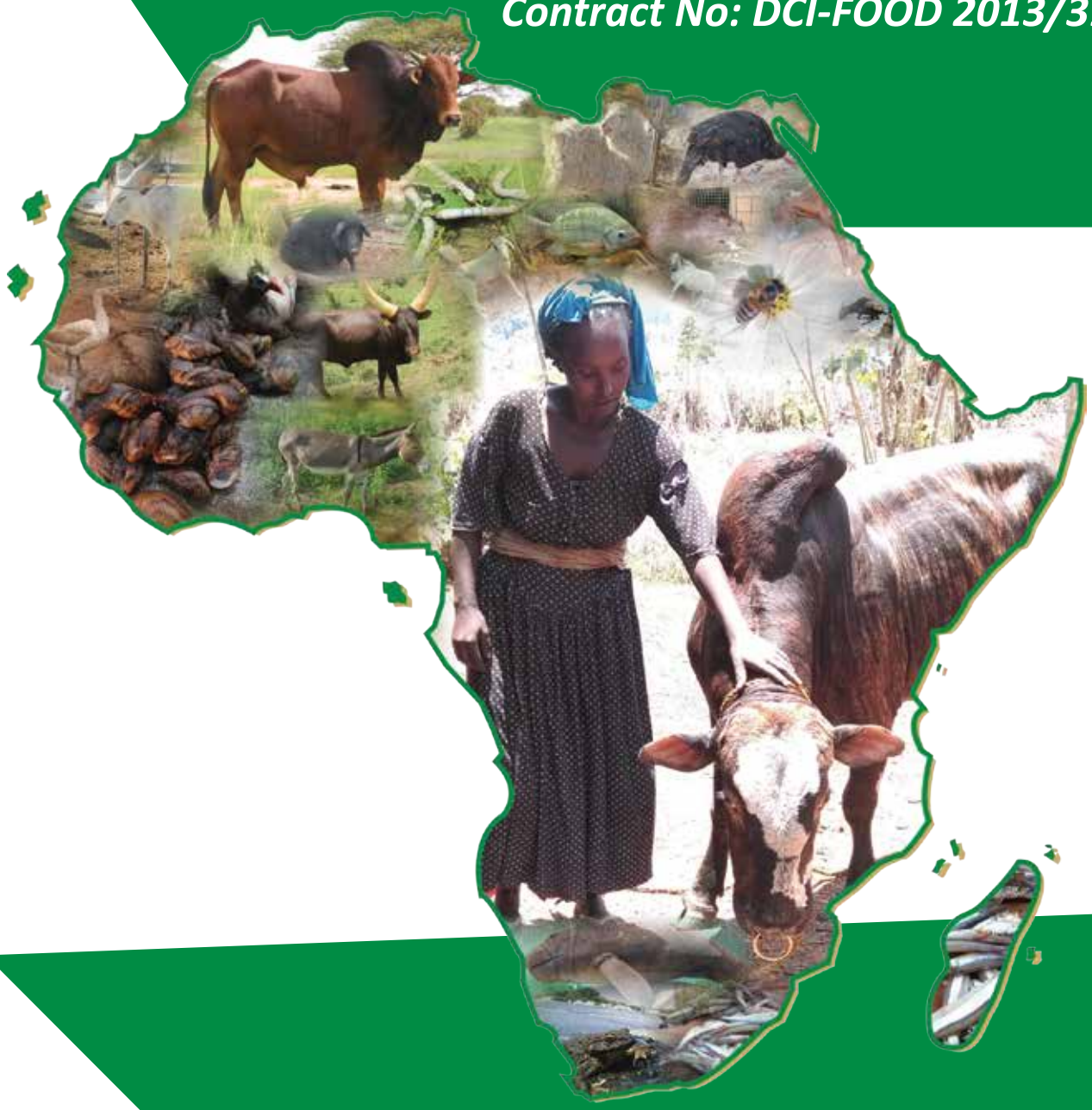
AFRICAN UNION
INTERAFRICAN BUREAU
FOR ANIMAL RESOURCES

EUROPEAN UNION

GENETICS PROJECT

Strengthening the Capacity of African Countries to Conservation and Sustainable Utilization of African Animal Genetic Resources

Contract No: DCI-FOOD 2013/319-541



FINAL TECHNICAL REPORT

(JULY 2013 - JULY 2019)

TABLE OF CONTENTS

	ACRONYMS AND ABBREVIATIONS	***v***
	EXECUTIVE SUMMARY	***vii***
1.	***BACKGROUND***	***1***
	Description	*2*
2.	***CONTEXT OF THE PROJECT***	***4***
3.	***ACHIEVEMENTS JULY 2013-JULY 2019***	***4***
	Result Area 1: The Status and trends of AnGR in Africa established	*4*
	Result Area 2: Policy frameworks for the sustainable use of AnGR developed	*15*
	Result Area 3: Supporting and strengthening national and regional conservation and improvement strategies and initiatives	*21*
	Result Area 4: Increasing knowledge, attitude and practice of the contribution of livestock and livestock sector to economic growth, food security and poverty reduction	*38*
4.	***COMMUNICATION AND VISIBILITY***	***47***
5.	***MONITORING AND EVALUATION***	***50***
6.	***EXIT STRATEGY***	***51***
7.	***STAFF***	***51***
8.	***THE PROJECT MANAGEMENT***	***51***
9.	***CONTRACTUAL ARRANGEMENTS WITH PARTNERS AND SUB-REGIONAL FOCAL POINTS***	***52***
10.	***CHALLENGES***	***52***
11.	***CONCLUSION***	***53***
	ANNEXES	***58***

ACRONYMS AND ABBREVIATIONS

AACAA	All Africa Conference on Animal Agriculture
AAGRIS	African Animal Genetic Resources Information System
ABS	Access and Benefit Sharing
AI	Artificial Insemination
AnGR	Animal Genetic Resources
AnGR-CIM	Animal Genetic Resources Characterization, Inventory and Monitoring tool
AnGR-TAG	AnGR Taxonomy Advisory Group
APU	Animal Production Unit
ARIS	Animal Resources Information System
ASARECA	Association for Strengthening Agricultural Research in Eastern and Central Africa
AU	African Union
AUC	African Union Commission
AU-IBAR	African Union-Interafrican Bureau for Animal Resources
BAHPA	Bulletin of Animal Health and Production in Africa
BCP	Biocultural Community Protocol
CCARDESA	Centre for Coordination of Agricultural Research and Development for Southern Africa
CEBEVIRHA	Communauté Économique du Bétail, de la Viande et des Ressources Halieutiques,
CIRDES	Centre International de Recherche-Développement sur l'Elevage en zone Subhumide
COMESA	Common Market for Eastern and Southern Africa
CGRFA	Commission on Genetic Resources for Food and Agriculture
CORAF	Conseil Ouest et Centre Africain pour la Recherche et le Développement Agricoles
CR	Country Report
CTB	Coffee Table Book of cattle breeds
CTLGH	Centre of Tropical Livestock Genetics and Health
DAD-IS	Domestic Animal Diversity Information System
DAD-Nets	Domestic Animal Diversity –Information System Networks
DAGRIS	Domestic Animal Genetic Resources Information System
DREA	Department of Rural Economy and Agriculture
DSBSK	Dorper Sheep Breeders Society of Kenya
EAC	East African Community
ECCAS	Economic Community of Central African States
ECOWAS	Economic Community of West African States
EU	European Union
FAnGR	Farm Animal Genetic Resources
FAO	Food and Agriculture Organization of the United Nations
GDP	Gross Domestic Product
GIFT	Genetically Improved Farmed Tilapia
GPA	Global Plan of Action
IGAD	Intergovernmental Authority for Development
ILRI	International Livestock Research Institute
INRAA	Institut National de Recherche Agronomique d'Algérie
IPR	Intellectual Property Rights
ITWG	Intergovernmental Technical Working Group ()
MS	Member States

NABAM	National Animal Breeders and Multipliers (The Gambia)
NAP	National Action Plan
NP	Nagoya Protocol
NSAP	National Strategy and Action Plan
MTA	Material Transfer Agreement
ODK	Open Data Kit
RECs	Regional Economic Communities
RMS	Red Maasai Sheep
RMSBSK	Red Maasai Sheep Breeders' Society of Kenya
SADC	Southern Africa Development Community
SDC	Sub-Delegation Contract
SOP	Standard Operating Procedures
SoW-AnGR	State of the World's Animal Genetic Resources for Food and Agriculture
SoW-AqGR	State of the World Aquatic Genetic Resources
S-RFP	Sub-Regional Focal Point
TALIRI	Tanzania Livestock Research Institute
TOT	Training of Trainers
UMA	Union Maghreb Arabe

EXECUTIVE SUMMARY

This final technical project report presents the achievements and challenges of the 6 years of implementation of the Genetics Project. The project embraced an all-inclusive consultative approach with relevant stakeholders. This involved holding various consultative meetings to accomplish the various outcomes realized by the project.

The publication The State of Farm Animal Genetic Resources in Africa which is aligned to the four Strategic Priority Areas of the Global Plan of Action (GPA) was one of the key products of the Genetics Project that was published and officially launched in June 2019. The publication covers the predominant species in Africa: cattle, sheep, goats, pigs and chickens, aquatic genetic resources as well as those considered non-conventional or species of limited distribution and use. African and international experts and practitioners in the AnGR sector contributed to the development of this publication, which is intended to serve as a reference document on animal genetic resources (AnGR) for a variety of stakeholders, particularly policy makers. One thousand copies of the publication were printed and almost half have been distributed to stakeholders. The Coffee Table Book of cattle breeds "The Story of the African Cattle-Diversity Matters", a vivid depiction showcasing the diversity and uniqueness of indigenous African cattle breeds with some inspirational stories of the owners and/or custodians of these resources, is currently in press. Three thousand copies will be published and shared with stakeholders. The "Know your animals" series was initially a monthly feature publication on the website to highlight the diversity of African animal resources. Twenty seven features were produced over the duration of the project and these were compiled into two editions published in 2016. Eighteen policy briefs on various aspects of the management and development of AnGR in Africa were developed and published. These briefs are available and are being disseminated to stakeholders. The topics covered by the policy briefs include: crossbreeding, conservation, selection, characterization, inventory and monitoring, the Nagoya Protocol, traditional knowledge, mobility, Genetically Improved Farmed Tilapia (GIFT), among others. Studies were conducted in all regions on the development of policy frameworks/guidelines on crossbreeding and conservation. These are available for dissemination to Member States (MS) and Regional Economic Communities (RECs). The manual of Standard Operating Procedures (SOPs) with the technical, administrative and legal procedures/frameworks necessary for the collection, storage and exchange of animal genetic materials at regional level, was developed and published with inputs from African experts and is being disseminated to stakeholders. Material Transfer Agreements (MTAs) for the movement and mutually agreed exchange of AnGR was also developed, published and ready for adoption by Member States. Capacity building of African technical personnel to improve the understanding and implementation of the Nagoya Protocol (NP) on Access Benefit and Sharing was conducted for all the Member States. The project supported Member States were in their development of National Strategies and Action Plans (NSAPs) for AnGR. Some MS such as Kenya, Zambia, Togo, Rwanda, have officially developed, validated and launched their NSAPs while others, for example, Benin, Burundi, Tanzania and Zimbabwe were awaiting the launch of their NSAPs. The project offered support to all 55 African MS in an effort to ensure that by the end of the project these important institutional requirements for the management and development of AnGR will be in place. The project provide technical and financial support to 98 initiatives on national breeding and conservation initiatives in various MS. Supported initiatives covered the following species: cattle, goats, sheep, pigs, poultry, bees, fisheries and ducks. Twenty seven breeders/farmers associations were offered technical and financial support from the project. Notable achievements from this support included the establishment of the following: Red Maasai sheep, Galla Goat (Kenya), Muturu and Somba cattle (Benin), Bakossi cattle (Cameroon), White Pare goat (Tanzania) and Azawak cattle (Niger). Over 700 livestock keepers were trained in the management of the Tuli cattle breed in Zimbabwe. Beekeepers in Kenya were provided with modern beehives to increase honey production. Five regional

gene banks were provided with equipment to enable them to function as regional cryo-conservation centres for their respective regions. Memorandums of Understanding to guide the management of the regional gene banks were drafted for signature by stakeholders in the respective regions. The five Sub-Regional Focal Points (S-RFPs) for AnGR represented by Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA) (Eastern Africa), Communauté Économique du Bétail, de la Viande et des Ressources Halieutiques (CEBEVIRHA) (Central Africa), Institut National de Recherche Agronomique d'Algérie (INRAA) (North Africa), Centre for Coordination of Agricultural Research and Development for Southern Africa (CCARDESA) (Southern Africa) and Conseil Ouest et Centre Africain pour la Recherche et le Développement Agricoles (CORAF) (West Africa), were capacitated to coordinate the management and development of AnGR in their respective regions. One of the Strategic Priority Areas of the Global Plan of Action is characterization of breeds. In order to have harrmonized tools for characterization, inventory and monitoring of AnGR in AU Member States, the project working in close collaboration with African experts who were members of the Taxonomy Advisory Group for AnGR (AnGR-TAG) and other stakeholders, developed the AnGR-Characterization, Inventory and Monitoring tool. This tool was adopted by all Member States in Africa and is now in use. The AnGR-CIM tool was translated into French and digitalized on Open Data Kit (ODK) that supports mobile data capture and storage. A data analyses and visualization platform is also available to enrich the tool. The African Animal Genetic Resources Information System (AAGRIS), was developed to capture and share information and data specifically on African AnGR. This information system for AnGR is housed as a module in AU-IBARs Animal Resources Information System (ARIS) and complements information available in Domestic Animal Diversity-Information System (DAD-IS) and Domestic Animal Genetic Resources Information System (DAGRIS) of Food and Agriculture Organization of the United Nations (FAO) and the International Livestock Research Institute (ILRI), respectively. The project in collaboration with FAO, supported the establishment of five regional information sharing platforms, the Domestic Animal Diversity –Information System Networks (DAD-Nets). These platforms offer opportunities for stakeholders to share and exchange information and data on various aspects of AnGR. Currently well over 800 African stakeholders are registered on the various DAD-Net platforms and continue to interact and share information on AnGR. The project developed a best practise document on selection programs in Africa. A special edition of the Bulletin of Animal Health and Production in Africa (BAHPA) to commemorate and raise awareness on the importance of AnGR in Africa was published. Thirty two peer-reviewed scientific papers are contained in the special edition. In order to communicate its achievements, the project produced various publications in print, online, video and other formats. The project produced various branded paraphernalia to showcase the contributions of the donor and other partners and raise awareness and increase visibility of the project. A video documentary was produced to highlight the contribution of the project to the development of AnGR in Africa and to acknowledge the contributions of the donors. To determine the level of achievement on the set out objectives of the project, external Monitoring and Evaluation reviews were conducted through a Mid-term review and a Final Evaluation. An Exit Strategy of the project to ensure the sustainability, consolidation and continuation of the project achievements, was developed and highlighted what needed to happens after the end of the project. Various challenges experienced during the implementation of the Genetics Project are documented in this report. Unfortunately, it was not possible to conduct the Project Close-Out meeting as planned due to the earlier than anticipated end of the project.

1. BACKGROUND

Africa is endowed with a rich diversity of animal genetic resources (AnGR). However, this diversity is being depleted at an alarming rate. The world is coming to depend on a livestock population with a dangerously narrow genetic base. There is growing evidence that improving the productivity of subsistence, smallholder and emerging farming systems has the potential to address poverty in agriculturally based economies, while the more commercialized (industrialized) production systems play their roles in providing large quantities of animal products. Africa is one of the centres of animal domestication and is richly endowed with a large number of indigenous breeds that have adapted well to the continent's environmental and climatic conditions.

Animal Genetic Resources (AnGR) for food and agriculture are essential components for Africa's food security and contribute to the livelihoods of hundreds of millions of people. Farmers living in low potential and unfavourable agricultural areas depend directly on ecosystem biodiversity for their livelihoods. AnGR are a major component of this biodiversity and are one of the most common assets among rural households in Africa.

A diverse resource base is critical for human survival and well-being, and is vital for the eradication of hunger. AnGR are crucial in adapting to changing socio-economic and environmental conditions, including climate change. The adaptability of species and breeds to extreme conditions of drought, humidity, cold and heat and diseases, makes livelihoods possible in some of the most inhospitable areas which are not suited for crop production.

The African Animal resources population is a valuable reservoir of genes for health, adaptive and economic traits, providing diversified genetic pools, which can help mitigate the challenges posed by changes in production systems and market requirements. Despite their importance, many African animal breeds are either facing extinction or are undergoing rapid genetic dilution. Genetic improvement programs, by governments, non-governmental organizations, bilateral aid agencies, and the private sector, have favoured the use of exotic breeds for crossbreeding, upgrading, or replacement. These programs have mostly been implemented without clear policies, regulatory frameworks, strategic thinking and a long term view and were generally motivated by the need for rapid productivity gains. This resulted in indiscriminate, uncoordinated or uncontrolled crossbreeding activities. However, the extent and rate of AnGR loss in Africa is still difficult to estimate.

On the other hand, very few genetic improvement programs in Africa are based on selection and improvement of indigenous breeds, probably because of their long term nature. Where these exist, they have tended to focus on single, market driven production traits in isolation of the broader livestock system functions and with limited involvement of farmers who are the final beneficiaries.

Considering the transboundary nature of some breeds and the mobility of animals across national borders for various reasons, among them the search for water and pasture and for trade, the lack of regional policies and strategies on these resources has hindered the conservation and protection of endangered breeds, especially when conservation measures (both in situ and ex-situ) are more efficient and cost effective when conducted at regional level.

The lack of information and consensus on the status and trends of AnGR in Africa, has constrained the development of appropriate policies and strategies on these resources. The lack of harmonization of

methodologies for the characterization, inventory and monitoring of AnGR, makes it difficult to inform policy and other decision-makers with evidence-based information and data on AnGR.

The sustainable conservation and utilization of AnGR require comprehensive legal and regulatory frameworks at country and at regional levels to regulate breed utilization, including breed improvement and exchange of genetic materials and to define the roles and responsibilities of stakeholders involved in the management and development of AnGR.

Given its strategic objectives, institutional mandate, links and experience in working with national authorities and RECs, AU-IBAR is assisting African countries and RECs to develop policy frameworks and strategies for AnGR as a top priority. The Genetics Project achievements fitted squarely into the AU-IBAR objectives as one of the major outcomes was the increased capacity of Member States and RECs to develop policy, legal and regulatory frameworks and strategies for AnGR. This has contributed to improved management and development of the AnGR sub-sector and should also convince national decision makers, private sector and other partners to mobilize the necessary human and financial resources to maintain and further enhance AnGR. RECs will be expected to ensure harmonization of policy frameworks at regional level.

Description

Project title	**Strengthening the Capacity of African Countries to Conservation and Sustainable Utilisation of African Animal Genetic Resources**
Period	18 July 2013 – 18 July 2019
Funding	Total budget : € 14,929,000 Contribution EU: €14,529,000 Contribution AUC: €400,000
Objectives	**Overall objective:** to enhance the contribution of livestock to food security, and economic growth in Africa **Purpose:** to strengthen the capacity of countries and Regional Economic Communities to sustainably use and conserve African animal genetic resources through institutionalising national and regional policy, legal and technical instruments
Partner(s)	**Lead executing agency:** AU-IBAR **Implementing partners:** • CIRDES: Centre International de Recherche- Développement sur l'Elevage en zone Subhumide • ILRI: International Livestock Research Institute **Other partners** • COMESA • ECCAS • ECOWAS • EAC • IGAD • SADC • UMA

Project title	**Strengthening the Capacity of African Countries to Conservation and Sustainable Utilisation of African Animal Genetic Resources**
Target groups	Ministries in charge of livestock and Regional Economic Communities in Africa
Beneficiaries	Livestock owners and keepers mainly the smallholders who are the custodians of AnGR in Africa and whose livestock are at risk of dilution or extinction and whose livelihoods depend on them, technical staff and decision makers of national, regional and continental institutions and research centers involved in policy development, line ministries and RECs
Results	1. The status and trends of animal genetic resources in Africa established. 2. The Policy frameworks for the sustainable use of AnGR developed. 3. The national and regional conservation and improvement strategies and initiatives are supported and strengthened. 4. Knowledge, attitude and practice of the contribution of livestock and livestock sector to economic growth, food security and poverty reduction are increased.
Result 1 Activities	1. Establish the state of AnGR in Africa to identify threatened breeds and breeds at risk of extinction 2. An inventory and assessment of existing policies and regulations on the use of animal genetic resources including genetic improvement of livestock in Africa 3. Assessment of the genetic and socio-economic impact of production and management systems i.e. crossbreeding with exotic breed, intensification, transhumance and commercialization on local AnGR 4. Assessment of selection programs (including breeding objectives) on animal genetic diversity in Africa
Result 2 Activities	1. Develop national, regional and continental guidelines for the formulation and harmonization of crossbreeding policies 2. Develop regional frameworks and policies for in situ and ex situ conservation 3. Develop technical standards and protocols (including property rights and benefits sharing) for the exchange and use of genetic materials
Result 3 Activities	1. Support member states to establish and implement their National Action Plan for AnGR within their livestock policy. 2. Support member states to establish or strengthen their national breeding and conservation strategies as part of their National Action Plan for AnGR. 3. Support the development of regional (REC based) conservation policies and strategies for transboundary breeds and populations that are at risk 4. Support the establishment of a regional/sub-regional facility for ex situ conservation, in particular cryogenic storage and establish a gene bank on AnGR 5. Support the establishment and strengthening of national and regional livestock breeders' associations
Result 4 Activities	1. Develop harmonized tools (protocols) for Characterization and Inventory of AnGR 2. Establishment of AnGR database 3. Establish and strengthen regional monitoring of trends and associated risks of trans-boundary breeds 4. Develop regional networks for information sharing 5. Establish or strengthen regional focal points for AnGR 6. Document and disseminate best practices and lessons learnt from AnGR conservation and improvement initiatives

2. CONTEXT OF THE PROJECT

Animal genetic resources (AnGR) for food and agriculture are essential for food security and contribute to the livelihoods of hundreds of millions of people in Africa. However, genetic improvement programs in Africa, by governments, non-governmental organizations, bilateral aid agencies and the private sector, have favored the use of exotic breeds for crossbreeding, upgrading, or replacement of indigenous breeds, which are well-adapted to the African environment. These crossbreeding programs were indiscriminate, uncoordinated or uncontrolled and have generally led to the loss, and in extreme cases, extinction of indigenous breeds. Most African countries lack political will, clear policies, regulatory frameworks, or strategic considerations on AnGR with little or no resources being put into this sub-sector. There was little recognition of the importance and contribution of AnGR to food and nutrition security, rural development and economic growth. Therefore, there was little or no budgetary support to the AnGR sub-sector despite its contribution to food and nutritional security, livelihoods and economic development in many of the countries. In the majority of African countries, public institutions in particular, lack the capacity to support the AnGR sub-sector. In some countries, these institutions are non-existent. The issue of transboundary breeds whose geographic distribution cuts across national borders, there was little or no concerted regional strategic approaches with harmonized legal and technical frameworks for exploiting these common genetic resources. The Genetics Project was designed to support African countries to implement the Global Plan of Action (GPA) as agreed to by the global community through the Interlaken Declaration of 2007. This was the prevailing environment when the Genetics Project was initiated in 2013.

This Final Technical Report provides the achievements and challenges under these prevailing conditions during the 6 years of implementation of the project (July 2013 to July 2019).

3. ACHIEVEMENTS JULY 2013-JULY 2019

Result Area 1: The Status and trends of AnGR in Africa established

This result area aimed at providing information about the current status of animal genetic resources in Africa, identifying the opportunities as well as the risks so as to provide evidence and knowledge to inform policy and strategy formulation and implementation, to increase advocacy and raise awareness for the development of AnGR. Under this result the following were achieved during the six years of project implementation.

Activity 1. Establish the state of AnGR in Africa to identify threatened breeds and breeds at risk of extinction.

This activity aimed at establishing the status of the AnGR sub-sector in Africa by providing reliable data and information on African AnGR in the context of the continent. The activity also aimed at contributing information and data to the 2nd State of the World's Animal Genetic Resources report of FAO (2015) to update and increase knowledge on Africa's AnGR. During the project, the following were achieved:

1.1 Submission of Country Reports by African Member States to the Second State of the World's Animal Genetic Resources Report

During its 14th Regular Session, the FAO Commission on Genetic Resources for Food and Agriculture (CGRFA) requested Member States for an update on the State of the World's Animal Genetic Resources (SoW-AnGR) to be presented in November 2014. The Genetics Project provided AU MS with technical support to finalize and submit their Country Reports (CR) to FAO in fulfilment of their statutory obligations to the global report on AnGR. A facilitation workshop was conducted to provide technical

assistance to African MS to finalize and timely submit their Country Reports (CR) for the 2nd SoW-AnGR Report. Thirty four (34) representatives from 32 African MS attended the workshop held in Naivasha, Kenya from 29 to 31 January 2014. The participants comprised National Coordinators and National Focal Points or their representatives. The project team also liaised with 16 other MS (Angola, Burundi, Cape Verde, Central African Republic, Chad, Congo, Lesotho, Madagascar, Mali, Mauritius, Sao Tome and Principe, Senegal, Seychelles, South Africa, South Sudan and Swaziland) that were not represented at the facilitation workshop and provided the necessary assistance and encouragement for preparation of their respective country reports. The major outcome of this exercise was that 44 African MS prepared and submitted their Country Reports on time as a contribution to the 2nd SoW-AnGR published by FAO in 2015.

At the Global National Coordinators' Workshop and the Eighth Session of the Intergovernmental Technical Working Group (ITWG) on Animal Genetic Resources for Food and Agriculture held from 23 to 29 November 2014, AU-IBAR, through the Genetics Project was highly praised for the strong mobilization of African National Coordinators for the timely, quantitative and qualitative submission of the CRs, which significantly increased the total number of reports submitted for the Second State of the World's AnGR report. Other regions of the world also appreciated this achievement for Africa which was acknowledged as a best practice to be utilized by others. At those meetings, for the first time the Africa group was shown to be a well-coordinated and united entity which improved the quality of its participation, as well as in the pertinence of the issues raised. This was attributed to the cohesion and collaboration brought about by AU-IBAR and the Member States with financial support from the EU through the Genetics Project.

1.2. Submission of Country Reports by African Member States to the First State of the World's Aquatic Genetic Resources Report

The Genetics Project also provided technical support to African MS to prepare Country Reports on aquatic genetic resources as a contribution to the 1st State of the World Aquatic Genetic Resources (SoW-AqGR) report by FAO. This resulted in the submission of national reports by 22 African MS to FAO for compilation of the first global report on aquatic genetic resources.

Technical support was provided by the Genetics Project during the African Regional Workshop on the status of aquatic genetic resources for food and agriculture held in Entebbe, Uganda 20 to 24 July 2015 where 33 participants convened from 14 AU MS. During the workshop, the project also shared their experiences in developing Country Reports for FAO.

1.3. Publication of the State of Farm AnGR in Africa Report

Africa has been losing some of its important AnGR due to various factors including indiscriminate crossbreeding with exotic breeds, poor breeding programs, lack of supportive policies and legislation and inadequate measures to ensure the deliberate conservation of and sustainable utilization of these resources. Lack of accurate and up-to-date information and data on African AnGR has contributed to poor planning and interventions on AnGR in most Member States of the African Union. The Project Inception Workshop held in Abidjan, Ivory Coast in April 2013 recommended that Africa should develop its own State of AnGR document. This was endorsed by the first Project Steering Committee meeting in July 2014. As a result, the first African report on the State of African Animal Genetic Resources on the continent was developed through consultative and collaborative processes involving the project team, African experts and practitioners in the AnGR sub-sector in the Member States. The document titled "The State of Farm Animal Genetic Resources in Africa" was published in 2019.

The objective of the publication on the State of AnGR in Africa was to provide useful and easily-accessible information and data on African AnGR to enable Member States to make informed decisions on the interventions necessary for the proper conservation, sustainable utilization and management of their AnGR. The sources of data and information for this document included those from African countries' submissions of Country Reports for the 1st and 2nd State of the World's AnGR (SoW-AnGR). Reports and responses to questionnaires provided by the Directorates of Animal Production across the continent also contributed to the publication. The questionnaire was designed to capture additional information and data to those submitted for the 2nd SoW-AnGR report. These comprised information on the status of the breeds, including what were termed as "emerging or non-conventional livestock" as well as aquatic resources. Non-conventional livestock were considered those with limited geographic distribution and use. These included grasscutters (*Thryonomys swinderianus*), molluscs such as the African Giant Snail (*Achatina fulica*) species which are popular in Central and West Africa. The status of reproductive and molecular biotechnologies, national policies and legislation on AnGR, were also to be included, among others. Reviews of literature on African FAnGR as well as expert knowledge of the FAnGR sub-sector, were also used to enrich the publication which provides a comprehensive assessment of the state of the farm animal genetic resources (FAnGR) diversity and its management in Africa. It describes the following: (i) diversity of production systems in Africa (ii) status of FAnGR in Africa (iii) status of characterization, inventory and monitoring of FAnGR (iv) the current threats to FAnGR (v) status of genetic improvement and conservation programs in Africa (vi) status of institutions, policy and legislation on FAnGR in Africa, and (vii) priority areas to enhance the sustainable management of FAnGR in Africa. The document is aligned to the four Strategic Priority Areas of the Global Plan of Action (GPA), namely: (a) Characterization, Inventory and Monitoring of Trends and Associated Risks; (b) Sustainable Use and Development; (c) Conservation and; (d) Policies, Institutions and Capacity-building.

The State of Farm Animal Genetic Resources in Africa publication identifies significant gaps and needs on the conservation and utilization of FAnGR. It also stimulates the need for Member States and others to re-strategize and ensure the development of appropriate national and regional policies for the proper management of FAnGR and implementation of priority activities in line with the GPA. It is the first comprehensive publication of its type covering African FAnGR, and should thus be a valuable reference material to breeders, breed societies, policy makers, scientists, academics, students, non-governmental organizations, private sector and other stakeholders on the management, conservation and utilization of these African resources.

The data and information contained in the publication are intended to raise and create awareness and improve decision-making processes on FAnGR in Africa. This should raise the profile of African FAnGR and highlight their contribution to food and nutrition security, eradication of poverty and enhancing the livelihoods of communities dependent on FAnGR. The current trends in the FAnGR sector, the state of institutional and human capacity to manage FAnGR, the state of the art in FAnGR technologies and management as well as the challenges faced by the sector, are well articulated in the publication. It focuses on the main species in Africa: cattle, sheep, goats, pigs, poultry, donkeys, horses and camels but also covers aquatic genetic resources and emerging or non-conventional species, including grass cutters, rabbits, ostriches, crocodiles, guinea fowls, giant snails, bees and buffaloes.

This publication is the first of its kind devoted to African animal resources and was drafted by African experts, subject matter specialists and practitioners at a consultative meeting in Kigali, Rwanda.

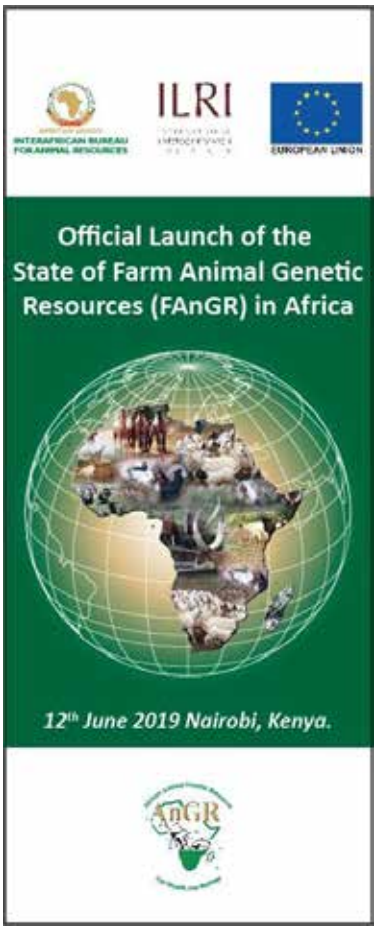


A group of experts drafting the State of Farm AnGR in Africa publication in Kigali, Rwanda (April 2016)

The document was circulated and assessed by over 30 independent reviewers, experts in animal genetic resources from within and outside Africa. The Genetics Project team incorporated the suggestions proposed by the reviewers and finalized the manuscript for submission to the publisher, Moran (E.A) Publishers Ltd. The publishers engaged a professional editor to check the technical content of the manuscript, quality of photographs, graphs and to proof-read the text in close consultation with the Genetics Project team for clarifications and/or corrections.

One thousand copies of the publication were printed and officially launched by the Commissioner of the Department of Rural Economy and Agriculture (DREA) of the African Union Commission (AUC), Her Excellency Ambassador Josefa Sacko on 12 June 2019 at the Intercontinental Hotel in Nairobi, Kenya. The occasion was attended by over 220 guests from 53 Member States including ten (10) Ministers responsible for Animal Resources or their representatives from (Burkina Faso, Chad, Congo, Egypt, Kenya, Sierra Leone, The Gambia, Uganda, Zambia and Zimbabwe and a representative from the East African Community (EAC), a representative of the European Union, the Director-Generals of ILRI and CIRDES, Executive Secretaries or their representatives of the Sub-Regional Focal Points, ASARECA, CEBEVIRHA, CORAF and INRAA, breeders associations, non-governmental organizations, tertiary institutions, members of the Animal Genetic Resources Taxonomy Advisory Group (AnGR-TAG), affiliate organizations and the private sector. The Commissioner highlighted the importance of African indigenous breeds and their contribution to food and nutrition security as well as the economic well-being of African communities. She noted that the lack of accurate and up-to-date information and data on AnGR in most AU Member States had contributed to poor planning and interventions on these resources. For the unveiling of the publication, the Commissioner was assisted by the Cabinet Secretary (Minister) of Agriculture, Livestock and Fisheries of Kenya as the host country and the other participating Ministers. All the participating Ministers and the Director-General of ILRI made brief remarks on the occasion of the launch of this important publication. At the end of the launch, all participants received copies of the publication and dissemination of the copies to stakeholders continues.

A companion document "*Current and Future Management of Farm Animal Genetic Resources (FAnGR) in Africa*: In the Context of Evolving Production Systems and Changing Environments" was also produced and published from an analysis and interpretation of questionnaires received by the Genetics Project team from Member States.



A poster of the official launch of the State of Farm Animal Genetic Resources in Africa document.

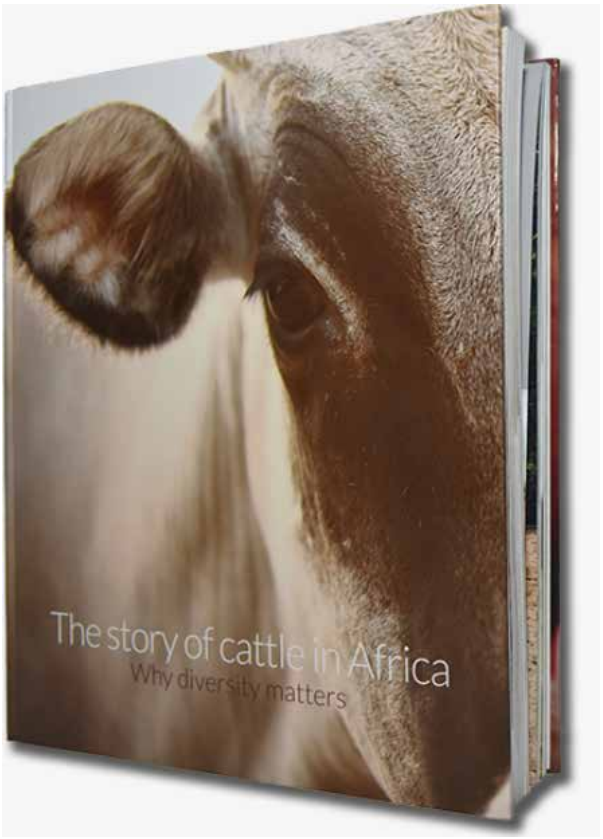




The official launch of the State of the Farm Animal Genetic Resources document

1.4. A Coffee Table Book of Cattle Breeds

Working in collaboration with ILRI, a book titled "The Story of the African Cattle-Diversity Matters" popularly known as "The Coffee Table Book" (CTB) of cattle breeds was developed to contribute to the state of AnGR in Africa to identify those threatened with extinction. ILRI was the main partner responsible for this activity and led its implementation. ILRI engaged consultants to design the CTB, take photographs and capture the stories of the livestock keepers for the publication. Cattle breeds from various countries (Burkina Faso, Cameroon, Ethiopia, Kenya, Senegal, Tunisia, Uganda and Zimbabwe) in the 5 regions of Africa were photographed for the CTB. This publication is a vivid illustration of indigenous African cattle breeds showcasing their diversity and uniqueness as well as providing some inspirational stories of the owners and/or custodians of these resources. The CTB showcases the unique attributes and contribution of these important African cattle breeds. Through the vivid imagery and captivating stories of the livestock keepers, it is expected to stimulate public interest, raise awareness on the importance of indigenous cattle breeds to Africa, particularly among those with decision-making mandates, especially policy-makers. This should also inspire improved conservation and sustainable utilization measures for these cattle breeds. The book is in press.



The cover page of the Coffee Table Book of cattle breeds

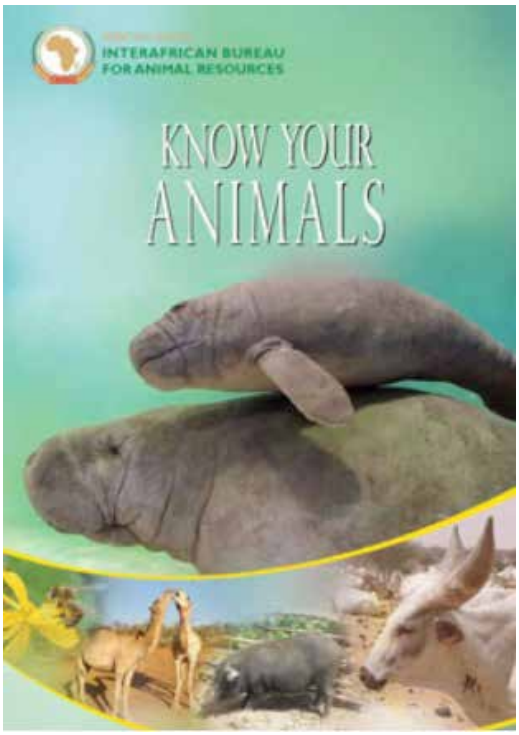
1.5. Catalogue of African Animal Genetic Diversity

It was initially planned that parallel to the development of the Coffee Table Book for cattle breeds, a similar publication on the other important species, specifically sheep, goats, poultry, pigs and camels would also be produced. Photographs of the various species were collected during the course of the implementation of the project. Most of the photographs were submitted by stakeholders in the Member States, particularly the National Coordinators. It was however, not possible in the scope of the implementation of the project to complete this activity. The photographs were compiled and will be posted on the project webpage to raise awareness of the rich diversity of Africa's AnGR.

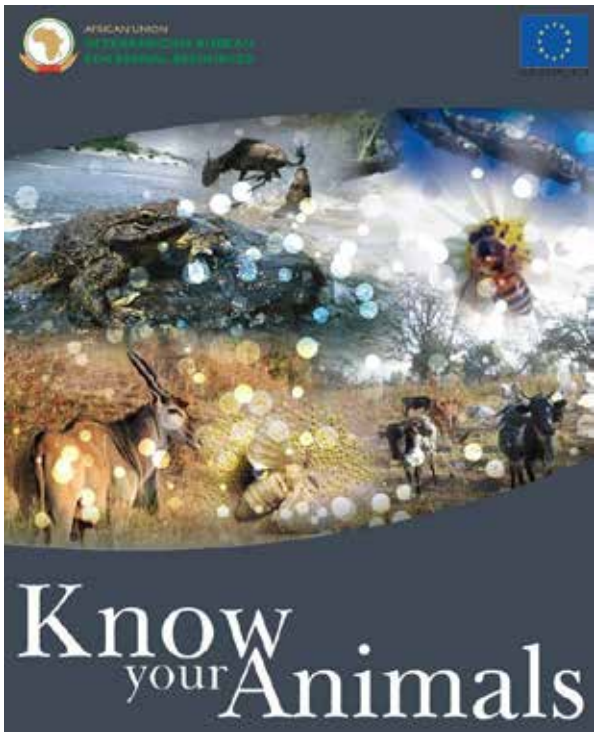
1.6. Know your animals/Animal of the Month

In an effort to raise awareness and advocacy on indigenous African animal, aquatic and non-conventional livestock species, the Genetic Project team together with technical staff in the Animal Production Unit (APU) of AU-IBAR made a decision in 2015 to feature on the AU-IBAR website one indigenous animal or aquatic resource per month as a contribution to the activity "Establish the state of AnGR in Africa to identify threatened breeds and breeds at risk of extinction". The feature aptly titled "Know your animals" aimed to: increase awareness and improve knowledge on Africa's animal and aquatic genetic resources; provide key information to policy makers with an ultimate goal of influencing policy formulation; be a catalyst to raise interest in the conservation of endangered breeds and create a platform to educate the general public through succinct and easy-to-understand articles. The short articles were well-researched and provided the readers with descriptions of selected terrestrial animal and aquatic genetic resources found in Africa. The articles shared information mainly on: the origin and distribution; general physical description, population trends, unique adaptive traits, key uses (economic, social, cultural and others), key recommendations and references for further reading. From May 2015 until July 2017, 27 features of animal and aquatic resources were published: Kuri cattle (*Bos indicus*), Nile Tilapia (*Oreochromis niloticus*), Tuli cattle (*Bos Taurus*), African catfish (*Clarias Gariepinus*), the West African Manatee (*Trichechus Senegalensis*), Red Maradi goat (*Capra aegagrus hircus*), Round sardinella (*Sardinella aurita*) and Flat sardinella (*Sardinella*

maderensis), local African pig, two articles on Bees (*Apis mellifera*), the Goliath frog (*Conraua goliath*), Silver fish (*Rastrineobola argetea*), the Common Eland (*Taurotragus oryx*), the Grasscutter (*Thryonomys swinderianus*), Mulberry silkworm (*Bombyx Mori*), Snail (*Achatinoidea*), the Sperm Whale (*Physeter microcephalus*), the Lagunaire cattle, Obscure Snakehead fish (*Parachanna Oscura*), the Sabi sheep, Nile crocodile (*Crocodylus niloticus*), the Tiger Shrimp (*Penaeus monodon*), Dromedary Camel (*Camelus Dromedarius*), Sawfish (*Pristis pristis*), Guinea fowls (*Numida meleagris*), Mopane worms (*Gonimbrasia belina*) and Ankole/Inyambo cattle (*Bos Indicus*) The issues were compiled and published in two Editions "*Know Your Animal-2016 Volume 1*" and "*Know Your Animals -2016- Volume 2*".



Know Your Animal 2016 Volume 1



Know Your Animal 2016 Volume 2

Activity 2. Inventory and assessment of existing policies and regulations on the use of animal genetic resources including genetic improvement of livestock in Africa.

The management of AnGR depends, to a very large extent, on the prevailing regulatory and policy situations, among other factors. At the start of the project, it was necessary to determine the status of policy and legislation on AnGR in African countries. This activity aimed to assess the existence, or lack thereof, of policies and regulations on the management of AnGR.

The Genetics Project team compiled the existing legislation and policies impacting on AnGR. These were extracted from Country Reports submitted particularly for the 1st SoW-AnGR Report, from National Coordinators during General Assembly meetings in all the various regions as well as from the FAOLEX Database. It was noted that most of the existing polices and legislation were not specifically targeting AnGR and these tended to be imbedded in agricultural or at best general livestock policies and legislation at the national level. It was also noted that in many African countries, the lack of clear policies and legislation on AnGR was primarily responsible for the losses of invaluable AnGR particularly through indiscriminate crossbreeding and haphazard breeding strategies. Matrixes of existing policies and legislation with some direct or indirect impact on AnGR were developed.

Analyses conducted on existing inventories of AnGR policies and legislation in African Member States indicated the clear lack of these in most of the countries and this needs to be addressed to arrest the negative impact on the management of AnGR and the development of the sector.

Activity 3. Assessment of the genetic impact of livestock production systems (i.e. intensification systems with utilization of exotic breeds) and movements of animal populations (linked to transhumance and commercialization) on local/indigenous AnGR resource base

This activity was designed to assess the impact of livestock production systems on genetic diversity, productivity of the animal population, sustainability of the production system and the short and long-term socio economic benefits for the livestock owners and the economy. The impact of crossbreeding and livestock mobility on AnGR was assessed in all the regions of Africa. These assessments highlighted regional specificities driven mainly by policies or lack of, institutional and socio-economic environments of livestock production systems in the different regions

The section below highlights some of the findings of the studies (Table 1).

Table 1: Examples of some of the impacts of crossbreeding in Southern Africa

BREED 1	BREED 2	EFFECT/IMPACT ON ANGR
LESOTHO		
Basotho chicken	Potchestroom Koekoek	Loss of brooding ability of the resultant progeny
Basotho cattle	Non-descript breed	Loss of Basotho cattle genetic material with time
Basotho sheep	Wool Merino	Improved wool quality and productivity Loss of Basotho sheep genetic material with time
Basotho goat	Angora	Improved mohair quality and productivity Loss of Basotho goat genetic material with time
Basotho pig	Exotic pig (Landrace, Large white)	Reduced back-fat on the Basotho pig
MALAWI		
Indigenous pigs	Large white Land race Tri-Star	Dilution of indigenous genes Loss of adaptive traits leading to frequent outbreaks of African Swine Fever Succumb to effect of climate change
Indigenous chickens	Black Australorp Layer strain, Hyline Broiler strains	Dilution of indigenous genes Loss of adaptive traits leading to frequent outbreaks of Newcastle disease Succumb to effect of climate change such as feed pressure, and parasite infestations
Indigenous goats	Boer Saanen	Dilution of indigenous genes Uncoordinated admix of meat and milk breeds into local breed Loss of adaptation to low input environments
MAURITIUS		
Local Creole cattle	Holstein Friesian	Drastic reduction in number of pure Creole cattle and Corresponding increase in number of Holstein Friesian cattle and crosses
Local goats	Boer	Traits of pure Boer that were imported long time back have been diluted over time. Their crosses still predominate in most herds. Pure Boer goats have recently been imported in 2015 and pure breed nuclei exist on several farms and on research stations of FAREI
Local goats	Anglo Nubian	Traits of pure Anglo-Nubian that were imported long time back have been diluted over time. Their traits are still found in crosses in most herds.
Local goats	Alpine	Traits of pure Alpine that were imported long time back have been diluted over time. Their traits are still found in crosses in some herds.

BREED 1	BREED 2	EFFECT/IMPACT ON ANGR
Local sheep	South African breeds (Dorper, Persian Blackhead)	Pure Dorper sheep have recently been imported in 2015 and pure breed nuclei exist on several farms and on research stations of FAREI Traits of Persian Blackhead Persian are very scarce in the national herd.
Local sheep	French breeds (Charmoise, Ile de France, Blanc du Massif Central, Romanov)	Traits of each exotic breed are very scarce in the national herd
Landrace pigs	Large white pigs	Most of the pigs in Mauritius are crosses of these breeds
SOUTH AFRICA		
Nguni	Angus	Distribution to community and pass on of upgraded animals. F1 females tend to "disappear" and used for unstructured crossbreeding.
ZAMBIA		
Boran	Angoni	Genetic diversity
Brahman	Tonga/Angoni	Improvement of productivity/Dilution of indigenous breeds
Boer Goats	Indigenous Goats	Dilution of adaptation traits/improvement of productivity
Red Kalahari	Local Goats	Improvement of meat production/ Dilution of indigenous breeds
Saanen Dairy Goat	Indigenous goat	Improvement of meat production/ Dilution of indigenous breeds
Dorper Sheep	Red Maasai Sheep	Loss of adaptive traits such as worm resistance/ Dilution of indigenous breeds
Black Australop	Local Chickens	Male Back Australop loss of libido/improvement of production
ZIMBABWE		
Exotic breeds: Boer goat, Brahman, Hereford	Indigenous breeds	Dilution of pure breeds

For Eastern Africa, the following impacts of crossbreeding were reported:

Positive impacts

- ***New synthetic breeds:*** Where crossbreeding has been planned and well implemented, new composite/ synthetic breeds have been created. By combining desirable traits from both indigenous and exotic AnGR, composite breeds with superior productive capacities have been created and maintained as purebreds through straight breeding.
- ***Increased production and output:*** Crossbreeding has increased the productive capacity of native animals as a result of hybrid vigor. Under appropriate management and good animal husbandry, crossbred animals have registered superior performance in quality and output of milk, meat and eggs relative indigenous breeds, thereby providing higher economic value to farmers.
- ***Increased diversity of AnGR:*** Crossbreeding has opened opportunities to introgress exotic genes into indigenous breeds, hence diversifying the genetic composition of the local AnGR base.
- ***Specialization of AnGR:*** Where crossbreeding objectives are well defined and planned, highly specialized breeds and lines have been developed to produce one or two major outputs e.g. milk or meat. The high performance of the specialized AnGR has allowed farmers and other actors in the relevant value chains to consolidate their resources in providing greater diversity of specialized products, thereby resulting in positive impacts on economic livelihoods.

Negative impacts

- ***Genetic dilution and erosion of indigenous genetic resources:*** Crossbreeding has resulted in the gradual erosion of indigenous AnGR through replacement and dilution with exotic genes, thereby reducing the AnGR resource base available for present and future needs. In some instances, the genetic erosion has resulted in near extinction of indigenous breeds, for instance the "Inyambo" cattle, an ecotype of Ankole-Watusi, which plays a significant role in Rwandese culture.
- ***Inbreeding depression:*** The limited numbers and high cost of maintaining exotic breeding bulls limits the diversity of AnGR available for upgrading indigenous animals, hence promoting inbreeding depression. The situation has been compounded by the wide adoption of artificial insemination as a mechanism for delivering genetic change, in which case a limited number of breeding bulls are used to produce semen to service females over many generations, further narrowing the genetic base.
- ***Non-descript populations:*** Widespread indiscriminate crossbreeding has resulted in non-descript populations of livestock, which do not possess phenotypic or production characteristics of specific defined breeds. These non-descript livestock populations are poorly characterized, hence it is difficult to utilize them effectively for production of milk, meat or draught power.
- ***Increased incidence of infectious and metabolic diseases:*** Importation of live animals and/ semen for crossbreeding has led to the introduction of new diseases into the region. Comoros, an isolated archipelago in the Indian Ocean has had outbreaks of "new" cattle diseases including Blackleg, Babesiosis, Heartwater and Theileriosis, which have been traced back to the importation of live animals from Madagascar and Tanzania. Similarly, the importation of German Alpine goats into Burundi in the 1980's led to the introduction of Caprine arthritis encephalitis in the indigenous breeds. Additionally, crossbreds and exotic purebreds show increased susceptibility to endemic infectious diseases e.g. parasitic and helminth infections, resulting in heavy expenditure on disease management. Moreover, improved dairy animals are highly susceptible to metabolic disorders such as ketosis and milk fever, which leads to reduction in milk yield, impaired reproductive performance and economic losses.
- ***Loss of adaptive traits:*** In addition to reduced tolerance to diseases and parasitic infestation, crossbreeds have poor tolerance for heat stress and harsh environmental conditions and reduced capacity for mobility over long distances. Poor adaptability has compromised production and increased the morbidity and mortality among crossbreeds.
- ***Increased pressure on natural resources:*** The high potential animals resulting from crossbreeding consume unsustainably high amounts of feed and water resources, which has not only increased production costs but also created further pressure on already limited natural resources.

In Western Africa, there were reported declines in the numbers of local breeds of pigs, poultry and sheep as well as an increase in diseases such as dermatoses. In Burkina Faso, there was an increase in susceptibility to certain diseases and reduced hardiness in some breeds. Brooding instincts in poultry of the F2 generation were greatly diminished after cross-breeding in Ghana.

In North Africa, a region considered as the "cradle of breeds", the disappearance of some indigenous breeds due to rampant crossbreeding was reported.

Central Africa has witnessed a loss of entire indigenous cattle breeds particularly in some parts of Cameroon. Most of the breeds found in the other Central African countries, namely Central African Republic (CAR), Congo and Democratic Republic of Congo (DRC) are exotic breeds. There is a general decline in numbers of Central African indigenous breeds due to the introduction of taurine breeds from West Africa such as the N'Dama and Lobi as well as exotic cattle breeds. The negative impacts include: (i) increased likelihood of total extinction of indigenous breeds (ii) high dependence on continual importation of exotic breeds

(iii) undesirable traits and phenotypic features which are unsuitable for certain production systems (iv) reduced resistance/tolerance to diseases and adverse climatic conditions (v) risk of introduction of new diseases and increased susceptibility to endemic diseases.

A separate study examined the impact of transhumance on the management of AnGR to provide information on the effect on transhumant species, breed improvement, conservation and sustainable utilization in Africa. This study identified the following impacts:

Positive impacts of transhumance:

- transhumant pastoralism is crucial for the maintenance of the ecological resilience of dryland ecosystems; migration of livestock out of such environments prevents further degradation allowing it to recover
- Transhumance maintains livestock productivity and conserves the indigenous animal genetic resource communities that act as hosts of transhumant livestock benefit from transhumance through the availability of milk and meat from transhumant herds
- Transhumance develops regional trade and contributes to the GDP of African countries
- Transhumance reduces poverty - increasing the productivity of transhumant livestock, positively impacts on rural communities by increasing their household incomes and generating employment
- Transhumant pastoralists have been able to forge mutually beneficial relationships with host communities
- Transhumance livestock provide manure to farming communities - selection of camping areas is done to ensure easy collection of manure
- Movement of livestock out of environments with a high risk of disease outbreak lowers the incidence of diseases experienced – for example movement out of tsetse infested regions in Cameroon reduces the risk of trypanosomiasis

Negative impacts of transhumance:

- Conflicts between pastoralists and herders – these may be due to disagreements on the utilization of natural resources especially over water and pasture, as well as cultural differences between the groups
- Conflicts over land use – range and pastures being converted into arable land
- Conflicts over damage to crops along the transhumance routes
- Conflicts arising from poorly organized transhumance – when poor arrangements are made with the receiving communities on the resources available to the transhumant pastoralists and the best routes
- Conflicts arising from cattle rustling activities - these activities have been exacerbated by the proliferation of weapons which end up in the hands of cattle rustlers
- Conflicts arising from degradation of forests and protected lands – transhumant livestock trespassing in protected areas are exposed to attacks by wild animals

In line with the goals of this activity which was designed to assess the impact of livestock production systems on genetic diversity, productivity of the animal population, sustainability of the production system, and the short and long-term socio economic benefits for the livestock owners and the economy, ILRI contributed and published a book chapter on "Goat production in Eastern Africa: Practices, Breed Characteristics and Opportunities for their Sustainability" [https://www.ilri.org/publications/goat-production-eastern-africa-practices-breed-characteristics-and-opportunities-their sustainability], published by Springer International Publishing AG. The chapter presented an overview of current indigenous goat breeds and the production systems under which they are raised in Eastern Africa. The chapter also highlighted key constraints to improving goat productivity, and outlines opportunities and changes to mitigate threats within the production systems. The growing populations of goats and their potential for improving the livelihood of diverse communities called for innovative strategies to reduce their environmental footprint in the existing ecosystems.

Activity 4. Assessment of local breed selection and breeding programs impact on animal genetic diversity and socio-economic status in Africa

Selection and breeding programs of AnGR have been conducted in some African countries to improve the productivity of these breeds. Most of the programs were donor-funded. However, it was not clear what impact these programs have had on African AnGR. Therefore, the socio-economic impact of selection and breeding programs was assessed through studies in all the regions of Africa. Some of the programs have contributed to genetic gains in parts of Africa. However, due to the absence of sustained funding, most of the programs were not maintained and the genetic gains were not extended to the smallholder farmers' animals or were simply lost.

In Southern Africa, genetic evaluation of traits is still considered narrow and focussed on exotic breeds leaving out a large majority of animals, often indigenous breeds, kept by smallholder farmers. Traits of economic importance where animals have multiple uses including socio-economic, are not well understood or effectively utilized.

In Central Africa, only Cameroon reportedly had a single-cross breeding program for cattle and pigs. In the other parts of the region, only in-situ conservation programs were identified. This is attributed largely to lack of political interest and/or unstructured and inadequate institutional, financial and human resources to sustain their implementation.

Some breeding programs embarked upon by countries in West Africa operated successfully as part of some donor-funded projects. However, most of these programs collapsed or were discontinued probably because some of them were not properly and consultatively planned.

In East Africa it was shown that breeding and selection programs that have been conducted in the region, have had both positive and negative impacts on the AnGR. The negative impacts include loss of biological biodiversity in the long-term, dilution of genetic diversity and inbreeding due to use of a small genetic base. The positive impacts include improved production and hardiness, introduction of desirable traits in populations and formation of new stable breeds.

Large selection programs were reported in North Africa for sheep (Morocco and Tunisia), dairy cattle (Tunisia and Morocco) and chicken (Egypt). Open nucleus breeding schemes in dairy cattle were conducted but these are dependent on the continuous importation of exotic genes mainly as semen. Progeny testing of bulls is not adequately practised in the region.

Result Area 2: Policy frameworks for the sustainable use of AnGR developed

Policies and legislative frameworks are necessary tools for the creation of an environment to promote the conservation and sustainable utilization of AnGR. They will facilitate decision-making processes and establishment of regulatory mechanisms for the management and development of AnGR. Therefore, the main objective of this result area was to support African MS and RECs to develop enabling and conducive environments for the sustainable management and utilization of AnGR. This entailed the formulation and development of coherent policies and legislative frameworks for the proper management and development of AnGR at MS and regional levels. Under this result area the following have been achieved:

Activity 1. Develop national, regional and continental guidelines for the formulation and harmonization of crossbreeding policies

Five regional guidelines for the formulation and harmonization of policies on crossbreeding were produced and validated by stakeholders in all the African regions. These guidelines identify key issues pertaining to crossbreeding and provide what Member States need to do to review their strategies and the need for harmonization on the movement of especially imported germplasm. The guidelines highlight issues which need to be included in the policy and regulatory frameworks for the respective regions. These include the following:

- Conduct regular breed-specific censuses to determine population sizes and dynamics, geographical distribution and production systems to identify the indigenous or locally-adapted breeds threatened with extinction or genetic erosion and subsequently develop strategies and legislation for their conservation. For transboundary breeds, there is need for cooperation and collaboration among countries sharing these resources
- Promote the establishment of programs to characterize livestock breeds to determine their potential and suitable production systems
- Continuous performance recording and genetic improvement within breeds in order to increase their productive performance
- Promote awareness on the potential of indigenous breeds - develop harmonised national extension messages and materials for extension agents from all service providers within the country, to raise awareness on the productivity potential of indigenous breeds and to dispel the erroneous beliefs of their inherent inferiority when compared with exotic breeds
- Where applicable, eliminate market discrimination and distortions against indigenous breeds - revise grading systems of live animals and carcasses to eliminate discrimination and distortions against indigenous breeds
- Control of the importation of exotic breeds - develop policies and regulations to control importations of exotic breeds or their germplasm
- Promulgate regulations to require that any new breed intended to be imported must be evaluated and screened on performance against indigenous and exotic breeds.
- Develop regulations for a designated national authority to compile lists of recognised and approved livestock breeds which will be published in a Government Gazette on a regular basis. Legislation should be promulgated allowing only importations of animals or germplasm of recognised and approved breeds
- Prevention of indiscriminate crossbreeding - provide incentives, raise awareness and advocacy to discourage indiscriminate crossbreeding in Member States; develop harmonised national extension materials on crossbreeding for use by extension agents; legislation to prohibit introduction of exotic breeds altogether;
- Promulgate legislation to monitor and control movement of exotic breeding animals into traditional smallholder areas where indiscriminate crossbreeding cannot be avoided
- Promulgate regulations and requirements on the formation and registration of new composite breeds derived from structured rotational crossbreeding systems
- Identification of ecotypes of transboundary breeds across national borders; regular genetic characterization of transboundary breeds to identify which of these breeds or landraces are ecotypes of the same breed and are therefore transboundary
- Harmonised conservation and multiplication of improved transboundary breeds breeding stock - develop common strategies for the conservation and multiplication of transboundary breeds
- Genetic improvement within transboundary breeds - develop harmonised strategies for the genetic improvement of transboundary breeds; develop national animal identification, traceability and performance recording systems in line with international standards to monitor these transboundary

breeds; conduct performance evaluation of their transboundary breeds in a manner that enables the breeding values of animals from different countries and herds or flocks to be compared in order to enhance genetic improvement of the entire breed and facilitate marketing and exchange of the quality animals or germplasm

- Harmonised control of exports and protection of intellectual property rights - develop harmonised intellectual property systems for transboundary breeds and determine whether patenting of live animals or germplasm should be developed; monitor and control exports of transboundary breeds or germplasm;
- Skills development - encourage agricultural training institutions to develop curricular with stronger animal breeding component; coordinate training to build skills and capacity in animal breeding;
- Stakeholder participation - provide incentives and promote involvement and participation of all relevant national livestock stakeholders especially in policy formulation, performance evaluation of indigenous breeds; multiplication and distribution of improved indigenous breeds;
- Infrastructure development - prioritize investment in cryo preservation

A policy brief developed on crossbreeding "Crossbreeding Panacea or curse to African Animal Genetic Resources improvement" is available. *https://documentcloud.adobe.com/link/track?uri=urn%3Aaaid%3Ascds%3AUS%3Aebf0614a-20c7-409b-84f8-ac24f76eeb9a*

A publication based on the analyses of the existing policies and strategies is available: "Challenges and perspectives for the development of policies and legislative frameworks for the sustainable management of AnGR in Africa"

Activity 2. Develop regional frameworks and policies for in situ and ex situ conservation

The five regional studies reported above also addressed regional frameworks and polices on the conservation of AnGR. The reports were validated by stakeholders in all the five regions of Africa. The studies identified the challenges related to the development of the regional strategies and guidelines on conservation and these include:

- Identification of transboundary breeds at risk and agreement on their importance
- Phenotypic and genetic characterization of transboundary breeds to identify their ecotypes
- Sharing of institutional and technical capacity among neighbouring countries

With support from the project, the following Regional Economic Communities (RECs) initiated the formulation of their regional strategies on AnGR issues including conservation and were at various stages of development by the end of the project: the East African Community (EAC), the Intergovernmental Authority on Development (IGAD), the Economic Community of West African States (ECOWAS), the Arab Maghreb Union (UMA), the Economic Community of Central African States (ECCAS) and the Southern African Development Community (SADC). The Strategies for EAC and IGAD were validated by stakeholders in their respective regions while those of ECOWAS, UMA and ECCAS are awaiting final validation and clearance. For SADC, the process was initiated in mid-2019.

A policy brief on the conservation strategies in Africa was developed and is available "Conservation strategies for indigenous AnGR" *https://documentcloud.adobe.com/link/track?uri=urn%3Aaaid%3Ascds%3AUS%3Aaa8f8290-ca74-4550-b299-58489079fab3*

Activity 3. Develop technical standards and protocols (including property rights and benefits sharing) for the exchange and use of genetic materials

Under this activity, and with the collaboration of many stakeholders, various standards and protocols for the exchange and use of genetic materials were developed by the project as follows:

- A workshop was conducted on 'Making access and benefit sharing work for animal genetic resources for food and agriculture'. The workshop resolved to initiate the development of Biocultural Community Protocols (BCPs) for selected transboundary breeds including: the Azawak cattle, the Kuri cattle, the D'Man sheep, the Dorper sheep, the Red Maasai sheep and the Muturu cattle breeds in Africa. However, it was only possible to develop BCPs for Azawak cattle and D'Man and Red Maasai sheep. The major challenge was the limited availability of consultants with the experience to conduct the assignments. The BCPs were developed with the active participation and collaboration of communities rearing the Azawak cattle, the Red Maasai and D'Man sheep who underscored their aspirations for the respective breeds. The BCPs were published and will be widely disseminated.



Red Maasai Sheep



Community consultations

Declarations on the Red Maasai Sheep (RMS)

We declare commitment

i. to the conservation of the Red Maasai Sheep genetic resources, to prevent further genetic erosion of its populations so as to retain its value for current use, maintain sufficient genetic diversity to meet the needs of current and future utilization, provide options for adaptation to changing environmental conditions, provide genetic resources for cross-breeding and development of new genotypes, provide options to meet the demands of new markets for livestock products, preserve cultural and historical values and sustain the legacy value of RMS;
ii. to its conservation within all our cultural and customary systems of governance, to pass the knowledge about it to upcoming generations, and to encourage its spread to other areas;
iii. to openness in its access by outsiders at agreeable terms and conditions, including but not limited to commensurate benefits;
iv. to willingness to cooperate and collaborate with development partners and international organizations in efforts to towards sustainable development of the RMS breed as an effective tool for resilience and sustainable livelihoods;
v. to provide indigenous traditional knowledge on the RMS as may be agreed upon by different parties
vi. to maintain the RMS as the flagship sheep breed and to make it available to outsiders as part of our contribution to the global economy and diversity of livestock genetic resources
vii. to fiercely protect the RMS from theft or depletion through inappropriate use and or abuse

The declaration by the D'Man sheep community:

"Who we are
We are the D'man community (called Kasabah) the creator of D'man breed. The D'man breed and our lives in the oasis is in our culture and our heritage. The D'man breeds are integrated description of the community's cultural identity, milestones in the community's development to our culture. Without our indigenous D'man breeds we will lose a critical part of our collective bio-cultural heritage, and without our culture our indigenous D'man breeds are less likely to be conserved.

Our traditional territory
We live in the southeast region of Morocco, close to the border with Algeria, in an oasis environment and we are attached to our land as inherited from our ancestors and it is important to our life and the breeding of our animals.

Our customary laws that govern the use of our D'man breeding
We use our traditional knowledge for managing our breeds. We have our ethnic knowledge and language. We support the conservation of our D'man breed.

We face a number of challenges
Under oasis living, we are far from the market and services. We also care about our breed and thus the scarcity of resources such as feed items is a challenge to continue managing our D'man breed and protect our livelihood.

This BCP is a dream of support to our lives
The BCP would support our economic activities and is necessary to ensure the continued existence of our community (Kasabah). The BCP is a tool to maintain our relation with our breeds and our oasis ecosystem.

Our rights
Our rights through our developed BCP will be protected by national and international laws and agreements that apply to our community (Kasabah) and Kasabah cooperatives.

Our claims
We are the creators of our D'man breeds and we are the guardian of the oasis ecosystem biodiversity. We are the conceivers of our culture and our life style and heritage

Our rights to be consulted
We developed the BCP and must be consulted for granting Free Prior and Informed Consent (FPIC). As a tribal community, we have our own leadership and our own decision-making processes"



Azawak community



Azawak cattle

- An experts' consultation meeting was conducted in Cotonou, Benin on "***The movement and exchange of animal genetic materials and implementation of the Nagoya Protocol on ABS in Africa***" and one of the major outcomes was the "African Communication to the Commission on Genetic Resources for Food and Agriculture, Access and Benefit Sharing Focal Points and National Coordinators for Animal Genetic Resources" which showcased Africa's resolve and unity on the issue of ABS
- Five regional expert consultation workshops were conducted on "***The movement and exchange of animal genetic materials and implementation of the Nagoya protocol***" where the status and experiences in the ratification of the Nagoya Protocol by Member States were assessed; the legal and regulatory requirements for the movement and exchange of animal genetic materials and implementation of the Nagoya protocol on ABS were identified and road maps into the fast-tracking of the implementation of the Nagoya Protocol developed
- Through a highly consultative process, Standard Operating Procedures (SOPs) for gene banks were developed by experts and stakeholders before they were published and disseminated. The SOPs will provide harmonized technical frameworks for the efficient and effective collection and exchange of animal genetic materials and offer operational, legal and administrative guidelines for the movement of animal genetic materials within the framework of collaborative and coordinated implementation of the Nagoya Protocol (NP) in Africa and implementation of regional gene banks for AnGR.
- Two training workshops, one for Southern African countries in the SADC region and another for the rest of the African countries from the other 4 regions, were conducted for Capacity Building on Access and Benefit Sharing (ABS) and Intellectual Property Rights (IPR) for Animal Genetic Resources. The workshops were attended by over 130 participants. At the end of the training workshops:
  1. The participants' level of understanding on ABS and IPR related issues and the content and usefulness of the Nagoya Protocol was significantly enhanced as evidenced by their intelligent presentations. This capacity building will create a critical mass of expertise on ABS and IPR in Africa
  2. The participants were equipped with enhanced knowledge of the basic principles of ABS in the context of the Nagoya Protocol and the necessary skills to develop and implement ABS and IPR policies for AnGR as well as better comprehension of the linkages between AnGR and ABS and corresponding challenges in their respective countries

3. For the SADC region, participants developed a draft key position paper on AnGR as one of the outputs of the workshop to lead to regional coordination unit/instrument/mechanism on ABS and ability to deal with multilateral agreements related to transboundary genetic resources.
4. The potential use and benefits of Biocultural Community Protocols which clarify and facilitate interactions between indigenous and local communities and third parties were better understood.

The following recommendations were made:

a. Domestication of the Nagoya Protocol through development of national legislation which takes into consideration traditional knowledge, IP and ABS of AnGR should be prioritized.
b. Communities should be empowered in decision-making processes on matters related to ABS and conduct effective benefit-sharing negotiations and agreements with the private sector.

Result Area 3: Supporting and strengthening national and regional conservation and improvement strategies and initiatives

The Genetics project's primary objective was to support Member States, farmer and breeder associations, Regional Economic Communities to establish or strengthen management, conservation, improvement strategies and utilization of their AnGR through the development of National Strategies and Action Plans (NSAPs). To achieve this, the project provided targeted financial and technical support to economically viable conservation and genetic improvement initiatives in Africa and likely to produce positive impacts on the livelihoods of livestock keepers and their AnGR.

Activity 1: Support Member States to establish and implement their National Action Plan for Animal Genetic Resources within their livestock policy

Member States were expected to utilize the guidelines, information and data generated from the studies on policy and legislative frameworks to develop National Strategies and Action Plans (NSAPs) for AnGR. To ensure that Member States had access to resources, the Genetics project offered support to all 55 AU countries to formulate and develop their NSAPs. Those who were willing to take up the offer, were supported. However, others did not respond to the offer. The following was the status of the development of NSAPs at the end of the project (Table 2). It must be noted that the status of some countries, particularly those that had finalized the NSAPs documents, might have changed after the end of the project.

Status of countries on completion of NSAPs

Table 2: Implementation status of formulation of NSAPs by selected MS (as at the end of the project)

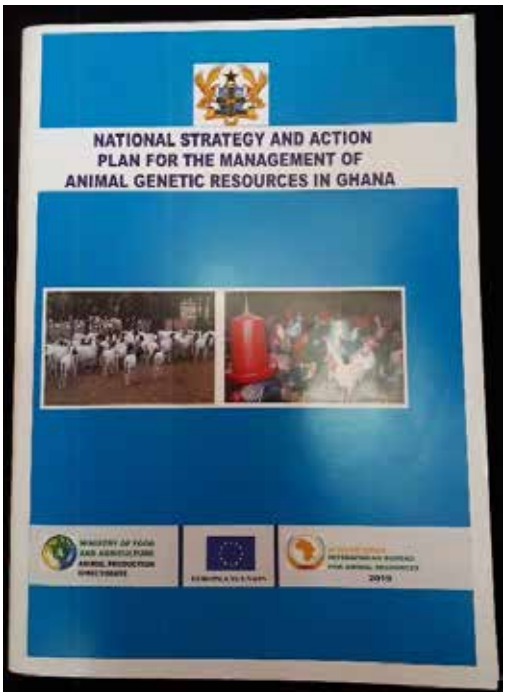
Countries	Project Title	Status
Algeria		No response despite award
Angola		Doing with own resources
Benin	Project for the Revitalization of the Institutions in charge of the Management of AnGR	Completed
Botswana		Done with own funds/Launched
Burkina Faso	Development of the National Action Plan for Animal Genetic Resources	Done with own funds/Launched
Burundi	Development of the National Action Plan for Animal Genetic Resources	Done with own funds, received support for popularization/Launched
Cabo Verde	Development of National Strategy and Action Plan	Completed/awaiting Launch
Cameroon		No response despite award

Countries	Project Title	Status
Central African Republic	Support to the National Consultative Committee for the Management of Animal Genetic Resources in Central Africa (COACGRAC)	No response despite award
Chad		No response despite award
Comoros	Support for the implementation of the National Policy on Genetic Resources and to the National Legislation on Animal Genetic Resources	Started
Congo, Republic of the		No response despite award
Congo, Democratic Republic of the		No response despite award
Cote d'Ivoire	Development of the National Action Plan for Animal Genetic Resources	Completed/Launched
Djibouti	Development of the National Action Plan for Animal Genetic Resources	Completed, to be launched
Egypt	Development of the National Action Plan for Animal Genetic Resources	Started towards end of the Genetics Project
Equatorial Guinea		No response despite award
Eritrea		No response despite award
Ethiopia	Ethiopian National Strategy and Plan of Action (ENSAP)	Done with own funds, supported for popularization /Launched/Publication
Gabon	Development of the National Strategy and Action Plan for the Sustainable Development of Genetic Resources in the Gabonese Republic	Completed/Published/Launched
Gambia	The Gambia National Strategies and Action Plans for AnGR	Completed
Ghana	Development of a ten-year National Strategy and Action Plan on Animal Genetic Resources for Ghana	Completed/Published/Launched
Guinea Conakry	Development of the national strategy and action plan for the sustainable development of animal genetic resources	No response despite award
Guinea-Bissau		No response despite award
Kenya	Finalization of the national Action plan for management of Animal resources for food and Agriculture	Completed/Published/Launched
Lesotho		No response despite award
Liberia		Done with own funds/Launched
Libya		No response despite award
Madagascar		No response despite award
Malawi	National Agenda for AnGR conservation in Malawi (NAGREC)	On-going
Mali	Development of the National Strategy and Action Plan for the Management of Animal Genetic Resources in Mali	Done with own funds/Launched
Mauritania		No response despite award
Mauritius		No response despite award
Morocco		No response despite award
Mozambique	Strengthening the capacity of the National Coordination and Advisory Committee to Contribute for better Management of Animal Genetic Resources in Mozambique.	On-going

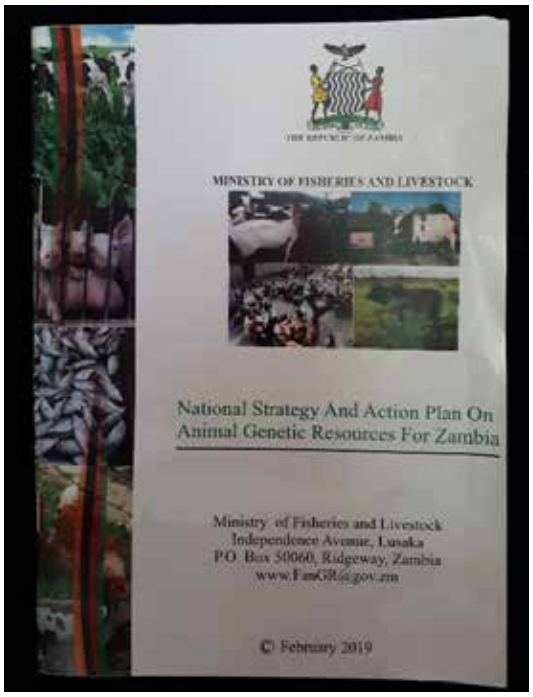
Countries	Project Title	Status
Namibia		No response despite award
Niger	Dissemination of the National Strategy and Action Plan for Animal Genetic Resources SNPAGRA	Done with own funds/Launched
Nigeria		Initiated late when project was ending
Rwanda	National Strategy and Action Plan	
for Sustainable Utilisation of Animal		
Genetic Resources in Rwanda	Completed/Published/Launched	
Sao Tome and Principe		No response despite award
Senegal	National Strategy and Action plan for animal genetic resources in Senegal	On-going
Seychelles		No response despite award
Sierra Leone	Development of National Strategic and Action Plan for Animal Genetic Resources - Sierra Leone	No response despite award
Somalia		Initiated late when project was ending
South Africa	National Strategy and Action Plan for Animal Genetic Resources for South Africa	Awaiting validation and launch
South Sudan	Development of the South Sudan National Strategy and Action Plan (NSAP) for Management and Conservation of the Animal Genetic Resources (AnGR	Initiated late when project was ending
Sudan		No response despite award
Swaziland		No response despite award
Tanzania	Development of the NSAP as a national compact to implement the GPA for AnGR in Tanzania	Completed/Published/ Launch
Togo	Support to the implementation of the National Strategy for Genetic Improvement for the Sustainable Management of AnGR in Togo	Completed/Published/Launched
Tunisia	Tunisia National Action Plan (TNAP)	Draft NSAPs available
Uganda	Development of National Strategy and Action Plan (NSAP) on Sustainable Utilization of Animal Genetic Resources in Uganda	Completed/Awaiting Launch
Zambia	National Strategy and Action Plan on Animal Genetic Resources in Zambia	Completed/Published/Launched
Zimbabwe	Development of Strategy and Action Plan on animal genetic resources in Zimbabwe	Completed/Awaiting launch

Completed and/or on-going = 31 (Launched = 15); Not yet started = 24

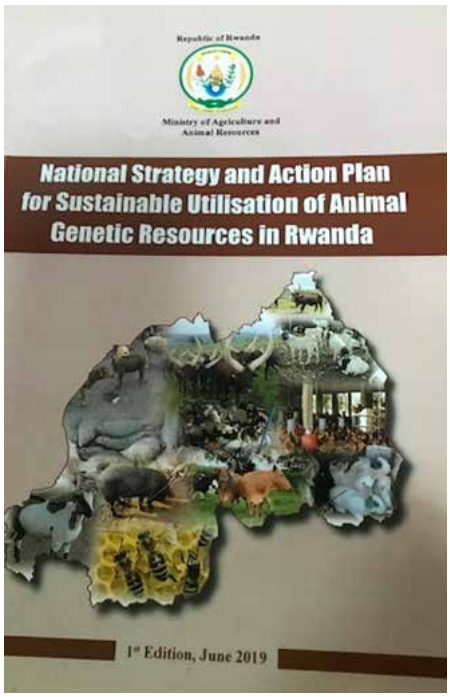
Copies of NSAP publications:



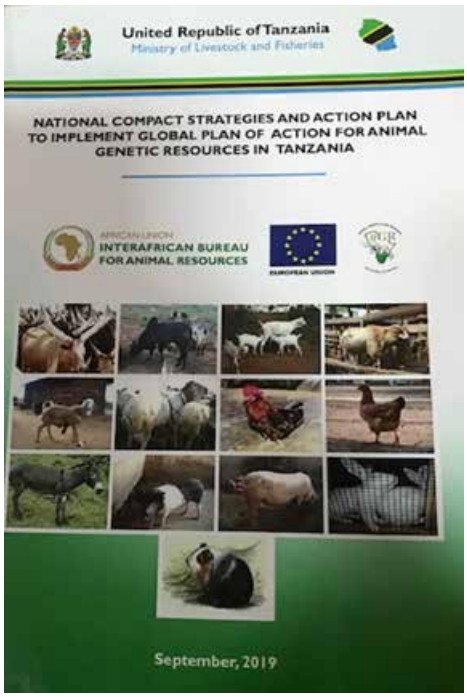
NSAP – Ghana



NSAP - Zambia



NSAP – Rwanda



NSAP - Tanzania

Activity 2: Support Member States to establish or strengthen their national breeding and conservation strategies as part of their National Action Plan for Animal Genetic Resources

A total of 98 initiatives for breeding and conservation were supported by the Genetics Project in three phases (2015, 2016 and 2019). Calls for proposals were sent out three times and the criteria used to select initiatives to be supported were primarily: region, species, and potential of meeting the objectives. The highlights and status of the supported initiatives are summarised in Table 3:

Table 3: Status of some of initiatives in Member States offered support by the project

Country	Project Title	Objective	Status
Kenya	Red Maasai Sheep: Breeding and Conservation strategies as a Pathway out of Poverty in Kenya	To develop breeding and conservation strategies for improvement of the genetic potential and population of the pure Red Maasai sheep	Completed, outputs include various handbooks (Red Maasai Husbandry booklet); breeding stock purchased, Animal housing shed constructed,
Sierra Leone	Maintaining the indigenous Breed of the West African Dwarf Goat and Djallonké sheep in Sierra Leone	To preserve the genetic material of the indigenous sheep & goats by establishing & maintaining a station herd of small ruminants at Teko Livestock Station	Started, on-going
Tanzania	Genetic improvement and Community based conservation of Pare white goats in Tanzania	To improve market-oriented goat productivity for poverty alleviation through conservation and sustainable use of Pare white goats	Completed. Information on goat characteristics and production systems available; farmers trained in goat management & marketing; Breeders association established; various outputs include; Breeding stock purchased, Animal housing shed constructed,
Togo	Support for the establishment of a national basis for the selection of Djallonké sheep in Togo	To establish a national basis for the selection of Djallonké sheep in Togo	Completed, story captured on project video
Zimbabwe	Breeding Selection & Marketing of Indigenous Matebele goat	To breed, select true type of Matebele goat and market improved goats to farmers and consumers	Stalled. Had challenges obtaining quotations due to the monetary situation in the country.
Botswana	1. Musi breed multiplication through multiple ovulation and Embryo Transfer 2. Phenotypic characterization & Production potential of Indigenous Tswana pigs	To characterize physical traits of indigenous Tswana pigs and create an inventory of their growth performance	Challenges faced with sample analyses which could only be done in South Africa.
Cameroon	Project to Improve Village Poultry and Conserve Animal Genetic Resources in the Western Region Cameroon	Promotion of local GRAs through village poultry farming	No response
Cote d'Ivoire	Integration of the Nagoya Protocol on Access to Genetic Resources and Fair and Equitable Benefit Sharing (ABS) arising from their use in the management of genetic resources	Contribute to the conservation and sustainable use of animal genetic resources through the extension of the Nagoya Protocol to stakeholders involved in the management of these resources in Côte d'Ivoire	Finished. Report available
Democratic Republic of Congo	Sustainable local goat management	To preserve the genetic diversity of the local goat of Kasaï and to improve its productivity with a view to contributing to the conservation and sustainable use of endemic RGAs	No response

Country	Project Title	Objective	Status
Ethiopia	Community based Sheko cattle breed In situ conservation	To support conservation of the Sheko breed in situ through community-based breeding program (CBBP)	16 Sheko bulls bought and distributed to farmers involved in Community-based breeding programs (CBBP)
Egypt	Conservation & better utilization of the potential dairy Zarabi goats	To conserve the Zarabi goat as a potential breed for milk and meat production using quantitative and molecular genetic information	Challenges with communication
Guinea	Support to the implementation of the open nucleus breeding program in Guinea	Implement measures to support and accompany the N'Dama livestock breeding program	Did not start
Mauritius	Conservation and utilization of the critically endangered Creole cattle in Mauritius	To conserve and utilize the Creole cattle	Breeding completed; Output include procurement of Creole breeding animals and distribution of feed and veterinary inputs to local farmers
Algeria, Egypt & Mauritania	Genetic Characterization & Utilization of Camel Genetic Resources in Eastern and Western-North Africa Sub-region	To characterize the genetic architecture of main camel ecotypes	Could not start due to logistical difficulties
Algeria	Performance of Algerian sheep breeds	Study the production and reproductive performance, genetic potential and resistance to certain diseases of Algerian sheep breeds	Chemicals procured by the project
Cameroon	Conservation of genetic resources by selection of pony horses Kirdi or pony Musey	To conduct within the communities and on the basis of common criteria, the selection of Kirdi pony which will be given to breeders in the extreme north of Cameroon	No response
Congo	In situ conservation and sustainable use of local populations of ducks in Congo	Contributing to food security through the conservation of local duck breeds in Congo	Feed, veterinary and other items procured and distributed by project
Eritrea	The Establishment of Nucleus breeding centre for Barka breed conservation and supply of Crossbreeds (HF*BK) dairy cattle	To establish a nucleus breeding centre capable of producing and conserving enough Barka breeding stock and crossbreds	No response
Mauritania	Phenotypic characterization and exploitation of dairy potential in a control environment of Gouera dairy goat in Mauritania	Helping people to better value the local population of dairy goats	Could not start due to logistical difficulties of getting quotations from local companies
Madagascar	Food safety of farmers through the genetic improvement of goats intended for the production of Meat	Strengthen knowledge on goat performance and cross-breeding with selected breeds	No response

Country	Project Title	Objective	Status
Rwanda	Establishing dairy cattle recording scheme for sustainable routine on-farm data collection and feedback in Rwanda	To strengthen a national cattle recording and feedback scheme	Started; recording system developed and training of technical staff conducted.
Uganda	Integrated dairy value chain development	To support two farmer groups in dairy chain management and development	Did not start due to retirement of main applicant
Tunisia	Use, development and conservation of AnGR in Tunisia: identification of genetic structure & genomic regions involved in adaptation of indigenous small ruminants breeds to their environment	Investigate the genetic structure of small ruminant breeds and the genetic relationship between them	Started: Purchased laboratory equipment
Kenya	Scaling Up of the Red Maasai Sheep Genetic Improvement and Conservation Project (Kenya Livestock Breeders Association (Kenya Stud Book) to AU-IBAR	To train registered farmers, breeders and breed inspectors on the breeding program; To inspection, select and register Red Maasai sheep by the Red Maasai Sheep Breeders Society of Kenya (RMSBSK) and Kenya Stud Book (KSB); To implement the RM sheep breeding program.	Red Maasai Sheep Training Manual produced Red Maasai Sheep Breed Standard and RM Breeding Program published 562 sheep registered and recorded. A database of registered flock established Training of farmers done Registration of Red Maasai breeders Society of Kenya
Kenya	Dorper Sheep Society of Kenya –Dorper breeding program	To achieve high yearling weights and good carcass quality of Dorper sheep in the project area. The breeding objective is to select for low fat deposition, high Body size, Drought tolerance and Disease resistance.	Breeders training materials were produced; criteria for selection of nucleus breeding farmers and breeding stock established; inspection and registration of nucleus breeding stock conducted. All reports available
Tanzania	Operationalization of the White Pare goats associations	To strengthen and operationalize the goat breeders' association and develop marketing strategies for Pare white goats.	Training of farmers on goat breeding, management and marketing White pare Goat Breeders association established and registered Breeding stock purchased Animal housing shed constructed
Egypt/Tunisia	Traveler farmers: research, education, training and extension on aquatic genetic resources within national jurisdiction: coordination, networking and information	To develop a network of farmer's educations and capacity building between the countries in the Northern Africa region.	Tunisia started but Egypt coordinator had to be withdrawn
Kenya	Conservation through Sustainable Improvement of Indigenous Chicken in Kenya	To develop and conserve meat; egg lines; 'Kari chicken' and dual purpose synthetic lines	Had challenges with procurement of indigenous germplasm, issues of single-sourcing

Country	Project Title	Objective	Status
Benin	Sustainable Breeding of Muturu Cattle in Benin: Participatory Implementation of Community-Based Breeding Program	To support the conservation of the Muturu breed in Benin - To characterize (molecular and biochemical) the Muturu breed in Benin - To develop a selection/ conservation scheme/ strategy for the breed in order to ensure its conservation and sustainability	Muturu Cattle breeders association established Training of local farmers on recording Breeding stock purchased Animal feeds and drugs purchased
Benin	Conservation In situ de la race bovine Somba dans la commune de Boukoumbé	To support local breeders in setting up a bio-cultural protocol for sustainable breeding of the breed To enhance the breeding of the Somba cattle breed	Somba Cattle breeders association established Training of local farmers on recording Breeding stock purchased Animal feeds and drugs purchased
Burkina Faso	Appui à l'amélioration génétique de la race ovine Djallonké dans la région des Hauts-Bassins au Burkina Faso	To strengthen the organizational and technical capacities of breeders through the preservation through production and genetic improvement of the Djallonke sheep breed in western Burkina Faso	Sigué Wouroma Breeders association supported to go exchange visit to Togo to look-and-learn on Djallonke sheep production and how to set up breeding schemes
Kenya	Development of the national breeds catalogue for Kenya	To document and catalogue Kenya rich diversity of AnGR	Supported to develop the catalogue; Catalogue published and distributed
South Africa and Zimbabwe	Insight into Queen turnover rates in honey bee colonies (South Africa and Zimbabwe)	To monitor and map turn-over rates of honeybee colonies	RSA supported to buy drones to monitor bee colonies; supported field work to collect samples and DNA analyses; Zimbabwe component not done due to procurement procedures
Malawi	Assessment Of The Status Of Pollinator Genetic Resources In Malawi (APGREM)	To come up with an inventory of pollinator genetic resources.	On-going; developed a draft inventory of pollinator genetic resources.
Tanzania	Genetic characterization of Tanzania's different Tilapiane species for sustainable commercial aquaculture production (Tanzania)	To genetically characterise the different tilapiane species with potential for aquaculture from the Tanzanian watersheds	Not done due to time limitations
Ethiopia	Strengthening of the existing in situ conservation of sheep and goat breeds in Ethiopia	To strengthen existing sheep and goats selection and improvement programs through training of farmers, development agents, district level experts as well as provision of a starter buck and rams for selected farmers.	Not done due to time limitations
Rwanda and Uganda	Integrating Pig artificial insemination as a tool for genetic improvement and conservation of local pig ecotypes in East Africa (Rwanda and Uganda)	To utilize AI in pigs as a breeding tool	Rwanda undertook a training on artificial pig insemination for technicians and pig breeders Uganda – Not done due to time limitations

Country	Project Title	Objective	Status
South Africa	Understanding the genetic profiling of tilapia fish products in the local markets and accessibility of domestic tilapia products to the market	To investigate the genetic status of tilapia fish traded in the informal and formal sectors of South African cities To investigate the genetic status of Malawian fish traded in the informal sectors of South Africa	Not done due to time limitations

Below is a testimony of one of the supported initiatives at Matopos Research Institute:

- AU-IBAR through the Genetics Project supported the Department of Research and Specialist Services at Matopos Research Institute to conserve the Tuli Cattle breed at Matopos Research Institute. A nuclear Tuli herd of 179 has been identified and registered with the Zimbabwe Herd Book (ZHB) and is currently being maintained at Matopos. Paddocks are also in place but they need rehabilitation. Efforts were made to facilitate fencing of some paddocks and drilling boreholes for water supply. However, these were not possible due to reluctance of the Zimbabwean service providers to abide by the AUC Rules and Regulations on procurement.
- The project created adequate awareness on the need to conserve indigenous animal genetic resource particularly the breed, to key stakeholders including the government. As a result of the awareness a number of stakeholders were keeping of the Tuli breed due to its advantages. The Zimbabwe Prison Services started keeping Tuli cattle in their prison farms as a direct result of this awareness. Further, in terms of number of registrations of pure cattle breeds the Tuli was amongst the highest.
- The project purchased two laptop computers which are already in use. The Herdmaster software which is used for herd management especially for recording livestock data such as weights at weaning, birth weights was installed on the two computers. Furthermore the Genetics project procured a cattle weighing scale as well as a 50-litre liquid nitrogen tank used by Matopos Research Institute for their Artificial Insemination (AI) activities in the surrounding communities using mainly Tuli bull semen.
- Staff were trained on livestock management using the Herdmaster software, through the support provided by the AnGR project. Furthermore key staff benefitted from the knowledge gained on various aspects of the management and development of AnGR through participation in regional and continental workshops which were supported by the project.
- Ownership: Conservation of the Tuli cattle breed is demand driven. The demand for Tuli is much higher than the available stock in Zimbabwe and in the Southern Africa region. There is need to conserve this breed but capacity to isolate and manage the Tuli breed is lacking. Access to water for livestock is a challenge in the Matabeleland region where Matopos Research Institute is located, making the drilling of boreholes and accessory infrastructure an absolute necessity.

Testimonials from beneficiaries (Red Maasai Sheep);

Red Maasai Sheep smallholder farmers "The establishment of the Red Maasai Sheep Breeders Society of Kenya (RMSBSK) has provided an excellent platform for collective bargaining power during the sale of the animals. More farmers have restocked their farm with the Red Maasai as a result of the awareness creation campaign by the members of the newly formed association"

Activity 3: Support the development of regional (REC based) conservation policies and strategies for transboundary breeds and populations that are at risk

At the beginning of the project, a total of six regional-based initiatives were awarded support by the project. Table 4 shows the state of implementation.

Table 4: State of implementation of Regional based initiatives at the end the project

REC/S-RFP/SRO	Project Title	Objective	Status
EAC	Development of a comprehensive Regional Strategy for the Conservation and Rational utilization of Animal Genetic Resources in the East African Community (EAC)	To complement and consolidate the Conservation and utilization of Farm Animal Genetics (FAnGR) in EA region	Completed. A regional strategy on AnGR was validated and published by EAC.
IGAD	Regional Legal & regulatory Framework for the management of Animal Genetic Resources in IGAD Region	To achieve effective and appropriate animal breeding services by strengthening the institutional environment for animal genetics resources, at the national and regional levels	Completed. A regional legal and regulatory framework for IGAD is available and published
KALRO/ TALIRI	Breeding & Conservation programs for Sahiwal cattle genetic resources in Eastern Africa: Unlocking the potential	To improve breeding and conservation of the Sahiwal cattle	This joint initiative resulted in the transfer of genetic resources (3 bulls) from Kenya to Tanzania to improve the gene pool in the recipient country. Training manuals on cattle general breeding and management, value addition and marketing best practices developed and published Sahiwal Cattle Management handbook developed 50 farmers trained on cattle general breeding and management, value addition and marketing Performed AI on Sahiwal cattle in pastoralist communities Facilitated formation of Sahiwal breeders' association
CIRDES	Sustainable Use and Conservation Strategies for Transboundary AnGR in West Africa	Contributing to the conservation and sustainable use of indigenous West African AnGR	Initiated
EISMV in collaboration with ECOWAS	Establishment of a network and plan of action in West Africa for the conservation and sustainable use of indigenous animal genetic resources (AnGR) of ruminant populations	Establishment of an effective regional network for the management of local West African AnGR and more particularly at the level of ruminant populations	Poor coordination between key implementing partners
ASARECA	Creating awareness & advocacy on sustainable utilization of AnGR in Eastern & Central African regions	To increase awareness creation and advocacy of sustainable utilization	This was partially achieved through interactions at various General Assembly meetings conducted in East Africa

Some results of studies on utilization, conservation and selection programs targeting 20 selected transboundary breeds at risk of extinction are also available from the regions. Table 5 presents the current status of implementation.

Country	Species	Breed of interest	Status
Sudan	Sheep	Hammari	Started; Purchase of breeding stock and laboratory equipment
Kenya	Sheep	Red Maasai	Completed: Training of Red Maasai Sheep Multipliers and inspectors; Breeding stock purchased; Farm equipment purchased; Registration and performance recording and a data management and feedback software; Cryo-conservation of Red Maasai sheep
Algeria	Sheep	D'man	No response received
Ethiopia	Cattle	Sheko	16 bulls purchased and distributed to farmers to ensure Sheko breed is conserved
Egypt	Buffaloes	Water Buffaloes	Not implemented due to lack of documentation for procurement
Cote d'Ivoire	Cattle	Languire	On-going
Cameroon	Cattle	Bakossi	Completed. Bakossi breeders association registration done;
Chad	Cattle	Kuri	No response received
CAR	Sheep	Djallonke	No response received
DRC	Goat	West African Dwarf	No response received
Ghana	Pig	Ashanti pig	Ashanti pig brochures published – awareness created Increased Ashanti pig population in station Approx. 200 bags maize and 50 Soyabean
Lesotho	Pig	Basotho	No response received
Mauritania	Camel	Dromedary	No response received
Mozambique	Goat	Landim	No response received
Namibia	Sheep	Damara	Not implemented mainly due to changes in staffing at country level
Nigeria	Cattle	Muturu	Not implemented because support was provided to Benin on the same breed
Niger	Goat	Red Maradi	No response received
Tunisia	Sheep	Tunisian Barbarin	No response received
Uganda	Cattle	Ankole	Purchase of data recording equipment; Purchase of farm equipment.
Zimbabwe	Cattle	Tuli	Coopers Zimbabwe provided training on the management of the Tuli cattle breed to over 700 livestock keepers for the Tuli Cattle Society of Zimbabwe. .

Activity 4. Support the establishment of a regional/sub-regional facility for ex situ conservation, in particular cryogenic storage and establish a gene bank on AnGR

This activity intended to improve accessibility to cryo-conservation facilities for all African Member States by supporting and upgrading selected national gene banks to serve as regional gene banks. The aim was to provide cryo-conservation facilities for countries without national gene banks, provide back-up storage for security purposes as well as store materials from transboundary breeds shared by MS in the regions. In close consultation and collaboration with the Member States, five regional gene bank facilities in the five Africa regions were identified by the project. After careful consideration of the required equipment and budgetary limits, equipment was procured by the project for five regional gene banks.

The equipment for the gene banks was delivered, installed and tested on-site at each of the five gene banks. Four out of the five regional gene banks (Botswana, Burkina Faso, Tunisia and Uganda) were officially

launched and handed-over to the respective regions. It was not possible to officially hand-over the regional gene bank for Central Africa in Cameroon due to time limitations and some logistical challenges. However, plans are under consideration for this regional gene bank to be officially launched in the near future. It was recognized that these regional facilities would require some legal platform on which their administration and management would be based. Therefore, a draft standard Memorandum of Understanding (MoU) was designed and developed by a legal expert and endorsed by the Office of the Legal Counsel at AUC. The MoU has 17 Articles including covering aspects of institutional framework, objectives, access, management of the regional gene banks, among others. An example of the MoU (for Southern Africa) is indicated below. *https://documentcloud.adobe.com/link/track?uri=urn%3Aaaid%3Ascds%3AUS%3A2dcff43f-559d-48c2-8087-da98b296e405*

This MoU is a temporary document that will be signed by regional stakeholders who will utilize the gene banks in their respective regions while awaiting substantive regional MoUs developed and signed according to regional protocols and procedures. Therefore, regions are expected to draw up substantive and legally-binding MoUs for their respective regional gene banks.

Standard Operating Procedures (SOPs) for the technical, administrative and legal requirements for the management of regional gene banks for AnGR developed by African technical and legal experts in preparation for the operations and management of the regional gene banks, are available and shared with stakeholders. These SOPs are expected to harmonize the operations of the gene banks and facilitate the sharing and exchange of genetic materials between Member States using laid down procedures and protocols.



Standard Operating Procedures



Draft Memorandum of Understanding for Regional gene banks (Central Africa)

Material Transfer Agreements (MTAs) are also in place for the movement of genetic materials between countries. These MTAs will be used by MS as they move genetic materials to the regional gene banks and among themselves.

Activity 5: Support the establishment and strengthening of national and regional livestock breeders' associations

As custodians of the invaluable AnGR of Africa, a total of 27 Breeders' and farmers' associations were offered support by the Genetics project. The status of support is shown in the Table 6. Some of the associations produced highly commendable outputs (Table 6). For example, new breeders' associations/ societies were established during the course of the project. Seven breeders associations established: Red Maasai sheep (Kenya), Galla Goat (Kenya), Muturu, Somba cattle (Benin), Bakossi cattle (Cameroon), White Pare goat (Tanzania), Azawak cattle (Niger). The Dorper Sheep Breeders Society of Kenya, the Tuli Cattle Society of Zimbabwe, the Nzaui District Small Scale Farmers Forum (NSSFF), Association des Éleveurs de Dabou (AED), the Tuli cattle breed, were among those strengthened by the project. The Red Maasai Sheep Breeders' Society of Kenya was established in 2017 with the registration of over 500 Red Maasai Sheep farmers. This augurs well with the conservation and survival of the Red Maasai sheep breed. The association also drafted a constitution and has elected officials in office. The White Pare goat breeders' association was formed in Tanzania in 2017, and was is registered with the local authority awaiting the Government of Tanzania to put in place an Act for the registration of animal breeders' associations at national level. The White Pare goat breeders' association is awaiting operationalization and was awarded an additional 25,000USD which was used to further train farmers on selection of breeding animals and good husbandry practises. The White Pare goat breeders' association was formed in Tanzania, and was registered with the local authority awaiting the Government of Tanzania to put in place an Act for the registration of animal breeders' associations at national level. Under this support by the Genetics Project, the following was achieved:

- Characterization of the goats' production system has been conducted and the farmers' breeding objectives are well-understood.
- Open nucleus breeding schemes for the Pare white goats were initiated and TALIRI procured 66 female goats and 6 male goats to increase the population. Currently the number of animals has increased to approximately 100 flock and will be distributed to selected association members.
- Development of a roadmap using the data collected from station: Farmers were trained on data recording so that they may be able to identify good breeds. However, this process needs time for the impact to be realised.
- Networking farmers with business people: During an inception workshop, farmers were brought together with business persons. This was organized in order to make farmers aware of the market demands.
- Training of farmers: Two training manuals were produced, one on marketing and the other one on breeding, and a training of trainers (TOT) for farmers was conducted whereby farmers were trained on good husbandry practices, selection, identification of best performing goats in the herd, improvement of genetic material and marketing
- Equipment provided by the project include a laptop and two (2) tablets to assist in the record keeping of the purchased breeding stock by the technical officers
- Watering systems at the centre were renovated and feeds and drugs purchased. Ear tag applicators were also provided.
- Identification of bucks; during the baseline survey, preferred traits by farmers were identified. Farmers were trained on how to improve the preferred traits and also on the best breeding practices e.g. on the buck rotational technique

For the Djallonke sheep in West Africa, members of the Sigué Wouroma Breeders Association of Bobo Dioulasso in Burkina Faso were supported by the project to embark on a look-and-learn visit to Togo to learn about the management of the breed.

A meeting was held in Gaborone, Botswana in July 2019 to initiate the process of establishing a Regional Tuli Breeders Society/Association for Southern Africa. Five representatives of Tuli breeders associations from South Africa, Zambia and Zimbabwe, the Namibia Stud Breeders Association (Namibia) and the South African Studbook (South Africa) attended the meeting under the auspices of the Genetics Project. The importance of regional breeders associations for transboundary breeds was emphasized. The representatives were all in agreement on the need to establish a regional breeders' society/association and plans are underway to establish this regional association this year.

The Genetics Project sponsored over 20 Red Maasai sheep and Galla goat smallholder farmers to participate in the Kenya Livestock Breeders' Sale and Show in 2018, an annual event on the agricultural calendar of Kenya. The participation of farmers in this event had a major impact on them and some winning awards for the best animals at the show. A video recording of the event is available.

Table 6: Status of supported Breeders Associations at the end of the project

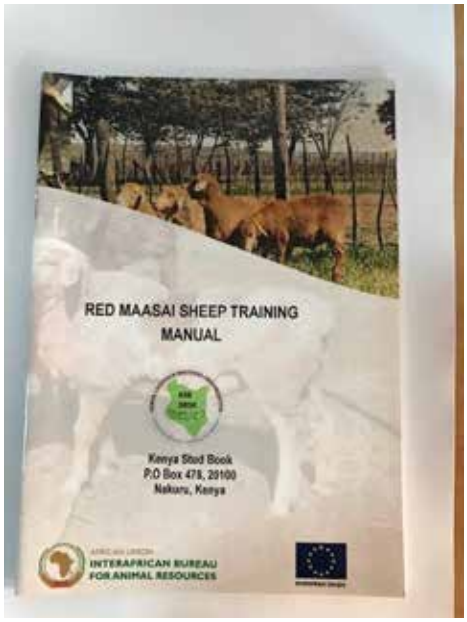
Country	Project Title	Objective	Status
Cote d'Ivoire	Project to improve village poultry farming in the department of Dabou	To development and promote local poultry breeds through control of the conduct of the improved traditional poultry farming	Completed. 18 farmers for the Association des Éleveurs de Dabou (AED) were trained on basic village chicken management techniques
Kenya	Saving the Red Maasai sheep for food security, prosperity and conservation	To promote Red Maasai sheep for livelihoods improvement and conservation	Completed. Red Maasai Sheep Breeders' Society of Kenya established Red Maasai Sheep Training Manual published Red Maasai Sheep Breed Standard of excellence published RMS Breeding Program published RMS Flyer for awareness creation Foundation flock of 562 sheep selected, inspected and registered A database of registered flock established
Kenya	Promotion sustainable utilization of Dorper Sheep in Kenya	To strengthen the operational capacity of Dorper Sheep Breeders Society of Kenya (DSBSK)	Completed. The DSBSK was strengthened and training manuals, breed standards and other documents were produced with the support of the project Dorper sheep breeding program booklet available Dorper Sheep Breed Standard of Excellence available Two County branches (Narok and Kajiado) of DSBSK established Branch offices run by elected office bearers 10 fully trained Dorper sheep inspectors and judges Training material for Dorper sheep inspectors and judges available

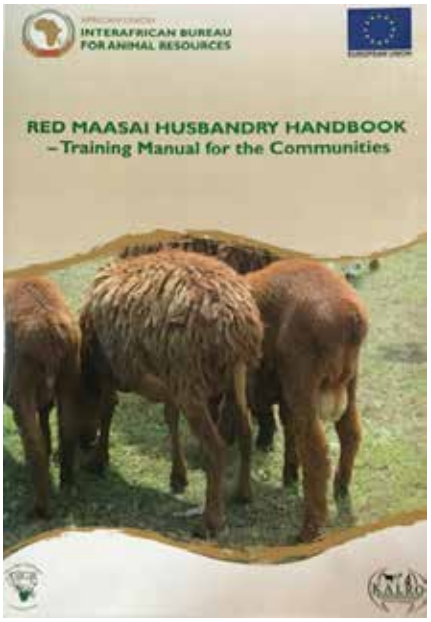
Country	Project Title	Objective	Status
			Improvement in selection, inspection, judging, and registration of Dorper sheep services
Kenya	Support for capacity building to integrate Apiculture into Agriculture	To build capacity for rehabilitative integrative positive exploitation of natural and suitable agricultural environments that supports the activity of the honeybee in Nzaui District of Makueni county	The Nzaui District Small Scale Farmers Forum (NSSFF) was supported by the project with 50 Beehives and starter kits Training of farmers on harvesting and packaging of honey using modern technologies undertaken
Nigeria	Genetic improvement of local pigs in Nigeria	To genetically upgrade the local pigs through crossbreeding with pure bred pigs.	Started. Training of 10 Selected farmers on breeding and management practices of local pig breeds Case study on "Promoting sustainable use of local pig genetic resources through improved performance by crossing with exotics" undertaken report available
Senegal	Project for the genetic conservation of the Gobra zebu breed of the Senegal River valley and the Sylvo-pastoral zone	Strengthen the genetic potential of local cattle breeds for a livestock adapted to the conditions of the Senegalese Sahelian environment in the valley of the Senegal river and the sylvo-pastoral zone	Not implemented
Uganda	Ankole Cow protection conservancy	To trace and conserve the genetic resources of the Longhorn Ankole cattle within the cattle corridor rangelands in Uganda	Completed. Ankole cattle breeding animals procured 7 cows and 1 bull for IRRA Rigumaho Association in Mbarara 3 months spot adverts and one hour show talk were aired
Cameroon	Project to Improve Village Poultry and Conserve Animal Genetic Resources in the Western Region Cameroon	Conservation of RGAs through the diffusion of local poultry	Not implemented
Zimbabwe	Dissemination of info as to the genetic value of the Boran	To ensure data being maintained by ZHB is accurate and amenable for genetic analysis	The Boran Breeders Society published handbooks without going through the AU-IBAR procurement process and it was difficult to proceed from there
Zimbabwe	Tuli cattle society Zimbabwe - Training program	To educate farmers and other stakeholders on the breeding, management of the Tuli cattle breed	Completed. Over 700 farmers trained in Animal Production and Health to improve the management of the Tuli cattle breed
Burkina Faso	Promotion of cattle breeds adapted to the socio-environmental context of the protected area region in eastern Burkina Faso (Gourma, Tapoa and Kompienga Provinces)	Contribute to the promotion of cattle breeds adapted to the socio-economic and environmental conditions of the protected area region in eastern Burkina Faso	Not started
Burkina Faso	Multiplication of the pure-bred Azawak zebu	Consolidate and perpetuate the achievements of UNEAB In the reproduction of pure-bred Azawak cattle for dissemination	Nine (9) breeding animals (females) were provided to 3 breeders to implement the multiplication process for the Azawak cattle breed Veterinary kits consisting of veterinary products and inputs were provided to the breeders

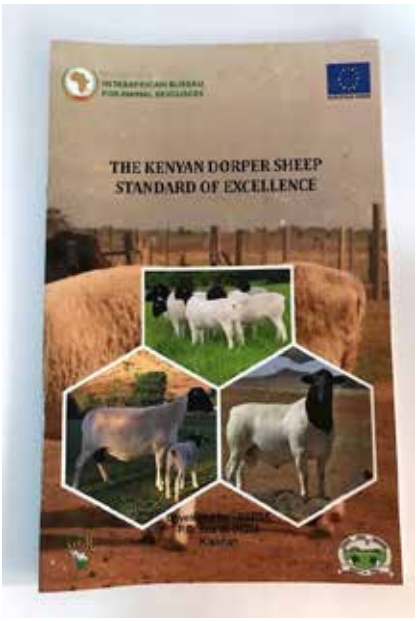
Country	Project Title	Objective	Status
			Fodder (hay) and conservation techniques provided to the breeders The project also trained breeders in conservation of AnGR and sensitized breeders on the Nagoya Protocol
Chad	Organizational, technical and pedagogical support to the cattle breeders of the Lake Chad basin for the conservation of the Kuri beef breed	Conserve the herd of the Kuri breed	Not implemented. Security concerns
Cameroon	Participatory promotion of dwarf goat farming in the mountains	Contribute to the consideration of threats and risks to the breed and to conduct two control farms	Not implemented
Cameroon	Fulani cattle breed conservation	To conserve the Fulani cattle breed	Not implemented
Democratic Republic of Congo	Project of the domestication of grasscutters in Kailo in Maniema	To distribute grasscutters, promote breeding techniques	Not implemented
Gambia	Support to animal breeders & multipliers in the Gambia	To strengthen the network to generate and inculcate best practices within the network and livestock industry as a whole	The National Animal Breeders and Multipliers (NABAM) was supported by the project to procure some equipment and upgrade website…..
Kenya	Prioritizing conservation & production of Galla goat	To ensure Galla goat is registered and improved through proper selection and upgrading	Registration of Galla Goat Breeders Association of Kenya (GGBAK) Reviewed the Galla Goat Breed Standard (BS) of excellence; Developed the Galla goat Training Manual and record keeping documents Identification, Recruitment and Registration of Galla Goat keepers/ breeders Farmer training, Identification, registration and Data Capture of Galla goat
Mozambique	Establishment of a participatory conservation program for Landim cattle breed in Mozambique	To develop and conserve the Landim cattle breed for present and future generations	Not implemented because of reluctance of service providers to deliver goods and service before payment
Niger	Support project for the Azawak cattle breeders at Filingué	To contribute to building the capacity of the cooperative through the large-scale adoption of artificial insemination practice and increasing the size of the Rouafi test unit	On-going
Rwanda	Empowering dairy cattle breeders' cooperatives to improve & conserve dairy cattle breeds genetics in Rwanda	To contribute to filing gaps existing in the dairy production and productivity value chain	On-going
Algeria	Support for the development of the federation of breeders by digital means	To strengthen the role of the federation to develop and organize livestock production in Algeria	Not implemented

Country	Project Title	Objective	Status
Chad	Support Project for the Alakindafa Farm (PAFAA)	To conserve the herd of the Kuri breed	Not implemented due to security concerns in Chad
Uganda	Capacity building for establishment of breed standard and Herd Book for the Ankole Cattle	To develop a standard breed of excellence and herd book for the Ankole Cattle	NAGRC&DB supported with data collection equipment as well farm equipment
Togo	Djallonké goat and sheep rearing project for dissemination and commercial fattening	To improve traditional breeding and popularization of sheep Djallonké	Completed. The impact of the project was highlighted on the project video…..
Sierra Leone	The genetic improvement, upgrading & multiplication of breeder pigs in Sierra Leone	To establish a genetic breeding program for exotic pigs	Not implemented
South Africa	Bull Power Project	To perform BSE on bulls to determine the genetic potential	Abandoned because coordinator of initiative relocated to another institution and there was no one to continue with this initiative

Examples of training manuals developed under the Genetics support









In general, the implementation of the support to the various Member States, breeders associations and RECs had mixed results:

- The AU-IBAR procurement procedures caused severe challenges to the implementation of activities of the supported initiatives. However, with the cooperation of the Procurement Unit, some flexibility was exercised which positively contributed to the implementation
- Despite the challenges affecting the support, some Member States, RECs and Breeders' associations remained committed to accomplishing the objectives of their initiatives for the overall good of the continent's AnGR
- With the increased emphasis on the support to breeders associations, the focus turned to the livestock keepers thereby promoting a sense of ownership due to their involvement. This impacted positively on the conservation and utilization of African AnGR, as witnessed in the community-based conservation of the White Pare goats, the establishment of the Red Maasai Sheep Breeders' Society of Kenya (RMSBSK), Galla Goat Breeders Society of Kenya (GGBSK), among others.
- There is greater commitment by livestock keepers in most regions of Africa to establish functional breed-specific breeders' associations.

Result Area 4: Increasing knowledge, attitude and practice of the contribution of livestock and livestock sector to economic growth, food security and poverty reduction

This result focused on the dissemination of information on issues affecting AnGR and rural communities living in the targeted regions to provide decision makers with information regarding AnGR, and promote the role of AnGR in resource stewardship, animal health and production of high-quality safe and nutritious products. Under this result the following activities were conducted:

Activity 1: Develop harmonized tools (protocols) for characterization and inventory of AnGR

The aim of this activity was to provide harmonized tools for characterization, inventory and monitoring of AnGR in AU Member States. Since these tools were developed on African AnGR, they are well-suited to characterize, inventorize and monitor the trends in Africa's breeds. Mechanisms are being put in place to promote the adoption of these harmonized tools throughout the continent. The following were achieved:

Development of the Animal Genetic Resources Characterization, Inventory and Monitoring tool for Africa (AnGR-CIM);

To achieve this, an assessment of existing characterization, inventory and monitoring tools/protocols of AnGR was done, first through an e-discussion "Improving the utilization of Animal Genetic Resources characterization, inventory and monitoring tools in Africa" and a workshop on the "Assessment of Animal Genetic Resources Characterization, Inventory and Monitoring tools to guide revision and harmonization processes" highlighted the various shortcomings of the current tools in use and proposed the development of an Animal Genetic Resources Characterization, Inventory and Monitoring (AnGR-CIM) tool tailored for the users in Africa. For the development of the above mentioned tool, an animal genetic resources taxonomy advisory group (AnGR-TAG) was established, with a primary role to offer technical advice and expertise towards the development and final delivery of the AnGR-CIM tool. The Taxonomy Advisory Group write shop developed in-depth draft tool guidelines for the revised and harmonized Animal Genetics Resources characterization, inventory and monitoring (AnGR-CIM) tool for Africa which were transformed into

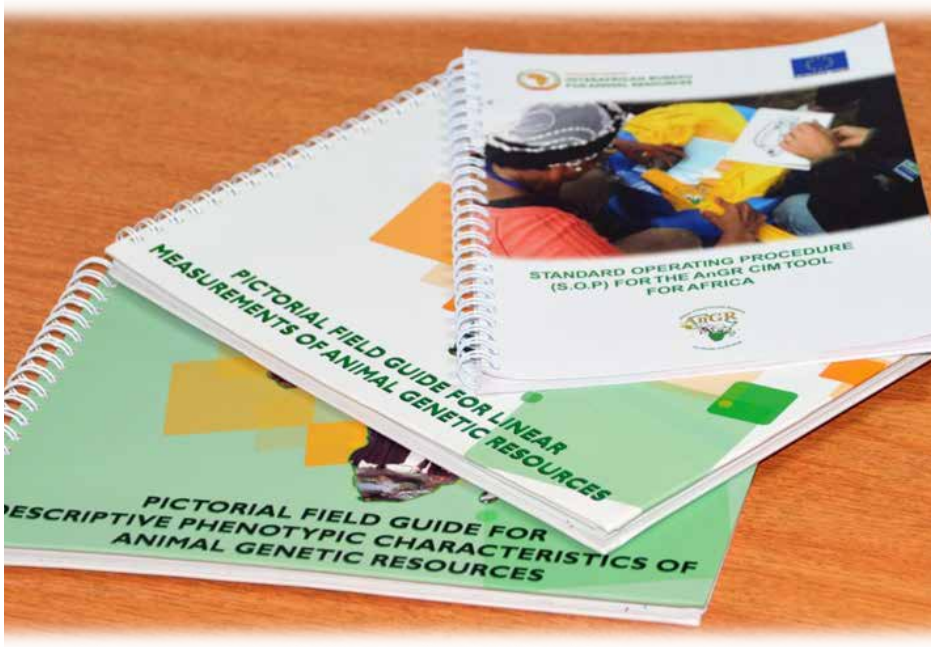
i. Digital form of AnGR-CIM tool (English and French versions) *http://www.au-ibar.org/training-manuals-and-tools*
ii. Two field manuals (Pictorial field guide for linear measurements of Animal genetic Resources and pictorial field guide for descriptive phenotypic characteristics of Animal genetic resources

iii. Standard operating procedures
iv. One Audio visual field teaching guide and documentary for phenotypic and morphometric characterization of Animal Genetic resources

The above tool has been validated by Member States and endorsed for utilization across the continent. Currently universities and research organizations such as University of Abomey-Calavi, Benin; University of Dschang, Cameroon, Zambian Open University and Zambia are utilizing the tool.



Screen display of the AnGR-CIM tool ENFR vr 2.1



Three field manuals



Audio visual field teaching guide and documentary for phenotypic and morphometric characterization of Animal Genetic resources

- ***Piloting of the AnGR-CIM tool:***

The Animal Genetics Resources Characterization, Inventory and monitoring (AnGR-CIM) tool for Africa was piloted in a total of 16 countries (Benin, Burkina Faso, Cameroon, Chad, Democratic Republic of Congo, Ethiopia, Ghana, Egypt, Kenya, Sudan, Madagascar, Mauritania, Mozambique, Liberia, Togo, Rwanda). During the piloting exercise over 2,500 animals, comprising approximately 97 breeds of cattle, sheep, goats, pigs, poultry, camels, grasscutters and fish were characterized using the AnGR-CIM tool as shown in the Table 7 below.

Table 7: Summaries of the various species to be characterized using the AnGR-CIM tool.

Species	Country	Number of breeds targeted
Cattle	Chad, Cameroun, B/Faso, Madagascar, Mauritania, Mozambique, Ghana, Liberia, Ethiopia, Togo, DRC, Kenya, Egypt, Benin, Sudan	18
Sheep	Chad, Cameroun, B/Faso, Madagascar, Mauritania, Mozambique, Ghana, Liberia, Ethiopia, Togo, DRC, Kenya, Egypt, Benin, Sudan	19
Goats	Chad, Cameroun, B/Faso, Madagascar, Mauritania, Mozambique, Ghana, Liberia, Ethiopia, Togo, DRC, Kenya, Egypt, Benin	17
Pigs	Chad, Cameroun, B/Faso, Madagascar, Mozambique, Liberia, Togo, Ghana, DRC, Benin	10
Poultry including Guinea Fowls	Chad, Cameroun, B/Faso, Madagascar, Mauritania, Mozambique, Liberia, Ethiopia, Togo, DRC, Kenya, Egypt	15
Camel	Sudan, Mauritania	3
Fish	Sudan, Tanzania	2
Grasscutter	Ghana	1

- ***Data analysis and Data visualization system***

Through continuous consultations with Member States on their data needs from the AnGR-CIM tool, the Genetics Project developed and operationalized a data analysis and visualization system (DVS). The DVS will enable Member States to analyse data generated from the AnGR-CIM tool more easily. The system (http://cim-analysis.au-ibar.org/) is hosted on the AU-IBAR website. The data and visualization system provides Member States with a platform to undertake simple data analysis, subsequently providing policy makers with robust evidence on AnGR. It further supports visualization of simple data outputs and monitoring of on-going data collection activities. Currently the data visualization and analysis system holds forms of over 2,500 animals from the pilot countries.



- ***Training of enumerators and equipping with AnGR-CIM toolkit:***

To enable the continental roll-out of the AnGR-CIM tool, it was therefore important to organise two continental training-of-enumerators workshops, and develop a network of skilled and professional trainers who will be adequately equipped and understand the AnGR-CIM tool. Robust training was pertinent as it culminates to making available quality data consequently quality results that will be highly informative to the policy makers during formulation of policies and resource allocation. In total, 263 technical personnel were trained on the AnGR-CIM tool as well as the field manuals. A total of 225 tablets were distributed Member States across the continent to enable them to collect the data effectively and efficiently.



Training on the digital AnGR-CIM tool



Training on taking of phenotypic and morphometric measurements



Training on biological sample collection from fish specimen

- ***Molecular Characterization:***

The Genetics project in a collaborative initiative on the molecular characterization of cattle breeds with ILRI through the Centre of Tropical Livestock Genetics and Health (CTLGH) project supported an initiative to create a Genomics Reference Resource for African Cattle. This resource comprises sequence and / or genomic information on African cattle breeds, which will be made accessible to the general public, particularly those conducting research in livestock genetics for the ultimate benefit of African livestock keepers. Material Transfer Agreements (MTAs) have also been developed and are now available and will be used by all Member States. Currently five countries are participating in the on-going molecular

characterization activity (Table 8). Due to some logistical challenges, ILRI has so far received samples from Ghana, Benin and Kenya. Molecular genotyping was conducted and data analysis will be finalized. The Genomics Reference Resource for African cattle was developed and is now available for use by researchers and information to policy makers [*https://cgspace.cgiar.org/handle/10568/77173*].

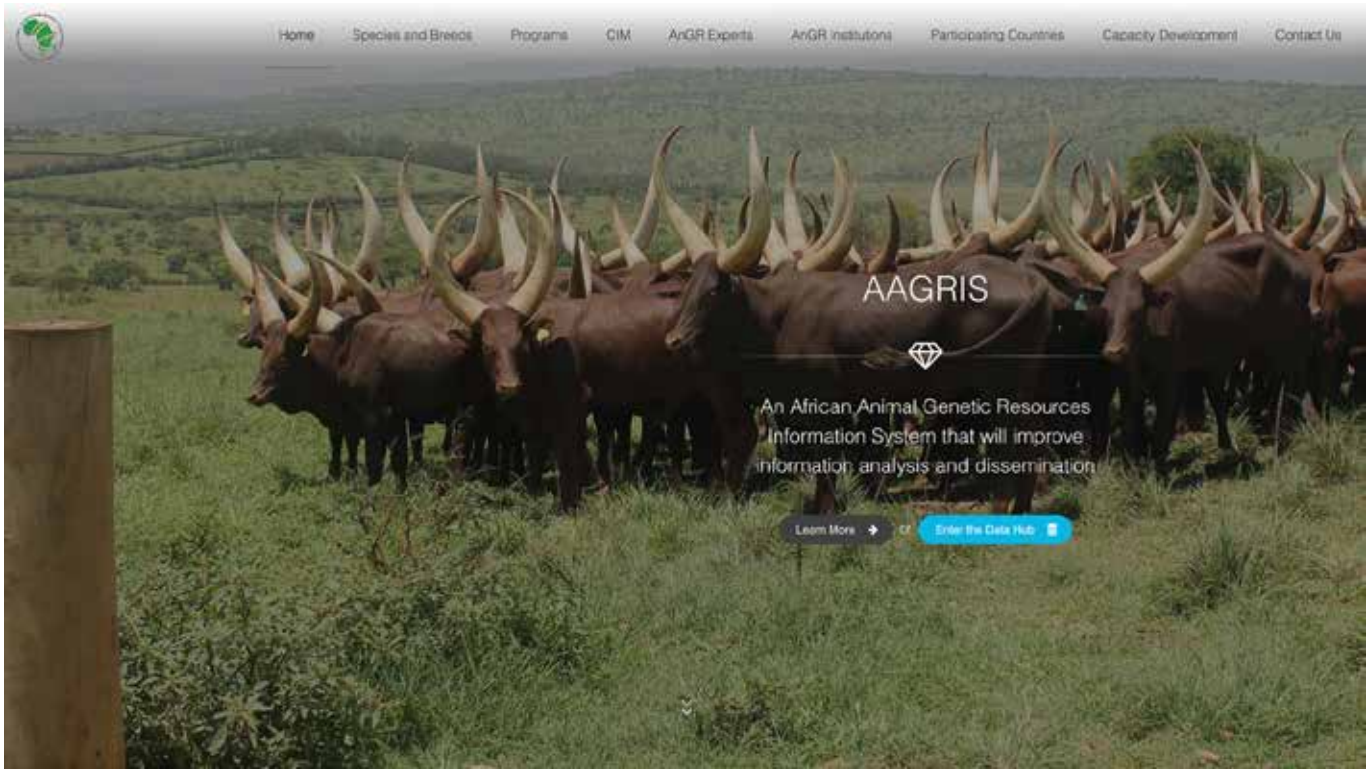
Table 8: Summary of selected MS, cattle breeds and sample numbers

Country	Cattle breed
Egypt	Egyptian baladi
Ghana	Ghana Shorthorn
Kenya	Northern Frontier District Zebu
Madagascar	Zébu malgache
Rwanda	Inyambo
Benin	Borgou

Activity 2: Establishment of AnGR database

The "African Animal Genetic Resources Information System (AAGRIS)" was developed as a module on animal genetic resources within the AU-IBAR Animal Resources Information System (ARIS). The AAGRIS is intended to be a "one-stop shop" on various aspects of AnGR and has six core data and information categories including; Species and breeds, Inventory and monitoring, Conservation and breed improvement programs, Capacity development, AnGR Institutions and News trends.

The AAGRIS is a combination of a data collection and web portal systems and is envisaged to achieve interoperability with existing information systems such as DAD-IS and DAGRIS, among others.
AAGRIS has been developed and operationalized (*http://aagris.au-aris.org/*).



Home page of AAGRIS

A Continental Training-of-trainers workshop on the African Animal Genetic Resources Information System was undertaken, were 150 participants were trained on navigation of the AAGRIS website and its sub-modules, data download, data entry and analysis and familiarization with the user manual for AAGRIS.

In efforts to improve information and data availability at national level, the project procured Information, Communication and Technology (ICT) equipment for all Member States. Thirty one (31) of them were distributed to Directors of Animal Production or their representatives from the following countries (Angola, Benin, Cameroun, Central African Republic, Egypt, Equatorial Guinea, Eritrea, Eswatini, Ethiopia, Gabon, Guinea Bissau, Ivory Coast, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mozambique, Niger, Nigeria, Senegal, Sierra Leone, South Sudan, Sudan, Togo, Tunisia, Uganda, Zambia and Zimbabwe). The ICT equipment comprised; HP laptops, docking stations, monitors and accessories.



The Director and project staff handing-over of ICT equipment to representatives of African Member States

Activity 3: Establish and strengthen national and regional systems for monitoring of trends of breeds and associated risks

Frameworks for the harmonized mechanisms of regional monitoring systems for transboundary breeds for the West African region are available and these were operationalized within the developed AnGR-CIM tool data analysis and visualization system. By the end of the project, IGAD, EAC, UMA, ECCAS and ECOWAS working closely with Sub-Regional Focal Points were at various stages of developing frameworks/guidelines on transboundary breeds which will include mechanisms for monitoring the trends of targeted breeds.

Activity 4: Develop regional networks for information sharing

The five regional DAD-Nets on AnGR are currently functional and new members are continually being added to the respective platforms. By the end of the project, over 900 members are registered on the five DAD-Nets. Over time, there was a noticeable increase in the level of interaction and sharing of information as recorded by the number of exchanges in the DAD-Nets. Following discussions by the Genetics Project team and the Secretariats of the S-RFPs and the RECs at the various General Assembly meetings, it was agreed that the moderation of these networks will be handed over to these institutions for sustainability. The process of the hand-over is underway.

Activity 5: Establish or strengthen regional focal points for animal genetic resources

The project managed to establish five S-RFPs in all the regions of Africa. The Secretariats of the S-RFPs were anchored in respective sub-regional research and development organizations to ensure sustainability after the end of the project. The Genetics Project financially supported the operations of the Secretariats of the S-RFPs, particularly on staff time and office operations. Sub-Delegation Contracts (SDC) were signed with all the Secretariats.

On 13 June 2019,AU-IBAR was officially proclaimed and endorsed by 53 Member States and 7 RECs as the Regional Focal Point for Animal Genetic Resources for the Africa region to formalize Africa's representation in global forums on AnGR hosted by the FAO.

Activity 6. Document and disseminate best practices and lessons learnt from animal genetic conservation and improvement initiatives

AU-IBAR through the Genetics and Live2 Africa Projects, financially contributed to the organization of 7th All Africa Conference on Animal Agriculture (AACAA). The support included Communication and Visibility materials, production of book of abstracts, branded conference bags, flash-disks, pens, notepads and nametags. The Genetics Project submitted and presented paper on the AnGR-CIM tool during the conference proceedings.

It was intended to publish at least 4 best practices and lessons learnt papers at the end of the implementation papers. For this activity, it was decided to engage a consultant to develop these based on the activities conducted and reports that the project generated. However, the consultant did not deliver quality documents as expected. The team then developed a publication on selection programs in Africa, one of the topics the consultant had been asked to work on. The publication, "***Genetic improvement programs in Africa: Practices and lessons for effective implementation***" is available. The following were some of the Best Practices and Lesson learnt derived from the project implementation in three of the African regions (Table 9):

Table 9: Some Lesson learnt and Best Practices

Central	• Baseline information needs to be strengthened. • Identify ecosystem management practices and associated techniques and policies to promote positive and mitigate negative impacts on farm genetic resources. • Develop linkages between livestock genetic conservation and use and benefit sharing. • Strengthen community management of AnGR to increase livestock diversity for secure livelihoods. • Develop appropriate partnerships. • Motivate the private sector to take responsibility for ensuring that their activities support the AnGR conservation. • Carefully consider the position of various stakeholders in issues of access, benefit sharing and intellectual property rights. • Use of advanced biotechnologies • Expanding global trade increases access to biodiversity for countries, but the potential hazards to genetic resources need to be addressed • Characterization of breeds and production environments to enhance policy making in AnGR management. • Develop decision support tools for situations where information is deficient. • Maintain within-breed diversity to cope with eventual changing in market demands. • Stakeholder involvement in traceability and recording systems are key elements of successful genetic improvement programs. • Breeding programs adapted to low external input systems. • Use of locally adapted breeds to provide environmental services, support for niche market production and subsidies for keeping threatened breeds.

	• Conservation measures in low external input systems taking into account of the livelihood-support functions of livestock. • Community-based approaches to conservation and breeding. • In vitro conservation has the potential to be an important complement to in vivo methods, reliable techniques for all livestock species need to be developed.
West	• Need to have policies for introduction of exotic breeds that can help improve the production and productivity of livestock to ensure protein food security and improve living conditions (more revenue) and the economy (under foreign exchange outflows in the case of milk, more exports of meat and live animals, job creation) • Need to support crossbreeding programs which allow modernization of farming conditions (equipment and infrastructure, change in the conduct of business) with a diversification of breeds in livestock. • need to encourage stakeholder and farmer organizations that promote specific breeds and thus contributing to their conservation) • That policies should be developed to ensure sustainable use of AnGR where the objectives should be informed not only by short term interests • There should be adequate funds to support implementation of the policies • Need to create awareness of the importance of AnGR conservation • Exports of live animals are a threat that can weigh heavily on some breeds such as the Balami (Niger). • NGOs and local livestock associations play a big role in supporting the development and implementation of policies and legislative frameworks on AnGR.
North	• In situ, ex situ conservation and characterization projects of local breeds (examples are Sheep: Hamara, Barbarine fat tail Cattle: Brune Atlas; Equines: the beard and Arabian horse, camel); • The National sheep Plan herd in Morocco with the harmonization and coordination of national and regional policies; • The plan Ram breeding' in Tunisia, with two pilot projects: - Project 1: CRP Dryland Systems Program (ICARDA-INRAT) that began in 2013 in the community of Zoghmar (Sidi Bouzid) as a pilot site among three in the NAWA region "North Africa and East Asia ". - Project 2: Who makes the link with the local races and the concept of terroir or controlled (AOC) and the method of marketing of meat, this project' Crossing trends in native meat sheep breeds and monitoring the effects of actual market demands on breeds composition' partners are: • In Algeria, an industrial white Blue Belgian cross 'BBB' project with dairy breeds using Artificial Insemination for red meat production. • Sperm Cryo-preservation of some local sheep and goat breeds threatened with extinction; • Characterization and knowledge cameline breeds between Algeria, Mauritania and Egypt; • Selection of new parent stock for local poultry breeds in Egypt.

The first Special Edition of the Bulletin of Animal Health and Production in Africa (BAHPA) to commemorate and highlight the importance of animal genetic resources in Africa was produced and published in 2015. Thirty two (32) papers were published covering various aspects of AnGR including: breeding, genetic improvement, conservation, population genetics, genomics, policy, legislation, socio-economic aspects, among others. These papers provided science-based information and data to contribute to better understanding of the issues related to the management and development of AnGR. It was intended to publish a second

edition of the Special Bulletin. However, due to the low number of abstracts received, the publication was shelved.

An expert consultative meeting involving members from all the regions of Africa developed draft policy briefs on various aspects of AnGR. From these drafts, eighteen (18) policy briefs were synthesized and published in English and French. The policy briefs provide evidence-based information and data on various aspects of AnGR and were intended to inspire and encourage Member States in particular, to develop and formulate policies which will provide a conducive environment for the development and management of the AnGR sub-sector. The following policy briefs are available for dissemination:

1. The Nagoya Protocol: A missing opportunity to maximize the benefits from conservation and sustainable use of African animal genetic resources
2. Recognize, enhance and promote the use of traditional knowledge for socio-economic- environment gain
3. Crossbreeding: Panacea or curse to African Animal Genetic Resources
4. Participatory planning and implementation of crossbreeding activities in Africa
5. Will the farming of the GIFT Fish be a Panacea or Enigma for Africa?
6. The need to develop effective conservation strategies for Indigenous AnGR in Africa
7. Promotion of Regional Cooperation for the sustainable management of animal genetic resources in Africa
8. Selection and breeding programs in Africa
9. Mobility and conservation programs for animal genetic resources
10. Mobility of animal genetic materials
11. Characterization, inventory and monitoring; the game changers to sustainable utilization and conservation of animal genetic resources in Africa
12. Identification, traceability and performance recording to better support the management of AnGR in Africa
13. Ethical issues related to conservation and preservation practices of AnGR in Africa
14. Public and private partnership for AnGR improvement and governance in Africa
15. Applying ecosystem services approach for AnGR in Africa
16. Promotion of indigenous AnGR specific products (development, marketing, added value creation) in Africa
17. Awareness creation, Communication and Advocacy in support of better Management of AnGR in Africa
18. Public Investments and Payoffs in the Livestock and Animal Genetic Resources in Africa

IGAD as part of their regional policy framework, also produced a policy brief "Animal Genetic Resources in the IGAD Region: Regional Policy Brief on Policy and Legal Issues" which was disseminated in the region.

The Genetics Project hired the services of a professional communication firm to document the achievements of the project in video. Two versions of a video documentary on the project were produced, a 14-minute and a 3-minute, respectively. The video documentary was produced to highlight the contribution of the Genetics Project to the development of AnGR in Africa as well as to acknowledge and appreciate the contributions of the donors. .

4. COMMUNICATION AND VISIBILITY

The Genetics Project developed a Communication and Visibility Plan to set the procedures and methods of communicating on the project activities with the various types of stakeholders. The main objectives of the Communication and Visibility Plan were to:

- enhance the visibility and promote the Genetics Project and its development partners (EU and AUC)
- establish a feasible and efficient system of communication to contribute to knowledge creation and to policy and decision-making in the field of Animal Genetic Resources;
- inform about the project activities and outcomes and to raise awareness on the key issues addressed by the Genetics Project among all stakeholders and final beneficiaries, while assuring the effective communication within the consortium and with other relevant actors outside the project consortium;
- facilitate knowledge sharing among the project partners, relevant external actors, and final beneficiaries.

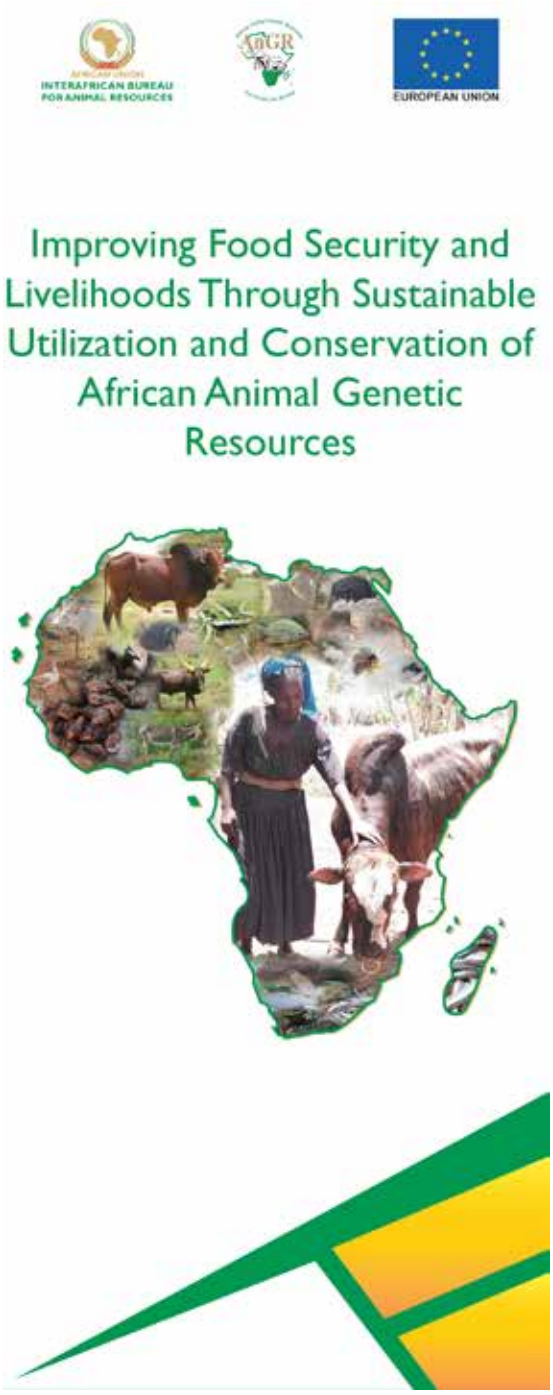
Specific communication objectives for the various target groups, related to the projects' objectives and the phases of the project cycle were also defined. The Communication matrix is indicated in Table 10 below:

Table 10: Animal Genetic Resource Project Communication and Visibility Matrix

Project cycle stage/ communication activity and target groups	**Financing**	**Implementation**	**Evaluation and Audit**
Communication objec-tive	Highlight the EU response and part-nership with AU-IBAR for mitigation of the food crisis in Africa	Raising awareness on the progress and achieve-ments of the Action	Demonstration of im-pact
Responsibility	AU-IBAR and EU	AU-IBAR, implementing partners	EU, AU-IBAR, ILRI and CIRDES
Key message	EU working through African Institutions to support countries in crisis	Collaboration between EU and AU-IBAR for mitigating the negative impacts of rising food prices	EU and partners make a difference in improving food security and en-hancing sustainable use and management of Africa's natural re-sources
Most appropriate tools	Letters, policy-briefs, e-mails, workshops, press release and websites, broadcast-ings	Stakeholders' workshops and meetings, radio and other news media, web-sites, flyers, banners, bro-chures, promotional ma-terials and adhesive stick-ers	Reports, Public confer-ence, websites and pho-tos
Beneficiary population of livestock keepers, na-tional animal resources services and other ser-vice providers	Inform through the press releases, web-sites and meetings	Information campaigns through the media, work-shops, high level site visits and photos	Publicise key results through the media, e-mails, websites adhesive stickers and promotional material.
EU Institutions and in-ternational donor com-munity	Inform through e-mail, publications, and websites	Information campaigns, raising awareness through TV/radio interviews, bro-chures, websites and pho-tos.	Make key results and reports publicly availa-ble through the media and websites
European citizens	Inform through press release and websites,	Raising awareness through websites, flyers, photos and brochures, press tours	Make key results public-ly available through websites and inform through the media.

The Genetics Project Communication and Visibility Plan was aligned to the Communication Strategy of the Animal Production Unit (APU) in 2016. The project, working in collaboration with supported initiatives, developed customized communication and visibility materials including press releases, various postings on project webpage, pull-ups, banners, billboards, T-shirts, brochures, folders, bags, caps, mugs, among others. All supported initiatives displayed branded materials including banners, billboards, pull-ups, apparel (shirts, T-shirts, polo-shirts, caps), brochures and stickers on assets/equipment provided by the project. In 2017, AU-IBAR in collaboration with the EU, developed the Communication and Visibility Strategy 2017-2021. The project then adopted the re-designed formats for the branded project communication and visibility materials and started using these formats until the end of the project. The stickers clearly indicated that funding of activities/initiatives was from the EU and the AUC as indicated in the link below.
https://documentcloud.adobe.com/link/track?uri=urn%3Aaaid%3Ascds%3AUS%3A5b8b1fee-c7ca-4ee2-bf0e-51be03d1371b

Some examples of branding on some of the publications and materials are shown below:













The project made all efforts to regularly post press releases and other documents on its webpage to keep stakeholders informed of its activities. During the Intergovernmental Technical Working Group (ITWG) meeting in November 2014, the project team was interviewed on a radio programme of the FAO Radio. The interview included questions on the project implementation and its main achievements to date as well as the sustainability of the project after completion. The radio interview enhanced communication on the project and increased its visibility. The Rigumaho Association, one of the supported initiatives in Mbarara in Uganda conducted local radio programmes to highlight the contributions of the Genetics Project and the EU to the Ankole cattle breed. Among other key achievements in communication and visibility was the production of the video for the Red Maasai, Dorper sheep and Gall goat breeders at the 2018 Kenya Livestock Breeders Show and Sale in Nairobi which showcased the support of the Genetics Project for these breeds. Branded pull-ups, T-shirts, caps and other paraphernalia were on display. The video recording of this important event is available.

During the course of implementation of various activities, social media platforms were created for sharing and exchange of information as well as for ease of communication. These were mainly as WhatsApp groups which were generally administered by selected staff from Member States. Examples of the WhatsApp groups created included: the SADC AnGR WhatsApp group; livestock breeders associations' WhatsApp group; Dorper sheep farmers WhatsApp group, among others. For the implementing partners a Trello group, the AU-IBAR-AnGR, group was established to allow sharing of information and targeted requests for information as well as for monitoring of deadlines and responses. ILRI and AU-IBAR were the acting administrators of the group. These platforms experienced high levels of interaction and exchange of information, especially soon after the associated meetings had been conducted.



Filming of video documentary at the Kenya Livestock Breeders Show and Sale 2018

The Genetics Project commissioned a professional communication firm to document the achievements of the project in video. However, due to logistical and time constraints, it was agreed to confine the recording to three regions (East, Southern and West Africa). The video documentary on the project was produced. Two video clips are available, one 14-minute and another 3-minute version, respectively. The video documentary highlighted the contribution of the Genetics Project to the development of AnGR in Africa and acknowledged and appreciated the contributions of the EU and AUC.

5. MONITORING AND EVALUATION

The project was reviewed by an independent consultant at "Mid-term" in 2017 based on assessment and analyses of written documents as well as face-to-face interviews with the project staff and key stakeholders. The objective of the mid-term review was primarily to check on progress made by the project and whether it was "on track" to achieve its objectives. The report described the project features and conducted a systematic review of the most significant aspects of the project; together with the reviewer's own assessment of the project achievements and performance. The report also gave recommendations for further implementation of the project. The elements reviewed included: the appropriateness of the project design; the general progress of the project; relevance, effectiveness, efficiency, impact as well as sustainability of the project. The M&E team of the Programs and Projects Unit (PPU) at AU-IBAR also conducted their own evaluation of the Genetics Project and visited 15 countries where project activities were implemented. Their report is available. The key recommendations were: (i) that a successor project is necessary to consolidate on the results the Genetics project had started to realize (ii) AU-IBAR Financial Management and Procurement Systems may need reviewing especially on keeping track of payments (iii) to document some of the success stories of the project, especially on the White Pare goat, the Ankole cattle, the Djallonke sheep, the regional gene banks and Azawak breeders association. The final evaluation of the Genetics Project was commissioned after the Terms of Reference were agreed to by AU-IBAR and the EU and is currently underway.

6. EXIT STRATEGY

The Exit Strategy for the Genetics Project identified activities that required special attention after project completion and closure and those that transcend the project. Implementation of the Exit Strategy should enable the project to smoothly transition into a sustainable enterprise run by stakeholders in the MS. It was assumed that by project closure time, all the planned activities will have been implemented fully, national and regional institutions will have been created and their budgetary support mainstreamed into the national financial systems, and the required policy, legal and technical instruments to govern the flow of genetic resources will have been created and adopted. The indications were that due to the late start of the project and various implementation and procedural challenges, some of the activities were not implemented to fruition and this resulted in loose ends in the project.

Key players in the Exit Strategy are AU-IBAR the project implementer who should ensure that exit activities during project period are fully implemented. Others are governments of MS who are expected to implement post-project activities to ensure sustainability; Regional Economic Communities (RECs) who are expected to operate the regional gene banks and data and information systems; and research institutions and universities who will support the MS with scientific backstopping.

7. STAFF

The team to manage the project was established by February 2014. There were four technical team members comprising: two Project Officers, one Technical Assistant and one Data Management Expert. This team was supported by one M&E Officer, one Accountant and one Administration Assistant. A Project Coordinator and also the Head of the Animal Production Unit, coordinated the team and oversaw the management of the project. However, in the course of the project, one of the Project Officers resigned in July 2016 while the Data Management Expert left the project in 2018 to take up another position within. AU-IBAR. The Project Coordinator and the M&E Officer also left in 2018. The Technical Assistant departed in July 2019 when the project implementation phase officially ended. The project continued to receive M&E support from staff in the AU-IBAR Programs and Projects Unit.

8. THE PROJECT MANAGEMENT

The project management hinged on administrative activities required for the smooth implementation of the project. Project management included activities such as organizing: annual Project Steering Committee meetings, annual project planning meetings, project team meetings, requesting the donor, EU, for a "no-cost extension" of the project, which was granted for an additional 12 months. The other activities included maintaining contacts with partners, ensuring adequate flow of information, enhancing cooperation when needed, coordinating the preparation of activities (including consultants' contracts) and supervising their execution. To ensure achievements at the activity level, the following management actions and reports were put in place:

- Annual Project planning meeting: The Genetic Project team held planning meetings every January or February with implementing partners ILRI and CIRDES, as well as Secretariats of the five Sub-Regional Focal Points (S-RFPs), ASARECA, CCARDESA, CEBEVIRHA CORAF, and INRAA with the following objectives to: (i) report and reflect on the achievements and challenges of the preceding period; (ii) develop strategies and identify priorities to successfully implement the remaining activities; (iii) develop detailed work plans and budgets for the following year; (iv) brainstorm on opportunities and new ideas, critically discuss and scrutinize aspects of the project; and (v) build team spirit to improve the

performance of the project.

- Coordination meetings these were held with partners ILRI and CIRDES to promote and encourage synergies and conduct joint planning to discuss various project-related issues especially work plans and budgets, agreements on which activities partners could conduct, monitoring of progress, among others.
- Monthly meetings: these generally served as opportunities to update on project achievements, share challenges faced during the month, seek guidance and make suggestions to address them. Upcoming events, activities were also presented. The presence of other technical and administrative staff offered opportunities for sharing experiences and cross-learning.
- Specific project technical meetings: these were held either with the Project Coordinator/Head of Unit or just the project staff, either as planned in advance or ad hoc when there was need, these meetings provided a platform for guidance from the Project Coordinator and also to rectify any project-related issues.
- Animal Production Unit meetings: these were monthly meetings where all projects under the APU including the Genetics Project reported on progress and challenges faced in the preceding month. The meetings served as a platform to share and exchange experiences with other projects and establish synergies where feasible. Plans for the following periods were also shared.
- EU annual reports: the project submitted annual narrative technical reports to the EU to provide updates on the state of implementation, including achievements and challenges
- Quarterly internal reports: The project regularly reported quarterly reports in AMERT as per AUC reporting requirement
- Meetings with Director occasionally, the Director would call for meetings with the Genetics Project team or with individual members of the team.

9. CONTRACTUAL ARRANGEMENTS WITH PARTNERS AND SUB-REGIONAL FOCAL POINTS

Sub-Delegation Agreements were signed at the beginning of the project with implementing partners ILRI and CIRDES. The project also signed Sub-Delegation Contracts with the Secretariats of the five Sub-Regional Focal Points (ASARECA, CCARDESA, CEBEVIRHA, CORAF and INRAA). For implementing partners, ILRI and CIRDES, funds were transferred to their institutions to conduct activities as per agreed work plans. For the Secretariats, funds were only transferred to their institutions after their finance and procurements staff had been trained on AU-IBAR's Finance and Procurement rules. The funds to Secretariats were intended to contribute to staff time and office running costs. For agreed regional activities, funds were administered from AU-IBAR. The Sub-Delegation Agreements and Contracts were renewed to July 2019 to enable completion of activities when the "no-cost extension" of the project was approved.

10. CHALLENGES

During the implementation of the project some challenges were experienced which affected the performance:

- The completion of the State of the Farm AnGR in Africa publication took longer than anticipated but was eventually published and launched by the Commissioner of DREA.
- The procurement procedures for support to Member States, RECs and Breeders' Associations were cumbersome and frustrating to the beneficiaries as well as AU-IBAR staff and caused serious delays and very often failure to implement some of the activities. This was exacerbated by the reluctance of service providers in some countries to provide goods and/or services before payment. For example, companies in Mozambique refused to provide laptops, printers, accessories and other equipment.

Companies in Mauritania refused to give quotations for goods and/or services. Service providers in Botswana were also not keen to provide quotations, which made implementation of activities very difficult. Furthermore, some quotations had validity of only 3 weeks which made it very difficult to work with.

- Furthermore, payment processes for goods, services and consultants were equally cumbersome and protracted resulting in long delays, complaints and threats of legal action by service providers and consultants. The major reason for the protracted payment processes was the lack of/inadequate supporting documents from the service providers and consultants which resulted in back and forth communication.
- While every effort was made to influence Member States and RECs to address policy and institutional challenges, this proved to be a slow and tedious exercise which required more time than the lifespan of the project. However, encouraging measures have been taken by some MS and RECs on this
- While the suppliers of regional gene bank equipment have been contracted, there were challenges getting the necessary paperwork such as Tax Exemption Certificates at the beneficiary's level, causing considerable delays in the shipment, installation and testing of the equipment. In a few cases, some of the equipment provided had missing parts causing further delays in installation and testing.
- It was planned that the Project Close-Out workshop would be held towards the end of the project. This important workshop was planned for the week starting 21st July 2019. Invitations were sent to over 250 key stakeholders including, selected Ministers responsible for animal resources, National Coordinators/Focal Points, Directors of Animal Production, representatives of EU, implementing partners, Secretariats of S-RFPs, of farmers/breeders associations, NGOs, tertiary institutes, private sector, among others. Unfortunately, this workshop had to be cancelled at the last minute because the project officially ended on the 18th of July 2019.
- At the end of the project, only one team member from the original four, was still in position. One Project Officer resigned, the Data Management Expert left to join another AU-IBAR project and the Technical Assistant left when the project officially ended. The Project Coordinator also left the project. This significantly increased the workload for the remaining member, especially with the drafting of this final technical report and preparations for the Final Evaluation.
- There were some problems with the Sub-Delegation Agreements and Contracts with the implementing partners as well as the Secretariats, respectively. The main challenge was the disbursements of funds due to the required documentation.

11. CONCLUSION

The Genetics Project made positive contributions to the implementation of the Global Plan of Action by Member States in Africa and raising awareness on the importance of African AnGR. The project also significantly improved the management and development of the AnGR sub-sector by: providing up to date information on the status of African AnGR; assessments and analyses of the prevailing policy and regulatory environment; impacts of crossbreeding, production systems; selection and breeding programs; guidelines on policy formulation on crossbreeding and conservation; implementation of the Nagoya Protocol, developing protocols and tools for movement of genetic resources; the three Bio-Cultural Protocols should inspire the creation of similar protocols for other breeds; supporting MS and RECs to develop NSAPs, implementation of breeding and conservation activities, regional strategies, especially on transboundary breeds; strengthening regional capacity for cryo-conservation; establishing and/or strengthening farmers// breeders associations; development of harmonized tools for characterization, inventory and monitoring of trends for indigenous breeds of various species; establishing regional institutions for coordinating AnGR activities; setting up regional information sharing platforms for AnGR; developing and publishing policy

briefs on various topics of concern for AnGR; documenting and showcasing the success stories of the project. Some best practices and lesson learnt are also highlighted. The various challenges especially on supporting MS, RECs, breeders associations and other stakeholders, the management and implementation of the project, were also highlighted. It is important to consider the issues raised in the Exit Strategy of the project to ensure the sustainability and continuation of the project achievements. Particular emphasis should be placed on the development and formulation of appropriate policies, strategies and regulatory frameworks on AnGR to create conducive environments for the management and development of this sub-sector. It was rather ambitious for the project to expect MS to develop and implement policies and legislation during the short lifespan of the project (6 years). Likewise, although the project posted some major successes with supporting the strengthening of breeders associations, the establishment of these institutions proved to be more challenging than expected. It is however, encouraging to note that the initiated establishment of the Regional Tuli Breeders Society in Southern Africa, should provide impetus for the establishment of the same for the Red Maasai and Djallonke sheep, the Ankole and N'Dama cattle, among others, which are low-hanging fruits due to the importance and popularity of these breeds in their respective regions. There is need to consider the various options available for supporting the S-RFPs and RECs in coordinating regional activities, especially the management of the regional gene banks, in view of the closure of the project. The project generated numerous documents and reports and these are being disseminated to stakeholders.

12. ACHIEVEMENTS USING THE LOG-FRAME INDICATORS

The table below provides an update of the achievements using the Project indicators.

	Intervention logic	Objectively Verifiable Indicators for achieve-ment	Baseline	Target	Achievements
Overall Objective	To enhance the contribution of livestock to food security and economic growth in Africa	• % of reduction of in-cidence of poverty and food insecurity among livestock de-pendent people re-duced by the end of the project. • % increase of live-stock sector contribu-tion to GDP by the end of the project		10% 10%	The project has made some contribution to reduction of poverty. However, for now it is diffi-cult to determine impact of project on increase in live-stock contribution to GDP
Purpose	To strengthen the capacity of countries and Regional Economic Communities to sustainably use and conserve African animal genetic resources through institutionalising national and regional policy, legal and technical instruments	• Number of target countries that have es-tablished databases on status and trends of AnGR by the end of the third year of the project	0%	60%	>60%
		• Percentage of target countries that have livestock policy frameworks for the sustainable use and conservation of AnGR by the end of the project	9%	80%	<30%
		• Percentage of RECs that having regional improvement pro-grams established by the year 4 of the pro-ject	0%	100%	>60%
		• Percentage of the tar-get countries that have national conservation initiatives by the third year of the project	83%	90%	100%
		• Percentage of target countries that promote in-situ and ex-situ breeding conservation programs by the fourth year of the pro-ject	83%	90%	100%
Result 1	Status and trends of AnGR in Africa established.	• The impact of cross-breeding of indige-nous cattle breeds and exotic breeds in Afri-ca documented and published by the end of the second year of the project	Not docu-mented and not pub-lished	Docu-mented and published	Documented in all 5 regions.
		• The impact of trans-humance and live-stock trade on AnGR in Africa documented and published by the end of the second year	0	Docu-mented and published	The impact has been docu-mented in all the 5 regions. A study on impact of transhu-mance on management of AnGR is available.
		• At least 4 policy notes on the success stories and lessons learnt from past genetic con-servation and im-provement program produced and dissem-inated by the end of the year 3	0	At least 4	18 policy briefs published; one best practices and lessons learnt available

	Intervention logic	Objectively Verifiable Indicators for achieve-ment	Baseline	Target	Achievements
		• The state on AnGR in all countries involved in project updated by the end of the year 3	93% (49/53 MS)	100%	The State of Farm AnGR in Africa published and dissemi-nated
		• All countries timely submit their contribu-tion to the global re-port by 31 January 2014	11% (6/54MS)	100%	81%
Result 2	Policy frameworks for the sustainable use and conservation of AnGR developed.	• Number of countries that have developed policy and protocols for the use of bio-technology for genet-ic improvement by the end of the project	5 MS	At least 20	<10
		• Technical standards and protocols for the exchange and use of genetic materials de-veloped for at least 2 livestock species by the end of the third year	0	2 species	Standard Operating Proce-dures (SOPs) for all species published 27 MS ratified the Nagoya Protocol 3 Biocultural Community Pro-tocols for Red Maasai, Azawak and D'Man sheep
		• Policy framework, Technical standards, guidelines and proto-cols for in situ and ex situ conservation of at least 3 livestock spe-cies developed by the end of the third year	0	3	Guidelines/ frameworks available for all 5 regions
Result 3	National and regional conservation and im-provement strategies and initiatives estab-lished and strength-ened	• Number of countries that have developed National Action plan for AnGR by the end of the project	6 MS (0 supported by project)	At least 30	All 55 MS have access to sup-port for development of NSAPs
		• Number of national breeding and con-servation programs/ project in target countries supported by the end of the project.	0 supported by project	23	98 initiatives on breeding and conservation activities offered support; of these at least 23 initiated completed or on-going by the end of the pro-ject
		• Number of regional livestock breeders' as-sociations supported by the end of the third year	0	At least 4	1 regional breeders associa-tions initiated establishment (Tuli), Others are pending: Red Maa-sai. Mututu, Djallonke, N'Dama
		• Number of livestock breeders association strengthened or estab-lished by the end of the project	0	At least 25	27 farmers organization were offered support to establish or strengthen their associations Seven Breeders associations established: Red Maasai sheep, Galla Goat (Kenya),

	Intervention logic	Objectively Verifiable Indicators for achieve-ment	Baseline	Target	Achievements
					Muturu and Somba cattle (Benin), Bakossi cattle (Cameroon), White Pare goat (Tanzania), Azawak cattle (Niger) The Dorper Sheep Breeders Society of Kenya, the Tuli Cattle Society of Zimbabwe, the Nzaui District Small Scale Farmers Forum (NSSFF) were strengthened by the project
		• Number of programs for the conservation of trans-boundary breed formulated or strengthened by end of project	0	At least 3	The project supported seven (7) regional-based initiatives on conservation of trans-boundary breeds including on transboundary camel
		• Number of RECs that have AnGR issue in their regional live-stock development agenda	0	At least 3	6 RECs: IGAD, EAC, ECO-WAS, ECCAS, UMA and SADC initiated the develop-ment of regional strategies for AnGR.
Result 4	Knowledge, attitude and practice of the contribution of live-stock and livestock sector to economic growth, food security and poverty reduc-tion, increased.	• Protocols for the characterization and inventory of at least four livestock breeds developed and im-plemented by the end of the third year		At least 4	AnGR CIM-tools available for multiple species including da-ta analyses and visualization
		• An AnGR database established at the end of the second year of the project	0	1	AAGRIS module available
		• Number of tools for monitoring of trends and associated risks of trans-boundary breeds developed and implemented by the third year of the pro-ject	0	1	AnGR CIM-tools published and available
		• Number of regional information sharing networks established by end of project	0	At least 3	5 regional DAD-Nets func-tional
		• Number of regional focal points for ani-mal genetic resources that are established and strengthened by the end of the third year	1	4	5S-RFPs operational
		• Information and best practices on animal genetic resources con-servation and im-provement initiatives documented and easi-ly accessible by all stakeholders at end of project	0		1 Best practices and lessons learnt publication available >30 Best Practices and lessons learnt available for North, Central and West Africa

ANNEXES

Some Reports and Publications of the Genetics Project

Project

1. Project Report Year 1
2. Project Report Year 2
3. Project Report Year 3
4. Project Report Year 4
5. Project Report Year 5
6. Project Report Year 6
7. Minutes of the 1st Steering Committee of the Project "Strengthening the Capacity of African Countries to Conservation and Sustainable Utilization of African Animal Genetic Resources"
8. Minutes of the 2nd Steering Committee of the Project "Strengthening the Capacity of African Countries to Conservation and Sustainable Utilization of African Animal Genetic Resources"
9. Minutes of the 3rd Steering Committee of the Project "Strengthening the Capacity of African Countries to Conservation and Sustainable Utilization of African Animal Genetic Resources"
10. Minutes of the 4th Steering Committee of the Project "Strengthening the Capacity of African Countries to Conservation and Sustainable Utilization of African Animal Genetic Resources"
11. Project Inception Workshop, Abidjan, Ivory Coast, April 2013
12. Report of Partners Roundtable Meeting for the Project Animal Genetics Project 2014
13. Minutes of the 5th Steering Committee of the Project "Strengthening the Capacity of African Countries to Conservation and Sustainable Utilization of African Animal Genetic Resources"
14. Minutes of the 6th Steering Committee of the Project "Strengthening the Capacity of African Countries to Conservation and Sustainable Utilization of African Animal Genetic Resources"
15. Workshop Report "Assessment Of Animal Genetic Resources Characterization, Inventory And Monitoring Tools To Guide Revision And Harmonization Processes" Dar-Es-Salaam, Tanzania (2014)
16. Write Shop Report "Development Of Revised And Harmonized Characterization, Inventory And Monitoring Animal Genetic Resources Tools' Guidelines" Naivasha, Kenya (2015)
17. Project Team Retreat Reports (2014 to 2019)
18. Project Implementing Partners Meeting Reports (2015-2018)
19. Annual Narrative Technical Reports to EU (2104-2019)
20. Narrative Project Report (July 2013- January 2018) – for "no-cost" extension (April 2018)
21. The State of Farm Animal Genetics Resources in Africa (2019)
22. The Story of the African Cattle-Diversity Matters (2019)
23. Report of the meeting between the Regional Economic Communities (RECs) and the Genetics Project Team Nairobi, Kenya (2015)
24. Report of the Training on AU Finance and Procurement Procedures for Sub-Regional Focal Points (S-RFP), 14 - 15 January 2016, AU-IBAR, Nairobi, Kenya

Workshops

25. Experts Consultation Meeting on "The movement and exchange of animal genetic materials and implementation of the Nagoya Protocol on ABS in Africa (2015)
26. Regional Workshop for the Strengthening of Capacities for the Management of Animal Genetic Resources in Northern Africa. Tunis, Tunisia (2015) (English and French versions) Training on handling of animal genetic materials for Anglophone and Francophone countries
27. Facilitation Workshop on the Preparation of the Global Second State of The World's Animal Genetic

Resources (SoW-AnGR)
28. Report on the meeting of the Secretariats of Sub-Regional Focal Points, Nairobi, Kenya (2014)
29. Regional Inception Workshop for East Africa, Kigali, Rwanda (2013)
30. Regional Inception and Sub-Regional Focal Point Workshop for North Africa, Algiers, Algeria (2014)
31. Regional Inception Workshop Report Animal Genetics Project for West Africa, Ouagadougou, Burkina Faso (2013)
32. Regional Inception Workshop for East Africa
33. Report of the Regional Inception Workshop of the Project Animal Genetics for Southern Africa, Harare, Zimbabwe (2014)
34. Regional workshop for "Strengthening the capacities for the management of animal genetic resources in Central and West Africa". N'Djamena, Chad (August 2014) (English and French versions)
35. Report on the meeting of the Interim Steering Committee of the Sub-Regional Focal Point for East Africa
36. Sub-Regional Focal Point General Assembly for Southern Africa (2014-2019)
37. Sub-Regional Focal Point General Assembly for Central Africa (2014-2019)
38. Sub-Regional Focal Point General Assembly for East Africa (2014-2019)
39. Sub-Regional Focal Point General Assembly for North Africa (2014-2019)
40. Sub-Regional Focal Point General Assembly for West Africa (2014-2019)
41. Report on the meeting of the SADC Livestock Technical Committee (LTC)
42. Workshop on the compilation of lessons learnt and best practices related to the development of guidelines and policies, crossbreeding, selection, conservation and preservation of AnGR in Africa
43. Workshop report on 'Making access and benefit sharing work for animal genetic resources for food and agriculture'
44. Report of the National Validation Workshop on the Outcomes of the Assessment of the Djallonké Sheep Selection Program in Togo

Consultancies

45. L'évaluation de l'impact des systèmes de production, de la mobilité du bétail et la commercialisation sur la base des ressources zoogénétiques locales en Afrique Centrale
46. Impact of livestock production systems and livestock mobility linked to commercialization and production systems on animal genetic resource base in East Africa
47. Impact of livestock production systems and livestock mobility linked to commercialization and production systems on animal genetic resource base in North Africa
48. Assessment of the impact of livestock production systems, livestock mobility and livestock commercialization on AnGR resource base
49. Evaluation de l'impact des croisements, des systèmes de production de l'élevage, de la mobilité et du commerce des animaux d'élevage sur les ressources zoogénétiques en Afrique de l'Ouest
50. Facilitating the development of regional policy frameworks for the management of animal genetics resources (AnGR) in Central Africa
51. To facilitate the development of regional policy frameworks for the management of animal genetic resources (AnGR) in Eastern Africa
52. Facilitation de l'élaboration d'un cadre de politique régionale pour la gestion des ressources génétiques animales dans l'Afrique du Nord
53. A study to facilitate the formulation of regional policy or regulatory frameworks for the conservation, management of transboundary breeds and crossbreeding in Southern Africa
54. A study to facilitate the formulation of regional policy or regulatory frameworks for the conservation, management of transboundary breeds and crossbreeding in West Africa

55. Assessment of the socio-economic impact of selection and breeding programs in Southern Africa
56. Analyse de l'impact socio-économique des programs de sélection et d'amélioration génétique en Afrique Centrale
57. Assessment of the socioeconomic impact of selection and breeding programs in East Africa
58. Assessment of the socio-economic impact of selection and breeding programs in Northern Africa
59. Assessment of the socio-economic impact of selection and breeding programs in West AfricaAssessment of Animal Genetic Resources Characterization, Inventory and Monitoring tools to guide revision and harmonization processes
60. Development of revised and harmonized characterization, Inventory and monitoring Animal genetic resources tools' guidelines
61. Workshop report: Finalization on operational structure of the African Animal Genetic Resources Information System (AAGRIS). Nairobi, Kenya (2015)
62. Regional Animal Gene banks for Africa:A strategy to ensure the sustainability and efficient maintenance of important animal genetic resources
63. Deepening the analysis and interpretation of questionnaires from member states on animal genetic resources
64. Regional Regulatory Frameworks for Exchange, Use and Conservation of Animal Genetic Resources (AnGR) Northern Africa Region
65. Report on regional regulatory frameworks for exchange, use and conservation of animal genetic resources in the Southern Africa region
66. Report on regional policy and legislative frameworks for the conservation and management of transboundary breeds and crossbreeding activities for Eastern Africa
67. Report on regional regulatory frameworks for exchange, use and conservation of animal genetic resources in Central Africa
68. Report on the effects of transhumance on the management of animal genetic resources of Africa
69. Guidelines and regional strategies for the sustainable utilization of selected transboundary breeds of livestock in West Africa
70. Towards the formulation of guidelines and regional strategies for the utilization of selected transboundary livestock in Africa
71. Formulation de lignes directrices et de stratégies régionales pour l'utilisation durable de certaines races transfrontières d'animaux d'élevage en Afrique - Document de réflexion pour la région de l'Afrique de l'Ouest
72. Regional Training Workshop for the Development of National Strategies and Action Plans (NSAPs) for Animal Genetic Resources, , Gaborone, Botswana (2015)
73. Regional Training Workshop On Mainstreaming AnGR Issues Into National Agriculture Investment Plans (NAIP) Within CAADP Framework, Gaborone, Botswana (2015)
74. Symposium on Animal Identification and Recording in sub-Saharan Africa in Pretoria, South Africa from 14th to 16th April 2015:AU-IBAR Perspective
75. Report Of The National Validation Workshop On The Outcomes Of The Assessment Of The Djallonké Sheep Selection Programme In Togo (2016)
76. Current and Future Management of Farm Animal Genetic Resources (FAnGR) in Africa: In the Context of Evolving Production Systems and Changing Environments

Brochures and publications

77. Synthesis report of the AnGR e-discussion
78. African Animal Genetic Resources Information System Brochure
79. Regional Animal Gene banks for Africa:A strategy to ensure the sustainability and efficient maintenance

of important animal genetic resource

80. African Communication to the Commission on Genetic Resources for Food and Agriculture, Access and Benefit Sharing Focal Points and National Coordinators for Animal Genetic Resources
81. Into animal genetic resources development in Africa - Challenges and Opportunities for the Nagoya Protocol
82. Dorper Breed standard of excellence
83. Dorper breeding program
84. Dorper Sheep Inspectors and Judges trainers guide
85. Kenya Agricultural Livestock Research organization(KALRO)
86. Red Maasai Husbandry handbook – Title should read "Red Maasai Husbandry Handbook – Training Manual for indigenous Communities"
87. Red Maasai Sheep Breed standard of excellence
88. Red Maasai Sheep Training manual for inspectors
89. Galla Goat Training Manual
90. Galla Goat "King of Milk and Meat"
91. Boran Cattle Breeders Manual
92. Training manual for general management and breeding practices of the white pare goats breeding
93. Know your animals - 2016 (Volume 1)- English and French versions
94. Know your animals – 2016 (Volume 2) – English and French versions
95. Technical procedures for the collection, handling, transport and storage of animal genetic materials
96. An "issues" paper on crossbreeding, conservation and the management of transboundary animal genetic resources (AnGR) in Africa, November 2015
97. Report of the Expert's Meeting on the Development of Standards Operating Procedures for the Management of Regional Gene banks for Animal Genetic Resources, Kigali, Rwanda, (2016)
98. Challenges and perspectives for the development of policies and legislative frameworks for the sustainable management of AnGR in Africa

Visits

99. Pre-assessment of the conservation facilities in Kenya
100. Pre-assessment of the conservation facilities in Uganda
101. Pre-assessment of the conservation facilities in Tanzania
102. Pre-assessment of the conservation facilities in Rwanda
103. Pre-assessment of the conservation facilities in Botswana
104. Pre-assessment of the conservation facilities in Zimbabwe
105. Pre-assessment of the conservation facilities in South Africa
106. Pre-assessment of the conservation facilities in Mauritania
107. Pre-assessment of the conservation facilities in Tunisia
108. Pre-assessment of the conservation facilities in Algeria
109. Pre-assessment of the conservation facilities in Egypt
110. Pre-assessment of the conservation facilities in Chad
111. Pre-assessment of the conservation facilities in Cameroun
112. Pre-assessment of the conservation facilities in Niger
113. Pre-assessment of the conservation facilities in Burkina Faso
114. Pre-assessment of the conservation facilities in Ethiopia
115. Assessments of regional AnGR programs on transboundary breeds and breeds at risk: Red Maradi
116. Assessments of regional AnGR programs on transboundary breeds and breeds at risk: Djallonke sheep

117. Assessments of regional AnGR programs on transboundary breeds and breeds at risk: Sheko
118. Report of the visit to the camel breeding center in Nouakchott Mauritania
119. Report on the Field Assessment of the Red Maasai Sheep of Eastern Africa
120. Assessments of regional AnGR programmes on transboundary breeds and breeds at risk: Poultry programmes in Ghana
121. Assessment of the piloting of the revised tools for characterization, inventory and monitoring for AnGR in Ghana, May 2016
122. Assessment of the piloting of the revised tools for characterization, inventory and monitoring for AnGR in Sudan, June 2016
123. Assessment of the piloting of the revised tools for characterization, inventory and monitoring for AnGR in the Democratic Republic of Congo

Policy notes

124. The Nagoya Protocol: A missing opportunity to maximize the benefits from conservation and sustainable use of African animal genetic resources
125. Recognize, enhance and promote the use of traditional knowledge for socio-economic- environment gain
126. Crossbreeding: Panacea or curse to African Animal Genetic Resources
127. Participatory planning and implementation of crossbreeding activities in Africa
128. Will the farming of the GIFT Fish be a Panacea or Enigma for Africa?
129. The need to develop effective conservation strategies for Indigenous AnGR in Africa
130. Promotion of Regional Cooperation for the sustainable management of animal genetic resources in Africa
131. Selection and breeding programs in Africa
132. Mobility and conservation programs for animal genetic resources
133. Mobility of animal genetic materials
134. Characterization, inventory and monitoring; the game changers to sustainable utilization and conservation of animal genetic resources in Africa
135. Identification, traceability and performance recording to better support the management of AnGR in Africa
136. Ethical issues related to conservation and preservation practices of AnGR in Africa
137. Public and private partnership for AnGR improvement and governance in Africa
138. Applying ecosystem services approach for AnGR in Africa
139. Promotion of indigenous AnGR specific products (development, marketing, added value creation) in Africa
140. Awareness creation, Communication and Advocacy in support of better Management of AnGR in Africa
141. Public Investments and Payoffs in the Livestock and Animal Genetic Resources in Africa
142. Executive summary of the State of Farm Animal Genetic Resources in Africa (in Arabic, French and Portuguese)

Other documents (Press Releases/Communique)

143. AU-IBAR facilitates Africa's contribution to the FAO 2nd State of the World's Animal Genetic Resources Report (2014)
144. Workshop helps to strengthen the regional capacities for the sustainable use of animal genetic resources in East Africa (2014)
145. Strengthening Regional Capacities for the Sustainable Use of Animal Genetic Resources in Southern

Africa (2014)
146. Communique - Regional Workshop on the Establishment of the Sub-Regional Focal Point for Animal Genetic Resources for North Africa (2014)
147. First Steering Committee of the Project "Strengthening the Capacity of African Countries to Conservation and Sustainable Utilisation of African Animal Genetic Resources" (2014)
148. Secretariats of Sub-Regional Focal Points for "Strengthening the Capacity of African Countries to Conservation and Sustainable Utilization of African Animal Genetic Resources" Project meet in Nairobi (2014)
149. Strengthening capacities on the genetic resources management in Central and West Africa (2014)
150. Assessment of Animal Genetic Resources Characterization, Inventory and Monitoring tools/ protocols to guide revision and harmonization processes (2014)
151. Communique - Strengthening Regional Capacities on the management of Animal Genetic Resources: General Assembly of the Sub-Regional Focal Point (S-RFP) for Southern Africa (2014)
152. Press Release - Write-shop on finalization of the State of AnGR in Africa Document
153. Press Release - Expert Meeting on the development of Standard Operating Procedures for the management of Regional gene banks for Animal Genetic Resources
154. 2nd Steering Committee of the Project "Strengthening the Capacity of African Countries to Conservation and Sustainable Utilisation of African Animal Genetic Resources", Port Louis, Mauritius (2015)
155. Communiqué - SADC Livestock Technical Committee (LTC) Meeting on the Establishment of the Regional gene bank and the Host Sub-Regional Focal Point (S-RFP) for Animal Genetic Resources (AnGR) in Southern Africa
156. 4th General Assembly of the Sub-Regional Focal Point (S-RFP) for the management of AnGR in Southern Africa 9 -11 October 2017, Quatre Bornes, Mauritius
157. Training on handling of animal genetic materials for Anglophone countries (2016)
158. 4 ème Assemblée générale du Point Focal Sous-Régional pour les ressources génétiques Animales (S-RFP) pour l'Afrique du Nord, Rabat, Maroc, 29 Novembre 2017
159. First Partners and Third Project Steering Committee Meetings for the Genetics Project Cairo, Egypt July 2016.
160. 5th Project Steering Committee meeting for the Genetics Project.
161. 5th General Assembly of the Sub-Regional Focal Point (S-RFP) for the management of AnGR in Southern Africa (2018)
162. Communiqué - Fifth General Assembly & Steering Committee Meeting of the Sub-Regional Focal Point for Animal Genetic Resources for Eastern Africa (2019)
163. SADC Regional Workshop for Capacity Building on Access and Benefit Sharing and Intellectual Property Rights for Animal Genetic Resources, Pretoria, South Africa (2019)

Webpage

http://www.au-ibar.org/angr

https://www.ilri.org/publications/goat-production-eastern-africa-practices-breed-characteristics-and-opportunities-their sustainability

http://www.au-ibar.org/training-manuals-and-tools

African Union – Interafrican Bureau for Animal Resources
(AU-IBAR)
Kenindia Business Park
Museum Hill, Westlands Road
PO Box 30786
00100 Nairobi
Kenya
Tel: +254 (20) 3674 000
Fax: +254 (20) 3674 341 / 3674 342
Email: ibar.office@au-ibar.org
Website: www.au-ibar.org