



**International organization progress report
on the implementation of
the Global Plan of Action for Animal Genetic Resources
2007-2013**

1. Contact information and mandate

Name and position of respondent	Okeyo Mwai & Karen Marshall
Name of organization	The International Livestock Research Institute
E-mail of organization	omwai@cgiar.org & kmarshall@cgiar.org
Geographical coverage of your organization	Global

2. Animal species coverage of your organization

General livestock-related mandate	<input checked="" type="checkbox"/>
Large ruminants	<input checked="" type="checkbox"/>
Small ruminants	<input checked="" type="checkbox"/>
Pigs	<input checked="" type="checkbox"/>
Poultry	<input checked="" type="checkbox"/>
Rabbits & micro livestock	<input type="checkbox"/>
Camelidae	<input type="checkbox"/>
Equines	<input type="checkbox"/>

Strategic Priority Area 1: Characterization, Inventory and Monitoring

1. Does your organization implement or support the implementation of projects or programmes on phenotypic characterization of animal genetic resources?

- Yes
- No

If yes, please provide details and specify the countries and species involved and whether you include characterization of production environments:

- Performance monitoring of dairy cattle in East Africa (Kenya and Uganda) and West Africa (Senegal), including production environment characterization.
- Performance monitoring of sheep, chickens and pigs in East Africa (Kenya and Ethiopia for sheep; Ethiopia for chickens; Uganda for pigs), including production environment characterization.
- Performance monitoring of goats, chickens and pigs, and their wild relatives, in Asia (Sri Lanka, Bangladesh, Vietnam and Pakistan), including production environment characterization and piloting sustainable breed improvement and conservation programs.

2. Does your organization implement or support the implementation of projects or programmes on molecular characterization of animal genetic resources?

- Yes
- No

If yes, please provide details and specify the countries and species involved:

- Molecular characterization for dairy cattle breed composition in East Africa (Kenya and Uganda) and West Africa (Senegal).
- Molecular characterization for genetic diversity and population structure in goats, chickens and pigs, and their wild relatives, in Asia (Sri Lanka, Bangladesh, Vietnam and Pakistan), chickens in Ethiopia, and sheep in Kenya and Ethiopia.
- Understanding the genomics of disease resistance of indigenous African sheep (gastro-intestinal nematodes) and cattle (trypanotolerance) using genetic markers.
- Understanding the genomics of immune response in pigs (Asia)
- Assessing genetic diversity and genetic resistance to infectious disease of and in indigenous Horro and Jarso chickens in Ethiopia and understanding the genomic basis of the resistance.

3. Does your organization implement or support the implementation of projects or programmes for surveying the size and/or structure of animal genetic resources populations and monitoring population trends?

- Yes
- No

If yes, please provide details and specify the countries and species involved:

- Support to livestock census (often at one time-point and in selected project sites) for goats, sheep and cattle in West Africa (Mali, Guinea, Senegal, The Gambia), East Africa (Ethiopia, Burundi, Rwanda, Kenya, Tanzania, Eritrea).
- Support to livestock census (often at one time-point and in selected project sites) for pigs, goats and chickens in Asia (Bangladesh, Sri Lanka, Vietnam and Pakistan).

4. Does your organization implement or support the implementation of projects or programmes for identifying and monitoring threats to animal genetic resources?

- Yes
- No

If yes, please provide details and specify the countries and species involved:

- Identification of potential threats to indigenous cattle, sheep and goat populations in project sites in four West African countries (The Gambia, Guinea, Mali and Senegal)
- Also, albeit less directly, for Uganda pigs, Tanzania dairy cattle, Nicaragua dual-purpose cattle (these are Livestock and Fish CRP focus sites)

5. Does your organization support countries in the development of early warning and response systems for animal genetic resources?

- Yes
- No

If yes, please provide details and specify the countries and species involved:

6. Is your organization involved in research and development on methods, technical standards or protocols for phenotypic or molecular characterization, surveying and monitoring of population size or threats to animal genetic resources, or breed evaluation, valuation and comparison?

Phenotypic characterization

- Yes
- No

Molecular characterization

- Yes
- No

Surveying and monitoring

- Yes
- No

If yes, participatory monitoring

- Yes
- No

Breed evaluation or comparison

- Yes
- No

Economic valuation

- Yes
- No

Please provide details:

- Various protocols developed to collect and analyse data on livestock production systems through animal, household, and community-level surveys (various countries and species).
- Various protocols, training manuals and guidelines developed to support within-breed improvement programs, including recording and evaluation systems (various countries and species).
- Protocols for socio-economic breed comparison using longitudinal surveys at the field level to capture data on animal performance and household economics, and with breed-composition derived from genomic (SNP-chip) data, developed for West Africa Dairy (Senegal)
- Protocols for productivity-based breed comparison using longitudinal surveys at the field level to capture data on animal performance, and with breed-composition derived from genomic (SNP-chip) data, developed for East Africa Dairy (Kenya & Uganda)
- Varied decision-making tools, including a risk assessment tool for conservation, and training manuals and guidelines for breeding programs, to support conservation and use of FAnGR and their wild relatives in Asia (Bangladesh, Sri Lanka, Vietnam and Pakistan).
- Various tools for value chain assessment of systems in which the FAnGR perform, including assessment of breeds and breeding systems, for pigs (Uganda, Vietnam), dairy cattle (Tanzania), dual-purpose cattle (Nicaragua), sheep (Ethiopia)

7. Has your organization identified major obstacles to inventory, characterization and monitoring of animal genetic resources in all or part of your mandate area or species coverage?

- Yes
- No

If yes, please list them being as specific as possible regarding geographical area / species:

8. What are the priority measures that need to be taken to address these obstacles?

Whilst no major obstacle, there is a general need to:

- build and strengthen technical / institutional capacities;
- harmonize survey and monitoring tools across countries, to allow effective comparisons and pooling of data (the latter particularly important for transboundary breeds);
- internalize and mainstream the global plan of actions into national and regional plans for sustainable management of animal genetic resources.
- support development/adaptation of data bases and data capturing, synthesizing and feedback systems (i.e make them simpler and easily to integrate with existing systems)

9. Please describe any additional activities relevant to the implementation of Strategic Priority Area 1: Characterization, inventory and monitoring of trends and associated risks.

Ongoing work on:

- Bio-banking of biological materials, including for a number of African livestock breeds (=ILRI's biorepository)
- DNA banking of Asian goat, chicken and pig genetic resources and facilitating the sequencing/re-sequencing of selected indigenous African and Asian breeds
- Climate change & natural resource management, and the affect this may have on livestock production systems, including in relation to animal genetic resources
- Developing and contributing to the development of comprehensive and systematic documentation of sampling protocols, Geo-referencing and linking such samples to related performance, phenotypic , and genotypic data and/ or the related parasites/pathogens etc.

Strategic Priority Area 2: Sustainable Use and Development

1. Does your organization support countries in developing, reviewing or adjusting their national policies affecting the sustainable use of animal genetic resources?

- Yes
- No

If yes, please provide details and specify the countries and species involved:

- Assistance to formulation of Tanzania's and Kenya's livestock breeding policies.
- Development of policy briefs (various countries)
- Review of policies on animal genetic resource use (Senegal)
- Review of policies related to the Uganda & Vietnam pig, Tanzania dairy, Nicaragua dual-purpose cattle, and Ethiopian sheep value chains

2. Does your organization promote agro-ecosystem approaches?

- Yes
- No

If yes, please provide details:

Various work in relation to crop-livestock systems, natural resource management and climate change in livestock production systems, and better matching of livestock breed-types (whether pure-bred, cross-bred, or composite) to production systems.

3. Does your organization contribute to the planning or implementation of strategic breeding programmes?

Mainstream breeds

- Yes
- No

Under-utilized breeds

- Yes
- No

If yes, please provide details (including the breeds involved) being as specific as possible:

Support to ongoing breeding programs for:

- mainstream breeds: dairy cattle in Kenya, Uganda, Senegal; N'dama cattle in The Gambia; and
- under-utilized breeds: Horro, Menz, Bonga and Afar sheep in Ethiopia and Red Maasai sheep in Kenya. Ho Chicken in Vietnam.
- Providing evidence (i.e. comparative on-farm breed performance evaluations) to inform dairy cattle breed improvement design and implementation strategies in East Africa

4. Does your organization contribute to the development of recording systems or organizational structures for breeding programmes?

- Yes
- No

If yes, please provide details (including the breeds involved) being as specific as possible:

• Community based breeding programs for Horro, Menz, Bonga and Afar sheep in Ethiopia and Red Maasai Sheep in Kenya

• Station (nucleus) and community (multiplier) based breeding programs for N'dama cattle in The Gambia

• Structuring of cross-breeding systems in dairy in Kenya, Uganda, Senegal

• Providing systematic performance and pedigree data storage via ILRI hosted MISTRO data base, cow and bull performance summaries and feedback systems to Kenya Livestock Breeders Organization

5. If the projects and programmes that your organization implements or supports involve the use of exotic breeds, have any assessments been made of the long-term impacts of the use of exotic breeds on animal genetic resource diversity, livelihoods and/or food security in the affected countries and production systems?

- Yes
- No
- No projects or programmes involving exotic breeds

If yes, please provide details:

Yes for Senegal Dairy - evaluating the socio-economics of keeping cross-breed (indigenous x exotic) from a livelihood viewpoint, and also an environmental (GHG) viewpoint. Plans to further extend this study to other environmental aspects and food security. Promoting more productive improved livestock breed types (improved Red Maasai in Kenya and Bonga sheep in and fewer crossbred cattle Ethiopia etc. as part of climate smart livestock production, thus reducing potential green house gas emissions.

6. Has your organization implemented or supported the implementation of animal genetic resources-related projects that aim at achieving sustainable intensification of production?

- Yes
- No

If yes, please provide details and specify the countries and animal genetic resources involved:

• ILRI has numerous projects aimed at sustainable intensification of livestock production systems (which, by default, have an

animal genetic resource component).

- Of particular note is the East African Dairy Development project, to which ILRI is a key partner, and which aims at improving the productivity of dairy cattle in intensive smallholder production systems in Kenya, Tanzania and Uganda

7. Does your organization contribute to the development of mechanisms for facilitating interactions among stakeholders, scientific disciplines and sectors as part of planning for sustainable use development of animal genetic resources?

- Yes
- No

If yes, please provide details and specify the countries or regions involved:

- Working with various stakeholders on AnGR use in East Africa (dairy , pigs, small ruminants: Kenya, Uganda, Ethiopia, Tanzania, Somaliland), West Africa (dairy, small ruminants: The Gambia, Guinea, Mali, Senegal), and Asia (pig, goat, chicken: Bangladesh, Sri Lanka, Vietnam and Pakistan) and Latin America (dual-purpose cattle: Nicaragua)
- Strong institutional focus on value-chain approach & innovation platforms, bringing together a range of stakeholders

8. Do your organization's activities contribute to improving farmers' and livestock keepers' knowledge of animal genetic resources from various sources?

- Yes
- No

If yes, please provide details and specify the countries and types of animal genetic resources involved:

Via use of participatory on-farm action-research approaches, including feedback to farmers on individual animal performance, as well as through monitoring and evaluation processes, for a number of country / species combinations (see 7 above).

9. Do your organization's activities contribute to improving farmers' and livestock keepers' access to animal genetic resources from various sources?

- Yes
- No

If yes, please provide details and specify the countries and types of animal genetic resources involved:

- Work on strengthening germplasm production and delivery systems underway for dairy in Kenya, Uganda and Senegal, and planned for other species / countries
- Establishment of a platform for in vitro fertilization and embryo transfer, in cattle, in Kenya.

10. Does your organization contribute to the development of agreements for equitable sharing of benefits arising from access to and use and development of, animal genetic resources?

- Yes
- No

If yes, please provide details:

11. Does your organization contribute to efforts to preserve and respect indigenous or local production systems and associated traditional knowledge and practices related to animal genetic resources?

- Yes
- No

If yes, please provide details:

A number of projects with focus on local breeds and production systems, and the use of indigenous knowledge,

including:

- pigs, goats, and chickens in Asia (Bengal goats in Bangladesh, indigenous chicken in Sri Lanka and Pakistan, Ho chicken and BAN Pig breeds in Vietnam)
- cattle, sheep and goats in West Africa (The Gambia, Guinea, Senegal, Mali)
- camel, cattle, sheep, goat in Somaliland
- Red Maasai sheep in Kenya.

12. Does your organization implement or support the implementation of projects that aim to promote the marketing of products from local breeds or local production systems?

- Yes
- No

If yes, please provide details and specify the breeds and production systems involved:

Projects with a component on marketing of local breeds and / or their products include:

- pigs, goats, and chickens in Asia (Bangladesh, Sri Lanka, Vietnam and Pakistan);
- cattle, sheep and goats in West Africa (The Gambia, Guinea, Senegal, Mali); and
- sheep and goats in Somaliland, and Red Maasai sheep in in Kenya.

13. Has your organization identified obstacles to enhancing the sustainable use and development of animal genetic resources?

- Yes
- No

If yes, please provide details:

- Lack of well formulated policies on the use, development, and exchange of AnGR.
- Weak institutions to implement AnGR use policies at the national level.
- Lack of capacity around the use and development of AnGR, particularly in West Africa.
- Lack of working models for sustained within-breed improvement programs.

14. What are the priority measures that need to be taken to address these obstacles?

Advocacy and capacity building.

15. Does your organization provide, or support the provision of, training or technical support programmes for animal breeding activities in pastoralist and farming communities?

- Yes
- No

If yes, please provide details:

- Development of animal genetics training course (<http://αγτρ.ιλρι.χλιαρ.org>).
- Various training activities, particular in relation to data collection for project activities.
- Continual support to updating national databases on AnGR.
- Supervision of graduate students & supporting partner to the EMABG (European Masters in Animal Genetics and Breeding).

16. Has your organization identified priorities for future training or support programmes to enhance the use and development of available animal genetic resources?

- Yes
- No

If yes, please provide details of the priority activities, being as specific as possible:

- Design and use of decision-support tools for breed use and conservation.
- Design and implementation of breeding programs for low input systems.
- Training at farmer level - both AnGR use and AnGR management issues.

17. Please describe any additional activities relevant to the implementation of Strategic Priority Area 2: Sustainable use and development.

Strategic Priority Area 3: Conservation

1. Is erosion of animal genetic resources occurring in any of the countries or regions in which your organization is active?

- Yes
- No
- Do not know

If yes, please describe. Please be as specific as possible and indicate which factors or drivers affect which species in which countries or regions:

- The Red Maasai sheep of East Africa as a result of crossing to the Dorper breed, which is less resilient but preferred by the local meat markets.
- Local chicken populations in Bangladesh, Sri Lanka and Vietnam due to competition from commercial breeds and lack of effective breeding program for the indigenous breed types veness
- Indigenous pigs in Uganda and Vietnam, due to competition from commercial pig production
- Local cattle breeds in East and West Africa (Kenya, Uganda, Senegal) due to low milk production in comparison to local x exotic crosses

2. Does your organization support the establishment of emergency response systems that provide for immediate action to maintain threatened breeds?

- Yes
- No

If yes, please provide details:

3. Does your organization take or support actions to protect breeds and populations that are at risk from natural or human-induced disasters?

- Yes
- No

If yes, please provide details:

4. From your organizational point of view, how would you judge the state of conservation policies for animal genetic resources in the countries and regions in which you operate?

Generally inadequate, and if existing may be poorly implemented

5. What types of conservation measures for animal genetic resources does your organization implement or support the implementation of?

In situ

- Yes
- No

Ex situ in vivo

- Yes
- No

Ex situ in vitro

- Yes
- No

Please provide details, and specify the countries and animal genetic resources involved:

- *In situ*: strengthening livestock production systems in East Africa (dairy , pigs, small ruminants: Kenya, Uganda, Ethiopia, Tanzania, Somaliland), West Africa (dairy, small ruminants: The Gambia, Guinea, Mali, Senegal), and Asia (pig, goat, chicken: Bangladesh, Sri Lanka, Vietnam and Pakistan), Central America (cattle, Nicaragua).
- *Ex situ - in vitro*: establishment and maintenance of a bio-bank for biological samples including AnGR (=ILRI biorepository)

6. If your organization maintains *ex situ* collections of animal genetic resources, could you please provide further information on these collections?

Various bio-banked samples (from livestock as well as their pathogens) kept in liquid nitrogen tanks on the ILRI compound in Nairobi, geo-referenced data managed by a-laboratory integrated management system (LIMS), samples generally available to other researchers on request.

7. Is your organization conducting research to further develop methods and technologies for *in situ* or *ex situ* conservation of animal genetic resources?

- Yes
- No

If yes, please briefly describe the research:

- *In situ* conservation via numerous projects aimed at sustainably improving livestock production systems.
- Protocols for *in vitro* maturation of indigenous cattle embryos, for possible application in conservation programs.
- Protocols for sample collection and storage for bio-banking purposes.
- Cloning (somatic cell nuclear transfer) was applied to clone Kenya Boran calves using Boran embryonic fibroblasts isolated from Boran fetus. This technique could be applied to conserve other African ingenious cattle or goat/sheep breeds once the corresponding cell lines are isolated from either embryos or adult tissues.
- Two vitrification methods were developed for *in vitro* produced bovine embryos cryopreservation. These two methods allow convenient embryo recovery without lab equipment and direct embryo transfer afterwards

8. Has your organization identified major obstacles to enhancing the conservation of animal genetic resources?

- Yes
- No

If yes, please provide details:

- Lack of awareness among key stakeholders as to their roles.
- Lack of funding to expand and maintain the bio-bank in the long term.

9. What are the priority measures that need to be taken to address these obstacles?

Advocacy and capacity building.

10. From your organizational point of view, what are the priority requirements for enhancing conservation measures for animal genetic resources in the countries and regions in which you operate? Please list the requirements, being as specific as possible:

- Development of appropriate national policies on animal genetic resource use, conservation and exchange.
- Development of *ex situ* conservation mechanisms for breeds that are not supported by the markets. Availability of guidelines / protocols to assist in this.
- Better targeted *in situ* conservation programs (some underway are targeting breeds not at risk; others have not considered the drivers of breed-use change).

11. Please describe any additional activities relevant to the implementation of Strategic Priority Area 3: Conservation.

Generally raising awareness that the genetic diversity of livestock in developing countries is high and could significantly contribute towards future food security for both developed and developing countries, even if this genetic diversity is used in new ways (such as inputs into cross-breeding systems).

Strategic Priority Area 4: Policies, Institutions and Capacity-building

1. Does your organization support or facilitate the establishment of institutional frameworks for planning and implementing animal genetic resources programmes?

- Yes
- No

If yes, please provide details and specify the countries or regions involved:

Assessment of existing frameworks, including identification of weaknesses and ways to strengthen them, in East Africa (dairy, small ruminants: Kenya, Uganda, Ethiopia, Tanzania, Somaliland), West Africa (dairy, small ruminants: The Gambia, Guinea, Mali, Senegal), Asia (pig, goat, chicken: Bangladesh, Sri Lanka, Vietnam and Pakistan), Central America (dual purpose cattle, Nicaragua).

2. Does your organization support countries in formulating or implementing national strategies and action plans for animal genetic resources?

- Yes
- No

If yes, please provide details and specify the countries involved:

Generally, via advocacy.

3. Does your organization contribute to the development of regulatory frameworks or legislation for animal genetic resources?

- Yes
- No

If yes, please provide details and specify the countries or regions involved:

Support to breeding policy formulation in Kenya and Tanzania.

4. Does your organization have a database or information system for animal genetic resources-related data?

- Yes
- No

If yes, please describe the purpose and contents of the system and, if relevant, how frequently data are updated:

DAGRIS (<http://DAGRIS.ILRI.CGIAR.ORG>) updated at national level at varied frequency.
Bio-bank with livestock & livestock pathogen samples linked to GPS location from which they were obtained and other data (usually project specific) AZIZI: <http://azizi.ilri.cgiar.org>

5. Does your organization have collaborative links to other stakeholders involved in the management of animal genetic resources (e.g. the breeding industry, livestock keepers, government agencies, research institutes and civil society organizations)?

- Yes
- No

If yes, please provide details:

Yes - linkages to various stakeholders in all countries in which we operate (see above for list)

6. Does your organization cooperate with breeders' organizations?

- Yes
- No

If yes, please provide details:

Support to the National Livestock Breeders Organisation of Kenya by back-stop support to performance and pedigree recording, and database maintenance.

7. Has your organization supported the establishment or strengthening of community-based organizations, networks or initiatives for sustainable use, breeding or conservation?

- Yes
- No

If yes, please provide details:

- Support to the National Livestock Breeders Organisation of Kenya (as above).
- Support to community-based breeding programs in sheep in Ethiopia.

8. Does your organization implement or support the implementation of training or capacity-building programmes for animal genetic resources management?

- Yes
- No

If yes, please provide details and specify countries involved:

- Development of the Animal Genetics Training Resource (<http://AGTR.ILRI.CGIAR.ORG>).
- Support to the European Masters of Animal Breeding and Genetics.
- Support to other initiatives (e.g. the FAO/ IAEA CRP on disease resistance).

- Various project related training and capacity building activities, and by sharing bio-banking protocols and training NARS on how to use them.

9. Has your organization identified priorities for future animal genetic resources-related capacity-building and education?

- Yes
- No

If yes, please provide details:

- Training of local scientists in issues around AnGR use and conservation, to create future leaders in this area.
- Raising awareness of policy makers on AnGR use and conservation.

10. Does your organization implement or support the implementation of programmes to increase public awareness of the roles and values of animal genetic resources?

- Yes
- No

If yes, please provide details:

Development and dissemination of various media (fliers, project reports, short video clips, journal publications) on the importance & value of FAnGR to the world's poor

11. Please describe any additional activities relevant to the implementation of Strategic Priority Area 4: Policies, institutions and capacity-building.

N/A

Implementation and Financing of Global Plan of Action for Animal Genetic Resources

1. Has your organization's budget for activities supporting the implementation of the Global Plan of Action and animal genetic resources programmes increased since the plan's adoption in September 2007?

- Yes
- No

Please provide details:

Yes, but insufficiently to meet demands for research in this area.

2. Has your organization contributed to the establishment or strengthening of international research and/or education programmes to assist developing countries or countries with economies in transition to better manage animal genetic resources?

- Yes
- No

If yes, please provide details:

- Through development and support of the Animal Genetics Training Resource (<http://AGTR.ILRI.CGIAR.ORG>).
- Through support to the European Masters in Animal Breeding and Genetics.
- Through support to graduate fellows and visiting scientists.

3. Has your organization contributed to the establishment or strengthening of international programmes to assist developing countries or countries with economies in transition to obtain training and technologies or develop information systems related to animal genetic resources?

Yes

No

If yes, please provide details:

- Through development and support of the Animal Genetics Training Resource (<http://AGTR.ILRI.CGIAR.ORG>).
- Through support to the European Masters in Animal Breeding and Genetics.
- Through support to graduate fellows and visiting scientists.

4. Has your organization provided funding to countries for the implementation of the Global Plan of Action for Animal Genetic Resources?

Yes

No

If yes, please provide details and specify the countries involved:

5. Has your organization contributed to establishing or strengthening international collaboration with regard to:

Characterization of animal genetic resources

Yes

No

Use and development of animal genetic resources

Yes

No

Conservation of transboundary breeds

Yes

No

Please provide details and specify the countries involved:

- Various projects on the characterization, development and use of breeds (including transboundary breeds) have partners from multiple countries (for example, the project on dairy in Senegal is supported by Senegalese and Finnish partners)
- Various projects on the characterization, development and use of breeds involving collaborating with other CG institutes (e.g. with ICARDA on sheep in Ethiopia; with CIAT on cattle in Nicaragua).

6. Does your organization collaborate with national or international non-governmental organizations (NGOs) in the fields of:

Characterization

Yes

No

Sustainable intensification

Yes

No

Conservation of breeds at risk

Yes

No

Please provide details and specify the countries involved:

Various local partners, including NGOs, are involved in our various projects.

7. Please describe any additional activities relevant to the implementation and financing of the Global Plan of Action for Animal Genetic Resources: