



Country report

supporting the preparation of

The Second Report on the State of the World's Animal Genetic Resources for Food and Agriculture,

including sector-specific data contributing to

The State of the World's Biodiversity for Food and Agriculture

- 2013 -

Country: Ghana

I. EXECUTIVE SUMMARY

Please provide an executive summary (not more than two pages) that will allow national and international stakeholders to gain a quick overview of the content of the country report.

The executive summary should contain information on:

- key trends and driving forces affecting animal genetic resources management in your country;
- strengths, weaknesses and gaps in capacity to manage animal genetic resources in your country;
- key constraints and challenges with respect to animal genetic resources management in your country;
- priorities and strategic directions for future action (focusing particularly on the next ten years).

Animal species contributing to food and agriculture in Ghana include cattle, sheep, goats, pigs, poultry, rabbits, grass cutters, asses and snails. There are six cattle breeds, two sheep breeds, two goat breeds, three pig breeds and six poultry species; chickens, turkeys, guinea fowls, ducks, ostriches and pigeons; five rabbit breeds and two grass cutter breeds. Various crossbred types can be found in cattle, sheep, goats, pigs and chickens which can be fully exploited to increase domestic meat production. In addition to the domestic species, thirty-five wildlife species are harvested for food. These include the duikers and antelopes, buffalo, warhog, red river hog and Togo hare as well as avian species like francolin and weaverbirds. There are plans to increase production within and outside protected lands.

Some degree of phenotypic and genetic characterization has been done for these indigenous breeds, particularly local chickens and cattle breeds. Capacity is being developed in the molecular genetic evaluation and marker-assisted selection as well as reproductive biotechnologies. Majority of indigenous animals are found in low input systems. The high demand of meat is gradually attracting investors into the animal industry. Because of the desire for quicker rates of return on capital invested, the high input production systems, which utilize fast growing breeds of all, monogastrics and intensive feeding, are preferred. For cattle, sheep and goat breeds where continuous importation of high-performing exotic breeds for breeding is not practicable, crossbreeding and development of indigenous AnGR are preferred. To control the indiscriminate, non-directed crossbreeding being done by farmers, it is also recommended that the indigenous breeds be used in terminal crossbreeding schemes.

The Government of Ghana has reactivated its National Consultative Committee on Animal Genetic Resources to provide guidance in the implementation of this Global Plan of Action on AnGR to ensure their sustainable use. A lot has been achieved in the areas of characterization, capacity building and in-situ conservation but more remains to be done. Ghana's Medium Term Agricultural Sector Investment Plan (METASIP; 2011-2015), indicates that the country has an annual meat deficit of over 95,000 metric tonnes. Ghana's ability to attain the Millennium Development Goals in agriculture thus hinges on increased livestock and poultry productivity. This objective depends on the availability and sustainable utilization of Animal Genetic Resources to meet current and future needs.

The Government of Ghana sees the FAO's State of the World's Animal Genetic Resources (SoW-AnGR) initiative as an opportunity to document the state of its AnGR. Ghana joined the SoW-AnGR process in 2002 and through hard work of the National Consultative Committee (NCC) and kind support from the FAO, Ghana's First Report on AnGR was prepared. This second report is an update of the first report based on the progress made in the implementation of the Global Plan of Action (GPA) on AnGR in Ghana.

The Government of Ghana as signatory to the Interlaken Declaration on Animal Genetic Resources believes that implementation of this Global Plan of Action will contribute significantly to achieving the Millennium Development Goals 1 (to eradicate extreme poverty and hunger) and 7 (to ensure environmental sustainability) in our dear country. Government through the Ministry of Food and Agriculture will continue to support the NCC to help us achieve these noble objectives.

II. DATA FOR UPDATING THE PARTS AND SECTIONS OF *THE STATE OF THE WORLD'S ANIMAL GENETIC RESOURCES FOR FOOD AND AGRICULTURE*

FLOWS OF ANIMAL GENETIC RESOURCES

1. Studies of gene flow in animal genetic resources have generally concluded that most gene flow occurs either between developed countries or from developed countries to developing countries. Does this correspond to the pattern of gene flow into and out of your country?

For developed countries, exceptions to the usual pattern would include significant imports of genetic resources from developing countries. For developing countries, exceptions would include significant exports of genetic resources to developed countries, and/or significant imports and/or exports of genetic resources to/from other developing countries.

- yes
- no
- yes but with some significant exceptions

1.1. If you answer "no" or "yes but with some significant exceptions", please provide further details. Please include information on: which species are exceptions and which regions of the world are the sources and/or destinations of the respective genetic material.

Poultry and pig breeding stock is imported from Europe and America into Ghana. Exceptions include cattle, sheep and goats. For these species, exchange of genetic materials occurs within and among West African countries.

2. Have there been any significant changes in patterns of geneflow in and out of your country in the last ten years?

- yes
- no

2.1. If yes, please indicate whether this view is based on quantified data (e.g. import and export statistics collected by the government).

- yes
- no

2.2. If yes, please provide references (preferably including web links) (if relevant, indicate which types of animal genetic resources are covered).

N/A

2.3. Please also describe the changes, indicating the species involved, the direction of the changes, and the regions of the world to and from which the patterns of imports and exports have changed.

N/A

3. Please describe how the patterns of geneflow described under Questions 1 and 2 affect animal genetic resources and their management in your country.

Note: Please answer this question even if the pattern of geneflow into and out of your country corresponds to the “usual” pattern described in the first sentence of Question 1 and/or has not changed significantly in the last ten years.

Importation of pig and poultry breeding stock from Europe and America has helped the development of commercial poultry and pig production in Ghana because few nucleus farms in these species exist in Ghana. Importation of ruminant livestock from neighbouring countries is leading to erosion of indigenous species. Sahel sheep, goats and cattle are imported to cross local Djallonké sheep and goats and N'dama and WASH cattle. Continuous crossing leads to genetic erosion of indigenous species.

LIVESTOCK SECTOR TRENDS

4. Please indicate the extent to which the following trends or drivers of change have affected or are predicted to affect animal genetic resources and their management in your country and describe these effects.

*Note: Relevant impacts on animal genetic resources and their management might include, for example, changes in the type of animal genetic resources kept (e.g. different breeds or species), changes in the uses to which animal genetic resources are put, changes in the geographical distribution of different types of animal genetic resources, increases or decreases in the number of breeds at risk of extinction, changes in the objectives of breeding programmes, changes in the number or type of conservation programmes being implemented, etc. In the text sections, please briefly describe the changes. If possible, provide some concrete examples of the challenges or opportunities presented by the respective drivers and the actions taken to address these challenges or opportunities. If relevant, you may also indicate why a given driver is not affecting animal genetic resources and their management in your country. For a general discussion of drivers of change, please see *The State of the World's Animal Genetic Resources for Food and Agriculture (Part 2, Section A)* (<http://www.fao.org/docrep/010/a1250e/a1250e00.htm>).*

Drivers of change	Impact on animal genetic resources and their management over last ten years	Future impact on animal genetic resources and their management (predicted for the next ten years)	Describe the effects on animal genetic resources and their management
Changing demand for livestock products (quantity)	medium	high	Traditionally, goat, sheep, cattle, pigs and poultry have been the main sources of livestock products. Over the years, local pig and poultry production has been going down due to unfair competition from imported products. Whereas there is increase in the rearing of micro livestock such as Grasscutter, rabbit and snail due to loss of grazing land to urbanization. This trend is expected to continue unless serious interventions are made to revamp local animal production. Grasscutter production increased because of domestication. Grasscutters relished by Ghanaians are usually hunted for by the setting of traps and bush fires and thus a whole lot of other animal species could be eliminated as a result.
Changing demand for livestock products (quality)	medium	high	As a result of increased food safety and health education and the high incidence of cardiovascular diseases, most people are rejecting fatty meat and demand lean meat. It is expected that more people will reject meat handled under unhygienic conditions.

Drivers of change	Impact on animal genetic resources and their management over last ten years	Future impact on animal genetic resources and their management (predicted for the next ten years)	Describe the effects on animal genetic resources and their management
Changes in marketing infrastructure and access	low	medium	Increased consumer awareness will demand an improved hygienic slaughter, transport and sale of meat and this will require provision of appropriate infrastructure, regulation and access by the government. This will also open the market for livestock farmers as there will be a high demand for local AnGR whose carcasses are relished for their flavour and a reduction in the volume of meat imports.
Changes in retailing	medium	high	In the last ten years, a lot of shops/supermarkets have been opened in the country. Most of these shops are, however, selling imported poultry and livestock products. If intensification of livestock production leads to a boost in local production, these shops/supermarkets will sell local products. It must be emphasized that some shops have been opened specifically to cater for product from local micro livestock farms.
Changes in international trade in animal products (imports)	medium	high	There has been a quantum leap in the importation of livestock products into Ghana. This is killing the local poultry and livestock industries because the imported products are cheaper than local products. However, with the provision of appropriate infrastructure for local livestock farmers, there should be a reduction in imported products.
Changes in international trade in animal products (exports)	none	none	There is a large demand in the West for local livestock products by the African and Asian population and a boost in local AnGR production will see emergence of niche markets in some developed countries.
Climatic changes	low	medium	There is evidence that the climate is changing in Ghana. Temperature is increasing, humidity is reducing, wind speed is increasing and amount of rainfall is decreasing. All these have negative effects (direct and indirect) on livestock production. On the other hand there will be the need to strategically provide and protect lands for livestock grazing.
Degradation or improvement of grazing land	medium	high	There is degradation of grazing land because of continuous grazing without maintenance of the rangeland. This affects the quality and quantity of forage in the rangeland.
Loss of, or loss of access to, grazing land and other natural resources	medium	high	Urban livestock production is dwindling due to loss of grazing land through agriculture, and building and road construction. Government will have to demarcate lands specifically for livestock production.

Drivers of change	Impact on animal genetic resources and their management over last ten years	Future impact on animal genetic resources and their management (predicted for the next ten years)	Describe the effects on animal genetic resources and their management
Economic, livelihood or lifestyle factors affecting the popularity of livestock keeping	medium	high	The number of farmers seeking alternative employment in micro livestock is increasing day by day. On the other hand most poultry and swine farms are closing or collapsing due to high production cost and unfair competition from imported products.
Replacement of livestock functions	none	low	The little change is mostly in finding alternative cheap feed resources. Intensification may call for more technologies.
Changing cultural roles of livestock	none	none	
Changes in technology	low	medium	Artificial insemination has been used for over two decades to improve milk production of the local Sanga cattle. It is expected that more novel methods including appropriate genomic selection will be brought to bear on livestock production in Ghana.
Policy factors	medium	high	Ghana developed a livestock policy in 2004 but the document is not being used however its review has been planned. The NCC is currently developing the National Strategy and Action Plan for AnGR and working closely with the Ministry to implement the policy especially for AnGR
Disease epidemics	low	low	There were outbreaks of swine fever and bird flu in the last 10 years but appropriate steps were taken by the government to rectify the situation. It will be important for stakeholders to provide appropriate infrastructure to discourage free range animal raising as this will help to control epidemics better in the future.

OVERVIEW OF ANIMAL GENETIC RESOURCES

5. Please provide the number of locally adapted and exotic breeds kept in your country.

Data on the number of breeds is needed in order to calculate the percentage of breeds subject to the various management activities that are covered in this questionnaire. In line with the request of the Commission on Genetic Resources for Food and Agriculture at its Fourteenth Regular Session (CGRFA-14/13/Report, paragraph 31), FAO will implement the "locally adapted" vs. "exotic breed" classification system in the Domestic Animal Diversity Information System (DAD-IS). Once countries have fully updated their breed lists and classified all breeds in DAD-IS, it will be possible to use these data to obtain the numbers of breeds in each category.

Species	Locally adapted breeds	Exotic breeds
Cattle (specialized dairy)	2	2
Cattle (specialized beef)	2	0
Cattle (multipurpose)	4	0
Sheep	2	0
Goats	2	0

Species	Locally adapted breeds	Exotic breeds
Pigs	1	2
Chickens	1	13
Guinea fowls	1	1
Rabbits	1	4

CHARACTERIZATION

To provide further details of your country's activities in the field of characterization, surveying and monitoring, please go to Strategic Priority Area 1 of the "Progress report on the implementation of the Global Plan of Action for Animal Genetic Resources 2007–2013" (below).

6. Please provide an overview of the current state of characterization in your country by indicating the extent to which the activities shown in the following table have been carried out.

Note: Please focus on characterization studies that have been conducted within the last ten years (baseline surveys of population size may have been conducted in the more distant past). Recall that some types of characterization study on your country's breeds may have been conducted outside your country. For the first two columns, please insert the number of breeds; for columns 3 to 8 please choose one of the following categories: none; low (approximately <33%); medium (approximately 33–67%); high (approximately >67%).

Species	Baseline survey of population size	Regular monitoring of population size	Phenotypic characterization	Molecular genetic diversity studies – within breed	Genetic diversity studies based on pedigree	Molecular genetic diversity studies – between breed	Genetic variance component estimation	Molecular genetic evaluation
Cattle (specialized dairy)	0	0	low	none	none	none	none	none
Cattle (specialized beef)	0	0	medium	none	none	none	low	none
Cattle (multipurpose)	0	0	medium	none	none	none	low	none
Sheep	0	0	medium	none	none	none	low	none
Goats	0	0	low	none	none	none	low	none
Pigs	0	0	medium	none	none	none	low	none
Chickens	0	0	low	low	none	none	none	none
Guinea fowls	0	0	low	low	none	none	low	none
Rabbits	0	0	none	none	none	none	none	none

INSTITUTIONS AND STAKEHOLDERS

To provide further details of your country's activities in the field of institutions and stakeholders, please go to Strategic Priority Area 4 of the "Progress report on the implementation of the Global Plan of Action for Animal Genetic Resources 2007–2013" (below).

7. Please indicate the state of your country's capacities and provisions in the following areas of animal genetic resources management.

	Score
Education	medium
Research	medium
Knowledge	low
Awareness	low
Infrastructure	low
Stakeholder participation	low
Policies	high
Policy implementation	low
Laws	low
Implementation of laws	low

8. Please provide further information regarding your country's capacities in each of the above-mentioned areas of management. If relevant, please indicate what obstacles or constraints your country faces in each of these areas and what needs to be done to address these constraints. You may also provide information on any particular successes achieved in your country in any of these areas and on the reasons for these successes.

	Description
Education	Ghana has the manpower to do the work in the universities but the universities lack the financial and infrastructural capacities to perform.
Research	The situation is similar to education. In both cases, the universities have assisted and supported in the characterization, management and conservation of AnGR. They have been collaborating with the Ministry of Food and Agriculture to achieve these.
Knowledge	Stakeholders are not getting the requisite knowledge because of lack of financing and infrastructural capacities.
Awareness	Situation is similar to (Knowledge).
Infrastructure	Poor infrastructure is due to financing constraint.
Stakeholder participation	Stakeholders involvement is low because the institutions responsible for educating them have done little as a result of poor finances.
Policies	Ghana developed a livestock policy which has components on the management, conservation and sustainable use of AnGR in 2004.
Policy implementation	Poor policy implementation is due to poor financial and infrastructural capacities of the Ministry of Food and Agriculture.
Laws	There have never been any initiatives to develop laws to govern the country's AnGR. Some laws on <u>animal health</u> exist.
Implementation of laws	Health laws are enforced.

9. What steps have been taken in your country to engage or empower the various stakeholders in animal genetic resources management (e.g. establishment of livestock keepers' organizations, development of biocultural community protocols)?

Note: Biocultural community protocol: a document that is developed after a community undertakes a consultative process to outline their core cultural and spiritual values and customary laws relating to their traditional knowledge and resources. For a discussion of the potential role of biocultural community protocols in the conservation of animal genetic resources, please see the guidelines In vivo conservation of animal genetic resources (<http://www.fao.org/docrep/018/i3327e/i3327e.pdf>).

1. Establishment of livestock farmers association.
2. Formation of National Consultative Committee on AnGR.

BREEDING PROGRAMMES

Note: Breeding programmes: systematic and structured programmes for changing the genetic composition of a population towards a defined breeding goal (objective) to realize genetic gain (response to selection), based on objective performance criteria. Breeding programmes typically contain the following elements: definition of breeding goal; identification of animals; performance testing; estimation of breeding values; selection; mating; genetic gain and transfer of genetic gain. Breeding programmes are usually operated either by a group of livestock breeders organized in a breeders' association, community-based entity or other collective body; by a large commercial breeding company; or by the government.

To provide further details of your country's activities in the field of breeding programmes, please go to Strategic Priority Area 2 of the "Progress report on the implementation of the Global Plan of Action for Animal Genetic Resources 2007–2013" (below).

10. Who operates breeding programmes in your country?

Note: the objective of this question is to identify which stakeholders lead or organize the breeding programmes that exist in your country. Stakeholder participation in the implementation of the various elements of breeding programmes is covered under Question 15. If you wish to provide further information on the activities of the various stakeholder groups (including collaborative activities on an international scale), please provide it in the text section of Question 15.

Species	Government	Livestock keepers organized at community level	Breeders' associations or cooperatives	National commercial companies	External commercial companies	Non-governmental organizations	Others
Cattle (specialized dairy)	yes	no	no	no	no	yes	no
Cattle (specialized beef)	yes	no	no	no	no	no	no
Cattle (multipurpose)	yes	no	no	no	no	no	no
Sheep	yes	no	no	no	no	no	no
Goats	yes	no	no	no	no	no	no
Pigs	yes	no	no	no	yes	no	no
Chickens	yes	no	no	yes	yes	no	no
Rabbits	yes	no	no	no	no	no	no
Guinea fowls	no	no	no	yes	yes	no	no

10.1. If you choose the option "others", please indicate what kind of operator(s) this refers to.

N/A

11. For how many breeds in your country are the following activities undertaken?

Note: Please do not include activities that are only undertaken for experimental purposes, i.e. include only activities that directly serve or involve livestock keepers. However, please include activities even if they do not at present form part of a breeding programme. The intention is to obtain an indication of whether the "building blocks" of a breeding programme are available or being developed in your country. Loc = Locally adapted breeds; Ex = Exotic breeds.

Species	Tools															
	Animal identification		Breeding goal defined		Performance recording		Pedigree recording		Genetic evaluation (classic approach)		Genetic evaluation including genomic information		Management of genetic variation (by maximizing effective population size or minimizing rate of inbreeding)		Artificial insemination	
	Loc	Ex	Loc	Ex	Loc	Ex	Loc	Ex	Loc	Ex	Loc	Ex	Loc	Ex	Loc	Ex
Cattle (specialized dairy)	0	1	0	1	0	1	0	1	0	0	0	0	0	1	0	1
Cattle (specialized beef)	1	0	1	0	1	0	1	0	1	0	0	0	1	0	0	0
Cattle (multipurpose)	1	0	1	0	1	0	1	0	1	0	0	0	1	0	0	0
Sheep	1	0	1	0	1	0	1	0	1	0	0	0	1	0	0	0
Goats	1	0	1	0	1	0	1	0	1	0	0	0	1	0	0	0
Pigs	1	1	1	1	1	1	1	1	1	1	0	0	1	1	0	0
Chickens	0	13	0	13	0	13	0	13	0	13	0	0	0	13	0	0
Guinea fowls	1	1	1	1	1	1	1	1	1	1	0	0	1	1	0	0
Rabbits	0	0	1	4	1	4	1	4	1	4	0	0	0	0	0	0

12. Please indicate how many of the breeds in your country are subject to breeding programmes applying the following breeding methods.

Note: Loc = Locally adapted breeds; Ex = Exotic breeds.

Species	Breeding method			
	Straight/pure-breeding only		Straight/pure-breeding and cross-breeding	
	Loc	Ex	Loc	Ex
Cattle (specialized dairy)	0	1	0	1
Cattle (specialized beef)	1	0	1	0
Cattle (multipurpose)	1	0	1	0
Sheep	1	0	0	0
Goats	1	0	0	0
Pigs	1	2	0	0
Chickens	0	13	0	0
Guinea fowls	1	1	0	0
Rabbits	0	0	1	4

13. Please indicate the state of research and training in the field of animal breeding in your country.

Species	Training	Research
Cattle (specialized dairy)	low	low
Cattle (specialized beef)	low	low
Cattle (multipurpose)	low	low
Sheep	low	low
Goats	low	low
Pigs	low	low
Chickens	low	low
Guinea fowls	low	low
Rabbits	low	low

14. Please indicate the extent to which livestock keepers in your country are organized for the purposes of animal breeding.

Species	Organization of livestock keepers
Cattle (specialized dairy)	low
Cattle (specialized beef)	low
Cattle (multipurpose)	low
Sheep	low
Goats	low
Pigs	low
Chickens	low
Guinea fowls	low
Rabbits	low

15. Please indicate the level of stakeholder involvement in the various elements of breeding programmes in your country.

Note: If your country has different types of breeding programme, the level of involvement of the various stakeholders may vary from one type of programme to another. In answering this question please try to indicate the overall degree of involvement of the various stakeholder groups.

	Government	Research organizations	Breeders' associations or cooperatives	Individual breeders/livestock keepers	National commercial companies	External commercial companies	Non-governmental organizations	Others
Cattle (specialized dairy)								
Setting breeding goals	high	high	none	none	none	none	medium	none
Animal identification	high	high	none	none	none	none	medium	none
Recording	high	high	none	none	none	none	medium	none
Provision of artificial insemination services	high	high	none	none	none	none	none	none
Genetic evaluation	high	high	none	none	none	none	none	none
Cattle (multipurpose)								
Setting breeding goals	high	high	none	none	none	none	none	none
Animal identification	high	high	none	none	none	none	none	none
Recording	high	high	none	none	none	none	none	none
Provision of artificial insemination services	none	high	none	none	none	none	none	none
Genetic evaluation	high	high	none	none	none	none	none	none

Sheep	Government	Research organizations	Breeders' associations or cooperatives	Individual breeders/livestock keepers	National commercial companies	External commercial companies	Non-governmental organizations	Others
Setting breeding goals	high	high	none	none	none	none	none	none
Animal identification	high	high	none	none	none	none	none	none
Recording	high	high	none	none	none	none	none	none
Provision of artificial insemination services	none	none	none	none	none	none	none	none
Genetic evaluation	high	high	none	none	none	none	none	none
Goats	Government	Research organizations	Breeders' associations or cooperatives	Individual breeders/livestock keepers	National commercial companies	External commercial companies	Non-governmental organizations	Others
Setting breeding goals	high	high	none	none	none	none	none	none
Animal identification	high	high	none	none	none	none	none	none
Recording	high	high	none	none	none	none	none	none
Provision of artificial insemination services	none	none	none	none	none	none	none	none
Genetic evaluation	high	high	none	none	none	none	none	none

Pigs	Government	Research organizations	Breeders' associations or cooperatives	Individual breeders/livestock keepers	National commercial companies	External commercial companies	Non-governmental organizations	Others
Setting breeding goals	high	high	none	none	none	high	none	none
Animal identification	high	high	none	medium	none	high	none	none
Recording	high	high	none	medium	none	high	none	none
Provision of artificial insemination services	none	none	none	none	none	none	none	none
Genetic evaluation	high	high	none	low	none	high	none	none
Chickens	Government	Research organizations	Breeders' associations or cooperatives	Individual breeders/livestock keepers	National commercial companies	External commercial companies	Non-governmental organizations	Others
Setting breeding goals	high	high	none	none	high	high	none	none
Animal identification	high	high	none	none	high	high	none	none
Recording	high	high	none	none	high	high	none	none
Provision of artificial insemination services	none	none	none	none	none	none	none	none
Genetic evaluation	high	high	none	none	high	high	none	none

Cattle (specialized beef)								
	Government	Research organizations	Breeders' associations or cooperatives	Individual breeders/livestock keepers	National commercial companies	External commercial companies	Non-governmental organizations	Others
Setting breeding goals	high	high	none	none	none	none	none	none
Animal identification	high	high	none	none	none	none	none	none
Recording	high	high	none	none	none	none	none	none
Provision of artificial insemination services	none	none	none	none	none	none	none	none
Genetic evaluation	high	high	none	none	none	none	none	none

15.1. If you choose the option "others", please indicate what kind of operator(s) this refers to.

N/A

15.2. Please provide further information on the roles that the stakeholders identified in the table play in the implementation of the various activities. If relevant, please also provide further information on the organizational roles played by the stakeholders identified in Question 10.

Livestock keepers involved in the National Breeding Programmes are provided with identification materials and taught to keep records.

16. Does your country implement any policies or programmes aimed at supporting breeding programmes or influencing their objectives?

Species	Policies or programmes
Cattle (specialized dairy)	yes
Cattle (specialized beef)	yes
Cattle (multipurpose)	yes
Sheep	yes
Goats	yes
Pigs	yes
Chickens	yes
Guinea fowls	yes
Rabbits	yes

16.1. Please describe these policies or programmes, indicating whether or not they include any measures specifically aimed at supporting breeding programmes for locally adapted breeds or any measures specifically aimed at supporting breeding programmes for exotic breeds (including breed-replacement programmes). Please indicate whether different types of programme are promoted in different production systems (and describe the differences).

Species	Description of policies or programmes
Cattle (specialized dairy)	<ol style="list-style-type: none"> 1. To develop through selection the Sanga animal for the dairy industry. 2. To promote, develop and sustain the peri-urban dairy industry through the production of crossbred from the Sanga and Friesian and/or Jersey with a potential for higher milk production. Through selective breeding crosses involving the Sanga (dam line) and the Friesian and/or Jersey (sire line) would be developed. The cross bred are expected to combine the production qualities of the Sanga (local adaptation) and the high milk production qualities of the sire line.
Cattle (specialized beef)	<ol style="list-style-type: none"> 1. To develop through genetic improvement, Ghana's indigenous cattle, the West African Shorthorn (WASH) 2. To establish nucleus breeding centres in their appropriate ecological zones for West African Shorthorn, White Fulani, and Sanga, namely Guinea, Sudan and Coastal Savannas, The Transitional and Rain forest zones.
Cattle (multipurpose)	To develop through genetic improvement, the Sanga as a multipurpose breed. This Sanga is a cross between the White Fulani and WASH. (Zebu)
Sheep	<ol style="list-style-type: none"> 1. To develop through selection the Djallonke sheep and goats. 2. To establish nucleus breeding centres for the two species in appropriate ecological zones. 3. To develop synthetic crosses between the Djallonke and Sahelian breeds of sheep and goats in the appropriate ecological zones of the country.
Goats	Same as sheep above.
Pigs	<ol style="list-style-type: none"> 1. To develop a nucleus breeding centre for preservation and conservation of the indigenous pig breed (Ashanti Black) to be used in the cross breeding programmes for the development of the synthetic lines. 2. To develop foundation stock of pigs to be based on the Large White, Duroc, Landrace and Hampshire breeds. The Duroc and Hampshire will constitute the male lines.
Chickens	<ol style="list-style-type: none"> 1. To establish breed improvement schemes to improve the performance of local chicken and guinea fowls. 2. The scheme should provide both males and females to farmers while ensuring that appropriate kinds of broodiness and hardiness are maintained. 3. To encourage the development of elite stock of highly selected commercial strain of poultry in Ghana.
Rabbits	<ol style="list-style-type: none"> 1. To develop and establish through selection of indigenous rabbits taking advantage of their adaptability to local conditions. 2. To develop and establish a synthetic breed of meat rabbit out of the nation's present heterogeneous population. 3. To develop and establish the use of the males of exotic breeds (eg. Fleming Giant and Californian) to improve the meat quality and growth performance of the local strains.
Guinea fowls	<ol style="list-style-type: none"> 1. To establish breed improvement schemes to improve the performance of local chicken and guinea fowls. 2. The scheme should provide both males and females to farmers while ensuring that appropriate kinds of broodiness and hardiness are maintained. 3. To encourage the development of elite stock of highly selected commercial strain of guinea fowl in Ghana.

17. Please describe the consequences of your country's breeding policies and programmes, or lack of breeding policies and programmes, for your country's animal genetic resources and their management.

Species	Description of consequences
Cattle (specialized dairy)	Though LDP and NLSP included breeding programmes in their activities, little was achieved as a result of poor breeding infrastructure and technical know-how. In many cases, the production system of livestock keepers did not support breeding programmes set out by MOFA. However, a peri-urban dairy production system was relatively successful with participating farmers having their animals artificially inseminated with Friesian semen and milk production in their F1s increasing.
Cattle (specialized beef)	There is little record keeping by these farmers making it difficult to monitor progress except on institutional farms. There is need to ensure participating breeders have appropriate infrastructure particularly for record keeping to be able to measure the impact of any breeding intervention.
Cattle (multipurpose)	The situation is similar to specialized beef cattle indicated above.
Sheep	The government's sheep breeding project on Djallonke sheep at Ejura has been a success for many years. An attempt was made to supply improved rams to participating breeders to use on their ewes so that the performance of their offspring will be monitored and some superior stock also supplied to other farmers to expand the programme. Unfortunately, this programme failed because of failure of the farmers to weigh the animals and also lack of resources by the Ministry to do the follow up and monitoring.
Goats	The West African Dwarf Goat (WADG) breeding station at Kintampo has infrastructure for breed evaluation but little genetic improvement has taken place. Additionally, the market is flooded with the Sahelian breed of goat which is much bigger and this has been a challenge to developing the WADG.
Pigs	The national breeding policy was to utilise the Open Nucleus Breeding Scheme to supply superior boars to participating farmers. The programme started well but collapsed due to lack of funds to feed breeding stock leading to loss of many good genetic material. Consequently most of the pig farmers also folded up.
Chickens	Ghana's poultry production has faced many challenges in recent times due to two main challenges - high cost of feed and other ingredients and the high influx of cheap poultry products making the industry non-competitive. In recent time there has been calls to encourage local chicken production on account of its superior flavour and resistance to most diseases. However the annual outbreak of Newcastle disease lead to high mortalities and there is need for a rigorous vaccination programme with the introduction of the I-2 vaccine.

18. Please describe the main constraints to the implementation of breeding programmes in your country and what needs to be done to address these constraints. You may also provide information on any particular successes achieved in your country with respect to the establishment and operation of breeding programmes and on the factors that have contributed to these successes.

<p>Ghana attempted to operate the Open Nucleus Breeding scheme under both the National Livestock Services Project (NLSP) and Livestock Development Project (LDP) but was not successful as a result of the following constraints:</p> <ol style="list-style-type: none"> 1. Illiteracy on the part of livestock keepers 2. extensive production system. 3. lack of financial resources for continuity of breeding programs after end projects. 4. lack of personel to give technical backstopping to the livestock keepers and to manage nucleus farms. 5. lack of infrastructure of recording system.

19. Please describe future objectives, priorities and plans for the establishment or further development of breeding programmes in your country.

Species	Description of future objectives, priorities and plans
Cattle (specialized dairy)	<ol style="list-style-type: none"> 1. To develop, through selection of the Sanga animal for the dairy industry. 2. To promote development, sustain the peri-urban dairy industry through the production of crossbred from the Sanga and Friesian and or Jersey with a potential for higher milk production. Through selective breeding crosses involving The Sanga (damline) and The Friesian and/or Jersey(sireline) would be developed. The crossbredd are expected to combine the food quality of Sanga (local adaptation) and high milk production quality of the sirelines.

Species	Description of future objectives, priorities and plans
Cattle (specialized beef)	<ol style="list-style-type: none"> 1. To develop, through genetic improvement, Ghana's indigenous cattle, The West African Shorthorn. (WASH) 2. To establish nucleus breeding countries in their appropriate ecological zones for West African Shorthorn, White Fulani and Sanga, namely Guinea, Sudan, and Coastal Savannah, The Transitional and rain forest zones.
Cattle (multipurpose)	To develop, through genetic improvement. The Sanga as a multipurpose breed. This Sanga is cross between white Fulani and WASH.
Sheep	<ol style="list-style-type: none"> 1. To develop through the selection of the Djallonke 2. To establish the nucleus breeding centres for the two species in appropriate ecological zones 3. To develop synthetic crosses between Djallonke and Sahelian breed of in the appropriate ecological zones of the country.
Goats	<ol style="list-style-type: none"> 1. To develop through the selection of the Djallonke 2. To establish the nucleus breeding centres for the two species in appropriate ecological zones 3. To develop synthetic crosses between Djallonke and Sahelian breed of in the appropriate ecological zones of the country.
Pigs	<ol style="list-style-type: none"> 1. To develop the nucleus breeding centre for preservation and conservation of the indigenous pig breed(Ashanti Black) to be used in the cross breeding programmes for the development of the synthetic lines. 2. To develop foundation stock of pigs to be based on large white, Duroc, landrace and Hampshire breeds. The Duroc and Hampshire will constitute the male lines.
Chickens	<ol style="list-style-type: none"> 1. To establish breed improvement schemes to improve the performance of local chicken and guinea fowls. 2. The scheme should provide both males and females to farmers whilst ensuring the appropriate levels of brodiness and hardiness are maintained. 3. To encourage the development of elite stock of highly selected commercial strain of poultry in Ghana.
Rabbits	<ol style="list-style-type: none"> 1. To develop and establish through selection of indigenous rabbits taking advantage of their adaptability to local conditions 2. To develop and establish a synthetic breed of meat rabbit and of nations present heterogeneous population. 3. To develop and establish the use of the males of exotic breeds (e.g. Flemish Giant and California) to improve the meat quality and growth performance of the local strains.

CONSERVATION

To provide further details of your country's activities in the field of conservation, please go to Strategic Priority Area 3 of the "Progress report on the implementation of the Global Plan of Action for Animal Genetic Resources 2007–2013" (below).

20. Please provide an indication of the extent to which your country's breeds are covered by conservation programmes.

Please focus on at-risk breeds and breeds for which there are serious grounds for concern about their potential to fall into the at-risk category in the near future. Countries should not reduce their scores because of a lack of conservation programmes for breeds that are clearly not at risk. The main purpose of this question is to obtain an indication of the extent to which your country's conservation programmes meet the objective of protecting breeds from extinction. If your country has no official national criteria for classifying breed risk status or lacks the relevant data for identifying which breeds are at risk, please base your answers on estimations. Please also note that Question 8 of the "Progress report on the implementation of the Global Plan of Action for Animal Genetic Resources – 2007 to 2013" (below) requests countries to provide information on the criteria they use to assess the risk status of animal genetic resources.

Note: n/a = no programmes implemented because all breeds of this species present in the country are secure.

Species	In situ conservation	Ex situ in vivo conservation	Ex situ in vitro conservation
Cattle (specialized dairy)	n/a	medium	n/a

Species	In situ conservation	Ex situ in vivo conservation	Ex situ in vitro conservation
Cattle (specialized beef)	n/a	high	n/a
Cattle (multipurpose)	n/a	high	n/a
Sheep	n/a	high	n/a
Goats	n/a	high	n/a
Pigs	n/a	high	n/a
Chickens	n/a	n/a	n/a

21. Does your country use formal approaches to prioritize breeds for conservation?

yes

no

21.1. If so, which of the following factors are considered?

Note: See Sections 2 and 3 of the FAO guidelines In vivo conservation of animal genetic resources (<http://www.fao.org/docrep/018/i3327e/i3327e.pdf>).

	Considered in formal prioritization approaches
Risk of extinction	
Genetic uniqueness	yes
Genetic variation within the breed	yes
Production traits	yes
Non-production traits	
Cultural or historical importance	yes
Probability of success	yes

22. Please indicate which of the following methods are used as elements of in situ conservation programmes in your country and which operators are managing them.

Note: Operators: the sector(s) that initiate(s) and manage(s) the respective activities. If both sectors undertake the respective activity, please answer "yes" in both rows. Please answer "yes" if the respective sector only works with some of the species targeted. If necessary, details of which sector addresses which species can be provided in the textual response. Information on what kinds of public- or private-sector organizations undertake the activities can also be provided, if necessary, in the textual response. Species targeted: Please answer "yes" if there are any such activities targeting the respective species, whether they are undertaken by the public sector, private sector or both.

Operators / Species targeted	Promotion of niche marketing or other market differentiation	Community-based conservation programmes	Incentive or subsidy payment schemes for keeping at-risk breeds	Development of biocultural community protocols	Recognition/award programmes for breeders	Conservation breeding programmes	Selection programmes for increased production or productivity in at-risk breeds	Promotion of at-risk breeds as tourist attractions	Use of at-risk breeds in the management of wildlife habitats and landscapes	Promotion of breed-related cultural activities	Extension programmes to improve the management of at-risk breeds	Awareness-raising activities providing information on the potential of specific at-risk breeds
Public sector	no	no	no	no	no	yes	no	no	no	no	no	no
Private sector	no	no	no	no	no	no	no	no	no	no	no	no
Cattle (specialized dairy)	no	no	no	no	no	yes	no	no	no	no	no	no
Cattle (specialized beef)	no	no	no	no	no	yes	no	no	no	no	no	no
Cattle (multipurpose)	no	no	no	no	no	yes	no	no	no	no	no	no
Sheep	no	no	no	no	no	yes	no	no	no	no	no	no
Goats	no	no	no	no	no	yes	no	no	no	no	no	no
Pigs	no	no	no	no	no	yes	no	no	no	no	no	no
Chickens	no	no	no	no	no	no	no	no	no	no	no	no
Guinea fowls	no	no	no	no	no	no	no	no	no	no	no	no

22.1. Please provide further details of the activities recorded in the table and any other in situ conservation activities or programmes being implemented in your country.

N/A

23. Does your country have an operational in vitro gene bank for animal genetic resources?

In vitro gene bank: a collection of documented cryoconserved genetic material, primarily stored for the purpose of medium- to long-term conservation, with agreed protocols and procedures for acquisition and use of the genetic material.

- yes
 no

23.1. If your country has no in vitro gene bank for animal genetic resources, does it have plans to develop one?

- yes
 no

23.2. If yes, please describe the plans.

N/A

24. If your country has an in vitro gene bank for animal genetic resources, please indicate what kind of material is stored there.

	Stored in national genebank
Semen	
Embryos	
Oocytes	
Somatic cells (tissue or cultured cells)	
Isolated DNA	

25. If your country has an in vitro gene bank for animal genetic resources, please complete the following table.

Species	Number of breeds for which material is stored	Number of breeds for which sufficient material is stored	Does the collection include material from not-at-risk breeds?	Have any extinct populations been reconstituted using material from the gene bank?	Have the gene bank collections been used to introduce genetic variability into an in situ population?	Have the gene bank collections been used to introduce genetic variability into an ex situ population?	Do livestock keepers or breeders' associations participate in the planning of the gene banking activities?
Cattle (specialized dairy)							
Cattle (specialized beef)							
Cattle (multipurpose)							
Sheep							
Goats							
Pigs							
Chickens							

25.1. Please provide further details of the activities recorded in the table (including any examples of the use of gene bank material to reconstitute populations or introduce genetic variability) and any other in vitro conservation activities or programmes being implemented in your country.

N/A

26. Does your country have plans to enter into collaboration with other countries to set up a regional or subregional in vitro gene bank for animal genetic resources?

- yes
- no

26.1. If yes, please describe the plans, including a list of the countries involved.

N/A

27. If there have been any cases in your country in which breeds that were formerly classified as at risk of extinction have recovered to a position in which they are no longer at risk, please list the breeds and describe how the recovery was achieved.

N/A

REPRODUCTIVE AND MOLECULAR BIOTECHNOLOGIES

28. Please indicate the level of availability of reproductive and molecular biotechnologies for use in livestock production in your country.

Note: low = at experimental level only; medium = available to livestock keepers in some locations or production systems; high = widely available to livestock keepers.

Species	Biotechnologies								
	Artificial insemination	Embryo transfer	Multiple ovulation and embryo transfer	Semen sexing	In vitro fertilization	Cloning	Genetic modification	Molecular genetic or genomic information	Transplantation of gonadal tissue
Cattle (specialized dairy)	low	none	none	none	none	none	none	low	none

28.1. Please provide additional information on the use of these biotechnologies in your country.

Artificial insemination is used on a small scale in peri-urban dairy systems on the Accra Plains. Frozen semen is imported from Europe or America and inseminated on local WASH and Sanga. The crossbred cattle so obtained are used for milk production.

Molecular genetic or genomic information is used on small scale for research purposes in universities and research institutions.

29. If the reproductive and/or molecular technologies are available for use by livestock keepers in your country, please indicate which stakeholders are involved in providing the respective services to the livestock keepers.

	Stakeholders					
	Public sector	Breeders' associations or cooperatives	National non-governmental organizations	Donors and development agencies	National commercial companies	External commercial companies
Artificial insemination	yes	no	no	no	no	no
Embryo transfer	no	no	no	no	no	no
Molecular genetic information	yes	no	no	no	no	no

29.1. Please provide additional information on the roles that the providers identified in the table play in the provision of biotechnology services in your country.

The government of Ghana through the Ministry of Food and Agriculture provides artificial insemination services to small scale dairy farmers in peri-urban systems. Universities and research institutes trying to catch up with the outside world find donors (mostly outside Ghana) to support them to conduct research in genetic biotechnology.

30. Please indicate which biotechnologies your country is undertaking research on.

Biotechnologies	Public or private research at national level	Research undertaken as part of international collaboration
Artificial insemination	yes	no
Embryo transfer or MOET	no	no
Semen sexing	no	no
<i>In vitro</i> fertilization	no	no
Cloning	no	no
Genetic modification	no	no
Use of molecular genetic or genomic information for estimation of genetic diversity	yes	yes
Use of molecular genetic or genomic information for prediction of breeding values	no	no
Research on adaptedness based on molecular genetic or genomic information	no	no

30.1. Please briefly describe the research.

Kyoto University in Japan is assisting the University of Ghana (Department of Animal Science) to conduct genetic diversities studies and develop genetic markers for grasscutters and guinea fowls.

31. Please estimate the extent to which artificial insemination (using semen from exotic and/or locally adapted breeds) and/or natural mating is used in your country's various production systems.

Note: low = approximately <33% of matings; medium = approximately 33–67% of matings; high = approximately >67% of mating; n/a = production system not present in this country.

Cattle (specialized dairy)	Ranching or similar grassland -based production systems	Pastoralist systems	Mixed farming systems (rural areas)	Industrial systems	Small-scale urban or peri-urban systems
Artificial insemination using semen from locally adapted breeds	none	none	none	none	none
Artificial insemination using nationally produced semen from exotic breeds	none	none	none	none	none
Artificial insemination using imported semen from exotic breeds	none	none	none	none	low
Natural mating	high	high	high	none	medium
Goats	Ranching or similar grassland -based production systems	Pastoralist systems	Mixed farming systems (rural areas)	Industrial systems	Small-scale urban or peri-urban systems
Artificial insemination using semen from locally adapted breeds	none	none	none	none	none
Artificial insemination using nationally produced semen from exotic breeds	none	none	none	none	none
Artificial insemination using imported semen from exotic breeds	none	none	none	none	low
Natural mating	high	high	high	none	high

Sheep	Ranching or similar grassland -based production systems	Pastoralist systems	Mixed farming systems (rural areas)	Industrial systems	Small-scale urban or peri-urban systems
Artificial insemination using semen from locally adapted breeds	none	none	none	none	none
Artificial insemination using nationally produced semen from exotic breeds	none	none	none	none	none
Artificial insemination using imported semen from exotic breeds	none	none	none	none	none
Natural mating	high	high	high	none	high
Pigs	Ranching or similar grassland -based production systems	Pastoralist systems	Mixed farming systems (rural areas)	Industrial systems	Small-scale urban or peri-urban systems
Artificial insemination using semen from locally adapted breeds	none	none	none	none	none
Artificial insemination using nationally produced semen from exotic breeds	none	none	none	none	none
Artificial insemination using imported semen from exotic breeds	none	none	none	none	none
Natural mating	high	high	high	none	high

32. Please provide further details on the use of reproductive and molecular biotechnologies in animal genetic resources management in your country. Please note any particular constraints to implementing these activities and any problems associated with their use. Please indicate what needs to be done to address these constraints and/or problems. You may also provide information on any particular successes achieved in your country in the use of biotechnologies in animal genetic resources management and on the factors that have contributed to these successes.

The use of reproductive and molecular biotechnologies is low in Ghana due to the following constraints:
1. Lack of technical know-how.

2. Production systems do not support use of technologies

3. Lack of financial support

Solutions:

1. Train more people in these areas

2. Intensify livestock production systems

3. Government and NGOs to provide funds.

III. DATA CONTRIBUTING TO THE PREPARATION OF *THE STATE OF THE WORLD'S BIODIVERSITY FOR FOOD AND AGRICULTURE*

INTEGRATION OF THE MANAGEMENT OF ANIMAL GENETIC RESOURCES WITH THE MANAGEMENT OF PLANT, FORESTRY AND AQUATIC GENETIC RESOURCES

1. Please indicate the extent to which the management of animal genetic resources in your country is integrated with the management of plant, forestry and aquatic genetic resources. Please describe the collaboration, including, if relevant, a description of the benefits gained by pursuing a collaborative approach.

	Extent of collaboration	Description
Development of joint national strategies or action plans	none	
Collaboration in the characterization, surveying or monitoring of genetic resources, production environments or ecosystems	none	
Collaboration related to genetic improvement	none	
Collaboration related to product development and/or marketing	none	
Collaboration in conservation strategies, programmes or projects	none	
Collaboration in awareness-raising on the roles and values of genetic resources	none	
Training activities and/or educational curricula that address genetic resources in an integrated manner	none	
Collaboration in the mobilization of resources for the management of genetic resources	none	

2. Please describe any other types of collaboration.

No efforts have been made to institute a collaboration.

3. If relevant, please describe the benefits that could be achieved by strengthening collaboration in the management of genetic resources in the animal, plant, forest and aquatic sectors in your country. If specific plans to increase collaboration are in place, please describe them and the benefits foreseen

N/A

4. Please describe any factors that facilitate or constrain collaborative approaches to the management of genetic resources in your country.

N/A

5. If there are constraints, please indicate what needs to be done to overcome them.

N/A

ANIMAL GENETIC RESOURCES MANAGEMENT AND THE PROVISION OF REGULATING AND SUPPORTING ECOSYSTEM SERVICES

6. Do your country's policies, plans or strategies for animal genetic resources management include measures specifically addressing the roles of livestock in the provision of regulating ecosystem services and/or supporting ecosystem services?

Regulating ecosystem services: "Benefits obtained from the regulation of ecosystem processes" – Millennium Ecosystem Assessment. 2005. Ecosystems and human well-being: synthesis. Washington D.C., Island Press (available at <http://millenniumassessment.org/documents/document.356.aspx.pdf>), page 40. Supporting ecosystem services: "Services necessary for the production of all other ecosystem services" – Millennium Ecosystem Assessment. 2005. Ecosystems and human well-being: synthesis. Washington D.C., Island Press (available at <http://millenniumassessment.org/documents/document.356.aspx.pdf>), page 40.

yes

no

6.1. If yes, please describe these measures and indicate which supporting and/or regulating ecosystem services are targeted, and in which production systems.

Examples of supporting and regulatory ecosystem services provided by livestock might include the following: provision or maintenance of wildlife habitats (e.g. via grazing); seed dispersal (e.g. in dung or on animals' coats); promoting plant growth (e.g. stimulating growth via grazing or browsing); soil formation (e.g. via the supply of manure); soil nutrient cycling (e.g. via supply of manure); soil quality regulation (e.g. affecting soil structure and water-holding capacity via trampling or dunging); control of weeds and invasive species (e.g. via grazing or browsing invasive plants); climate regulation (e.g. by promoting carbon sequestration through dunging); enhancing pollination levels (e.g. by creating habitats for pollinators); fire control (e.g. by removal of biomass that may fuel fires); avalanche control (e.g. grazing to keep vegetation short to reduce the probability that snow will slide); erosion regulation (e.g. indirect via fire control services); maintenance of water quality and quantity (e.g. indirect effect via erosion control); management of crop residues (e.g. consumption of unwanted crop residues by animals); pest regulation (e.g. by destruction of pests or pest habitats); disease regulation (e.g. by destruction of disease vectors or their habitats); buffering of water quantities – flood regulation (e.g. indirect effect via fire and erosion control).

N/A

6.1.1 Please describe what the outcome of these measures has been in terms of the supply of the respective ecosystem services (including an indication of the scale on which these outcomes have been obtained).

N/A

6.1.2 Please describe what the outcome of these measures has been in terms of the state of animal genetic resources and their management (including an indication of the scale on which these outcomes have been obtained).

N/A

7. Do your country's policies, plans or strategies for animal genetic resources management include measures specifically addressing environmental problems associated with livestock production?

Examples might include choosing to use particular species or breeds because they are less environmentally damaging in a given ecosystem or adapting breeding goals to produce animals that have some characteristic that makes them more environmentally friendly.

yes

no

7.1. If yes, please describe these measures and indicate the environmental problems that are targeted, and in which production systems.

7.1.1 Please describe what the outcome of these measures has been in terms of the reduction of the respective environmental problem (including an indication of the scale on which these outcomes have been obtained).

N/A

7.1.2 Please describe what the outcome of these measures has been in terms of the state of animal genetic resources and their management (including an indication of the scale on which these outcomes have been obtained).

N/A

8. Please describe any constraints or problems encountered or foreseen in the implementation of measures in your country aimed at promoting the provision of regulating and supporting ecosystem services or reducing environmental problems.

N/A

9. Please provide examples of cases in which the role of livestock or specific animal genetic resources is particularly important in the provision of regulating and/or supporting ecosystem services in your country. Please also describe any examples in which diverse animal genetic resources are important in terms of reducing the adverse environmental effects of livestock production.

N/A

10. Please describe the potential steps that could be taken in your country to further expand or strengthen positive links between animal genetic resources management and the provision of regulating and/or supporting ecosystem services or the reduction of environmental problems. If your country has specific plans to take further action in this field, please describe them.

N/A

11. Please provide any further information on the links between animal genetic resources management in your country and the provision of supporting and/or regulating ecosystem services and/or the reduction of environmental problems.

N/A

IV. PROGRESS REPORT ON THE IMPLEMENTATION OF THE *GLOBAL PLAN OF ACTION FOR ANIMAL GENETIC RESOURCES – 2007 TO 2013*

Note: Please provide further details in the text boxes below each question, including, if relevant, information on why no action has been taken.

STRATEGIC PRIORITY AREA 1: CHARACTERIZATION, INVENTORY AND MONITORING OF TRENDS AND ASSOCIATED RISKS

- The state of inventory and characterization of animal genetic resources
- The state of monitoring programmes and country-based early warning and response systems
- The state of international technical standards and protocols for characterization, inventory, and monitoring

1. Which of the following options best describes your country's progress in building an inventory of its animal genetic resources covering all livestock species of economic importance (SP 1, Action 1)?

Glossary: An inventory is a complete list of all the different breeds present in a country.

- a. Completed before the adoption of the GPA
- b. Completed after the adoption of the GPA
- c. Partially completed (further progress since the adoption of the GPA)
- d. Partially completed (no further progress since the adoption of the GPA)

Please provide further details:

Ghana had an inventory of its animal genetic resources before the adoption of the GPA as indicated in Ghana's first country report on AnGR.

2. Which of the following options best describes your country's progress in implementing phenotypic characterization studies covering morphology, performance, location, production environments and specific features in all livestock species of economic importance (SP 1, Actions 1 and 2)?

- a. Comprehensive studies were undertaken before the adoption of the GPA
- b. Sufficient information has been generated because of progress made since the adoption of the GPA
- c. Some information has been generated (further progress since the adoption of the GPA)
- d. Some information has been generated (no further progress since the adoption of the GPA)
- e. None, but action is planned and funding identified
- f. None, but action is planned and funding is sought
- g. None

Please provide further details:

Research on phenotypic characterization was on going before the adoption of the GPA. However, after adoption of the GPA, more work has been done on characterization including molecular characterization especially in poultry. More remains to be done to cover all species.

3. Which of the following options best describes your country's progress in molecular characterization of its animal genetic resources covering all livestock species of economic importance (SP 1)?

- a. Comprehensive studies were undertaken before the adoption of the GPA
- b. Sufficient information has been generated because of progress made since the adoption of the GPA
- c. Some information has been generated (further progress since the adoption of the GPA)
- d. Some information has been generated (no further progress since the adoption of the GPA)
- e. None, but action is planned and funding identified
- f. None, but action is planned and funding is sought
- g. None

Please provide further details:

Ghana needs more support and funding for molecular characterization of its AnGR. So far we have characterized only local chicken and guinea fowl at the molecular level. We need much more study on goat, sheep and cattle.

4. Has your country conducted a baseline survey of the population status of its animal genetic resources for all livestock species of economic importance (SP 1, Action 1)?

Glossary: A baseline provides a reference point for monitoring population trends. Population status refers to the total size of a national breed population (ideally, also the proportion that is actively used for breeding and the number of male and female breeding animals).

- a. Yes, a baseline survey was undertaken before the adoption of the GPA
- b. Yes, a baseline survey has been undertaken or has commenced after the adoption of the GPA
- c. Yes, a baseline survey has been undertaken for some species (coverage increased since the adoption of the GPA)
- d. Yes, a baseline survey has been undertaken for some species (coverage not increased since the adoption of the GPA)
- e. No, but action is planned and funding identified
- f. No, but action is planned and funding is sought
- g. No

Please provide further details:

The last time there was a survey was in 1986. Ghana is preparing for an agricultural census which will include AnGR.

5. Have institutional responsibilities for monitoring the status of animal genetic resources in your country been established (SP 1, Action 3)?

Glossary: Monitoring is a systematic set of activities undertaken to document changes in the population size and structure of animal genetic resources over time.

- a. Yes, responsibilities established before the adoption of the GPA
- b. Yes, responsibilities established after the adoption of the GPA
- c. No, but action is planned and funding identified
- d. No, but action is planned and funding is sought
- e. No

Please provide further details:

Some planning will be done by the consultative committee on AnGR.

6. Have protocols (details of schedules, objectives and methods) been established for a programme to monitor the status of animal genetic resources in your country (SP 2)?

- a. Yes, protocols established before the adoption of the GPA
- b. Yes, protocols established after the adoption of the GPA
- c. No, but action is planned and funding identified
- d. No, but action is planned and funding is sought
- e. No

Please provide further details:

N/A

7. Are the population status and trends of your country's animal genetic resources being monitored regularly for all livestock species of economic importance (SP 1, Action 2)?

- a. Yes, regular monitoring commenced before the adoption of the GPA
- b. Yes, regular monitoring commenced after the adoption of the GPA
- c. Yes, regular monitoring is being undertaken for some species (coverage increased since the adoption of the GPA)
- d. Yes, regular monitoring is being undertaken for some species (coverage not increased since the adoption of the GPA)
- e. No, but action is planned and funding identified

- f. No, but action is planned and funding is sought
- g. No

Please provide further details:

The Animal Production Directorate is responsible for ensuring accurate monitoring and reporting through its six breeding stations. Quarterly reports on population figures are sent to the national office which houses the National Focal Point and the reports are synthesized and appropriate recommendations made to Government.

8. Which criteria does your country use for assessing the risk status of its animal genetic resources (SP 1, Action 7)?

Glossary: FAO has developed criteria that it uses to allocate breeds to risk-status categories based on the size and structure of their populations (<http://www.fao.org/docrep/010/a1250e/a1250e00.htm>).

- a. FAO criteria
- b. National criteria that differ from the FAO criteria
- c. Other criteria (e.g. defined by international body such as European Union)
- d. None

Please provide further details. If applicable, please describe (or provide a link to a web site that describes) your national criteria or those of the respective international body:

Ghana will welcome support in this direction particularly from FAO and AU.

9. Has your country established an operational emergency response system (<http://www.fao.org/docrep/meeting/021/K3812e.pdf>) that provides for immediate action to safeguard breeds at risk in all important livestock species (SP 1, Action 7)?

- a. Yes, a comprehensive system was established before the adoption of the GPA
- b. Yes, a comprehensive system has been established since the adoption of the GPA
- c. For some species and breeds (coverage expanded since the adoption of the GPA)
- d. For some species and breeds (coverage not expanded since the adoption of the GPA)
- e. No, but action is planned and funding identified
- f. No, but action is planned and funding is sought
- g. No

Please provide further details:

N/A

10. Is your country conducting research to develop methods, technical standards or protocols for phenotypic or molecular characterization, or breed evaluation, valuation or comparison? (SP 2, Action 2)

- a. Yes, research commenced before the adoption of the GPA
- b. Yes, research commenced after the adoption of the GPA
- c. No, but action is planned and funding identified
- d. No, but action is planned and funding is sought
- e. No

Please provide further details:

This is being handled by the universities.

11. Has your country identified the major barriers and obstacles to enhancing its inventory, characterization and monitoring programmes?

- a. Yes
- b. No
- c. No major barriers and obstacles exist. Comprehensive inventory, characterization and monitoring programmes are in place.

Please provide further details. If barriers and obstacles have been identified, please list them:

Before the GPA, Ghana did not place much emphasis on inventory and monitoring. In addition, lack of funding to carry out inventory is also a barrier. There is also the need to have a protocol for the inventory which is yet to be established.

12. If applicable, please list and describe the measures that need to be taken to address these barriers and obstacles and to enhance your country's inventory, characterization and monitoring programmes:

The National Focal Point needs to be strengthened and the AnGR budgeted for by the Ministry. In addition, FAO should facilitate the training of APD staff to enable them to be equipped for the assignment.

13. Please provide further comments on your country's activities related to Strategic Priority Area 1: Characterization, inventory and monitoring of trends and associated risks (including regional and international cooperation)

Note: It is not necessary to duplicate information provided in previous sections. Where relevant, please provide cross-references.

Ghana is doing a lot of characterization on its AnGR particularly at the University level. However, we need to as a matter of agency carry out the survey of our ANGR to get accurate data on our animals for effective planning. Ghana also lacks the early warning system for monitoring AnGR which could be at risk.

STRATEGIC PRIORITY AREA 2: SUSTAINABLE USE AND DEVELOPMENT

- The state of national sustainable use policies for animal genetic resources
- The state of national species and breed development strategies and programmes
- The state of efforts to promote agro-ecosystem approaches

14. Does your country have adequate national policies in place to promote the sustainable use of animal genetic resources (see also questions 46 and 54)?

- a. Yes, since before the adoption of the GPA
- b. Yes, policies put in place or updated after the adoption of the GPA
- c. No, but action is planned and funding identified
- d. No, but action is planned and funding is sought
- e. No

Please provide further details. If available, please provide the text of the policies or a web link to the text:

Livestock Development, Policies and Strategies document had been prepared since 2004.

15. Do these policies address the integration of agro-ecosystem approaches into the management of animal genetic resources in your country (SP5) (see also questions 46 and 54)?

Glossary: The ecosystem approach is a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way (for further information see <http://www.cbd.int/ecosystem/description.shtml>).

- a. Yes
- b. No, but a policy update is planned and funding identified
- c. No, but action is planned and funding is sought
- d. No

Please provide further details:

These are well laid out in "Livestock Development in Ghana-Policies and Strategies" document of the Ministry of Food and Agriculture (May 2004).

16. Do breeding programmes exist in your country for all major species and breeds, and are these programmes regularly reviewed, and if necessary revised, with the aim of meeting foreseeable economic and social needs and market demands (SP4, Action 2)?

- a. Yes, since before the adoption of the GPA
- b. Yes, put in place after the adoption of the GPA
- c. For some species and breeds (coverage has increased since the adoption of the GPA)
- d. For some species and breeds (coverage has not increased since the adoption of the GPA)
- e. No, but action is planned and funding identified
- f. No, but action is planned and funding is sought
- g. No

Please provide further details:

There is still a lot of revision to be done for some species. The policies of some species are revised as and when we have programmes on them.

17. Is long-term sustainable use planning – including, if appropriate, strategic breeding programmes – in place for all major livestock species and breeds (SP4, Action 1)?

- a. Yes, since before the adoption of the GPA
- b. Yes, put in place after the adoption of the GPA
- c. For some species and breeds (further progress made since the adoption of the GPA)
- d. For some species and breeds (no further progress made since the adoption of the GPA)
- e. No, but action is planned and funding identified
- f. No, but action is planned and funding is sought
- g. No

Please provide further details:

The main breeding programmes are for Djallonke sheep, Ashanti Dwarf Pigs, West African Dwarf Goats, Sanga cattle, and the Ghana Shorthorn which are all kept on Government breeding farms but there is need to do more to transfer improved genetic material to livestock farmers.

18. Have the major barriers and obstacles to enhancing the sustainable use and development of animal genetic resources in your country been identified?

- a. Yes
- b. No
- c. No major barriers and obstacles exist. Comprehensive sustainable use and development measures are in place.

Please provide further details. If barriers and obstacles have been identified, please list them:

Lack of reliable statistics on AnGR; poor records keeping by farmers; non-functional breeding programmes when there is no project; lack of human resource, lack of funding for implementation.

19. Have the long-term impacts of the use of exotic breeds on locally adapted breeds (e.g. economic, environmental or genetic impacts) and on food security been assessed in your country (SP4, Action 1)?

Glossary:

Exotic breeds are breeds that are maintained in a different area from the one in which they were developed. Exotic breeds comprise both recently introduced breeds and continually imported breeds.

Locally adapted breeds are breeds that have been in the country for a sufficient time to be genetically adapted to one or more of traditional production systems or environments in the country. The phrase "sufficient time" refers to time present in one or more of the country's traditional production systems or environments. Taking cultural, social and genetic aspects into account, a period of 40 years and six generations of the respective species might be considered as a guiding value for "sufficient time", subject to specific national circumstances.

e. No but action is planned and funding is sought.

Please provide further details:

The National Consultative Committee will put up a proposal for this study.

20. Have recording systems and organizational structures for breeding programmes been established or strengthened (SP4, Action 3)?

- a. Yes, sufficient recording systems and organizational structures for breeding programmes have existed since before the adoption of the GPA
- b. Yes, sufficient recording systems and organizational structures for breeding programmes exist because of progress made since the adoption of the GPA
- c. Yes, recording systems and organizational structures for breeding programmes are partially in place (and were established or strengthened after the adoption of the GPA)
- d. Yes, recording systems and organizational structures for breeding programmes are partially in place (but no progress has been made since the adoption of the GPA)
- e. No, but action is planned and funding identified
- f. No, but action is planned and funding is sought
- g. No

Please provide further details:

N/A

21. Are mechanisms in place in your country to facilitate interactions among stakeholders, scientific disciplines and sectors as part of sustainable use development planning (SP5, Action 3)?

- a. Yes, comprehensive mechanisms have existed since before the adoption of the GPA
- b. Yes, comprehensive mechanisms exist because of progress made since the adoption of the GPA
- c. Yes, mechanisms are partially in place (and were established or strengthened after the adoption of the GPA)
- d. Yes, mechanisms are partially in place (but no progress has been made since the adoption of the GPA)
- e. No, but action is planned and funding identified
- f. No, but action is planned and funding is sought
- g. No

Please provide further details:

Livestock Sector planning involves all stakeholders.

22. Have measures been implemented in your country to provide farmers and livestock keepers with information that facilitates their access to animal genetic resources (SP 4, Action 7)?

- a. Yes, comprehensive measures have existed since before the adoption of the GPA
- b. Yes, comprehensive measures exist because of progress made since the adoption of the GPA
- c. Yes, measures partially implemented (and were established or strengthened after the adoption of the GPA)
- d. Yes, measures partially implemented (but no progress has been made since the adoption of the GPA)
- e. No, but action is planned and funding identified

- f. No, but action is planned and funding is sought
- g. No

Please provide further details:

Yes, extension delivery directs farmers to nucleus breeding centers.

23. Has your country developed a national policy or entered specific contractual agreements for access to and the equitable sharing of benefits resulting from the use and development of animal genetic resources and associated traditional knowledge (SP3, Action 2)?

- a. Yes, sufficient measures (policy and/or agreements) have been in place since before the adoption of the GPA
- b. Yes, sufficient measures (policy and/or agreements) are in place because of progress made since the adoption of the GPA
- c. Yes, some measures (policy and/or agreements) are in place (progress has been made since the adoption of the GPA)
- d. Yes, some measures (policy and/or agreements) are in place (but no progress has been made since the adoption of the GPA)
- e. No, but a policy and/or agreements are in preparation
- f. No, but a policy and/or agreements are planned
- g. No

Please provide further details:

Ghana is yet to work on access to benefit sharing.

24. Have training and technical support programmes for the breeding activities of livestock-keepers been established or strengthened in your country (SP 4, Action 1)?

- a. Yes, sufficient programmes have existed since before the adoption of the GPA
- b. Yes, sufficient programmes exist because of progress made since the adoption of the GPA
- c. Yes, some programmes exist (progress has been made since the adoption of the GPA)
- d. Yes, some programmes exist (but no progress has been made since the adoption of the GPA)
- e. No, but action is planned and funding identified
- f. No, but action is planned and funding is sought
- g. No

Please provide further details:

Capacity building for participating breeders was started but has not been continuous due to lack of resources.

25. Have priorities for future technical training and support programmes to enhance the use and development of animal genetic resources in your country been identified (SP 4, paragraph 42)?

- a. Yes, priorities have been identified or updated since the adoption of the GPA
- b. Yes, priorities were identified before the adaption of the GPA but have not been updated
- c. No, but action is planned and funding identified
- d. No, but action is planned and funding is sought
- e. No

Please provide further details:

N/A

26. Have efforts been made in your country to assess and support indigenous or local production systems and associated traditional knowledge and practices related to animal genetic resources (SP 6, Action 1, 2)?

- a. Yes, sufficient measures have been in place since before the adoption of the GPA
- b. Yes, sufficient measures are in place because of progress made since the adoption of the GPA
- c. Yes, some measures are in place (and were established or strengthened after the adoption of the GPA)
- d. Yes, some measures are in place (but no progress has been made since the adoption of the GPA)
- e. No, but action is planned and funding identified
- f. No, but action is planned and funding is sought
- g. No

Please provide further details:

N/A

27. Have efforts been made in your country to promote products derived from indigenous and local species and locally adapted breeds, and facilitate access to markets (SP 6, Action 2, 4)?

- a. Yes, sufficient measures have been in place since before the adoption of the GPA
- b. Yes, sufficient measures are in place because of progress made since the adoption of the GPA
- c. Yes, some measures are in place (and were established or strengthened after the adoption of the GPA)
- d. Yes, some measures are in place (but no progress has been made since the adoption of the GPA)
- e. No, but action is planned and funding identified
- f. No, but action is planned and funding is sought
- g. No

Please provide further details:

N/A

28. If applicable, please list and describe priority requirements for enhancing the sustainable use and development of animal genetic resources in your country:

1. Establish project around our locally adapted exotic animal genetic resource.
2. Train and motivate Agricultural Extension Agents
3. Source funding to be able to implement appropriate breeding programmes e.g. ONBS
4. Enhance local AnGR on the market through branding.
5. Encourage more youth to go into livestock farming.

29. Please provide further comments on your country's activities related to Strategic Priority Area 2: Sustainable Use and Development (including regional and international cooperation)

Note: It is not necessary to duplicate information provided in previous sections. Where relevant, please provide cross-references.

N/A

STRATEGIC PRIORITY AREA 3: CONSERVATION

- The state of national conservation policies
- The state of *in situ* and *ex situ* conservation programmes
- The state of regional and global long-term conservation strategies and agreement on technical standards for conservation

30. Does your country regularly assess factors leading to the erosion of its animal genetic resources (SP 7, Action 2)?

- a. Erosion not occurring
- b. Yes, regular assessments have been implemented since before the adoption of the GPA
- c. Yes, regular assessments have commenced since the adoption of the GPA
- d. No, but action is planned and funding identified
- e. No, but action is planned and funding is sought
- f. No

Please provide further details:

N/A

31. What factors or drivers are leading to the erosion of animal genetic resources? Please describe the factors specifying which breeds or species are affected:

No assessment has been made.

32. Does your country have conservation policies and programmes in place to protect locally adapted breeds at risk in all important livestock species (SP 7, SP 8 and SP 9)?

Glossary: Locally adapted breeds are breeds that have been in the country for a sufficient time to be genetically adapted to one or more of traditional production systems or environments in the country. The phrase "sufficient time" refers to time present in one or more of the country's traditional production systems or environments. Taking cultural, social and genetic aspects into account, a period of 40 years and six generations of the respective species might be considered as a guiding value for "sufficient time", subject to specific national circumstances.

- a. Country requires no policies and programmes because all locally adapted breeds are secure
- b. Yes, comprehensive policies and programmes have been in place since before the adoption of the GPA
- c. Yes, comprehensive policies and programmes exist because of progress made since the adoption of the GPA
- d. For some species and breeds (coverage expanded since the adoption of the GPA)
- e. For some species and breeds (coverage not expanded since the adoption of the GPA)
- f. No, but action is planned and funding identified
- g. No, but action is planned and funding is sought
- h. No

Please provide further details:

N/A

33. If conservation policies and programmes are in place, are they regularly evaluated or reviewed (SP 7, Action 1; SP 8, Action 1; and SP 9, Action 1)?

- a. Yes
- b. No, but action is planned and funding identified
- c. No, but action is planned and funding is sought

- d. No

Please provide further details:

N/A

34. Does your country have in situ conservation measures in place for locally adapted breeds at risk of extinction and to prevent breeds from becoming at risk (SP 8 and SP 9)?

Glossary: Locally adapted breeds are breeds that have been in the country for a sufficient time to be genetically adapted to one or more of traditional production systems or environments in the country. The phrase "sufficient time" refers to time present in one or more of the country's traditional production systems or environments. Taking cultural, social and genetic aspects into account, a period of 40 years and six generations of the respective species might be considered as a guiding value for "sufficient time", subject to specific national circumstances.

- a. Country requires no in situ conservation measures because all locally adapted breeds are secure
- b. Yes for all breeds
- c. For some breeds (coverage expanded since the adoption of the GPA)
- d. For some breeds (coverage not expanded since the adoption of the GPA)
- e. No, but action is planned and funding identified
- f. No, but action is planned and funding is sought
- g. No

Please provide further details:

The Animal Production Directorate through projects such as the National Livestock Services Project and the Livestock Development Project encourage livestock keepers to maintain their animals through provision of various extension packages. These included workshops on dry season farming, livestock marketing and the need to form breed association. These interventions were driven by the national livestock policy and were implemented before the adoption of the GPA.

35. Does your country have ex situ in vivo conservation measures in place for locally adapted breeds at risk of extinction and to prevent breeds from becoming at risk (SP 8 and SP 9)?

Glossary: Ex situ in vivo conservation - maintenance of live animal populations not kept under their normal management conditions - e.g. in zoological parks or governmental farms - and/or outside the area in which they evolved or are now normally found.

- a. Country requires no ex situ in vivo conservation measures because all locally adapted breeds are secure
- b. Yes for all breeds
- c. For some breeds (coverage expanded since the adoption of the GPA)
- d. For some breeds (coverage not expanded since the adoption of the GPA)
- e. No, but action is planned and funding identified
- f. No, but action is planned and funding is sought
- g. No

Please provide further details:

The Government of Ghana through the Animal Production Directorate has six(6) national breeding stations across the country. At these stations populations of cattle, sheep, goats, pigs, rabbits are kept. At the Amrahia Dairy Farm in the Greater Accra Region, local Sanga Cattle are kept and crossed with Fresian semen to produce Sanga-Freshian crosses which form the basis of a peri-urban dairy system. Farmers in the catchment area are supplied with some of the crossbred animals and supported to maintain on zero grazing. the objective is to help improve on milk production for the growing urban community. The Nungua Livestock Breeding Station, also in Accra maintains a nucleus herd of large white pigs and the offspring selected and sold to participating breeders. A herd of local Ashanti Black Forest Pigs are kept at Babile Station in the Upper East Region to improve on their meat characteristics . There is a sheep breeding station at Ejura in the Ashanti Region to supply good breeding stock to farmers. At Pong Tamale in the Northern Region, there are herds of cattle and small ruminants Sahelian Sheep and Goats. These are kept for teaching, research and also sale to farmers. In addition to these Government Farms, the University of Ghana, the University of Cape Coast and the Kwame Nkrumah University of Science and Technology also have livestock research stations where various AnGR are kept for teaching and research. The Animal Research Institute (ARI) of the Council for Scientific and Industrial Research

(CSIR) also have livestock farm in the southern and northern Ghana for research purposes. In recent times most of these institutional farms raise broilers for sale particularly during festive periods which is a commercial venture.

36. Does your country have ex situ in vitro conservation measures in place for locally adapted breeds at risk of extinction and to prevent breeds from becoming at risk (SP 8 and SP 9)?

Glossary: Ex situ in vitro - conservation, under cryogenic conditions including, inter alia, the cryoconservation of embryos, semen, oocytes, somatic cells or tissues having the potential to reconstitute live animals at a later date.

- a. Country requires no ex situ in vitro conservation measures because all locally adapted breeds are secure
- b. Yes for all breeds
- c. For some breeds (coverage expanded since the adoption of the GPA)
- d. For some breeds (coverage not expanded since the adoption of the GPA)
- e. No, but action is planned and funding identified
- f. No, but action is planned and funding is sought
- g. No

Please provide further details:

1. Lack of facilities for ex-situ in vitro conservation.
2. Absence of livestock census make it difficult to have accurate data for planning.
3. Lack of early warning and monitoring systems hampers our ability to determine which breeds are at risk.
4. Financial difficulties or limited budget makes it difficult to have stakeholder meetings and also educate the public on AnGR.
5. Lack of viable breed associations.
6. Low human resource capacity in AnGR conversation.

37. Please describe the measures (indicating for each whether they were introduced before or after the adoption of the GPA) or provide a web link to a published document that provides further information:

N/A

38. If your country has not established any conservation programmes, is this a future priority?

- a. Yes
- b. No

Please provide further details:

To prevent genetic erosion of locally adapted breeds.

39. Has your country identified the major barriers and obstacles to enhancing the conservation of its animal genetic resources?

- a. Country requires no conservation programmes because all animal genetic resources are secure
- b. Yes
- c. No
- d. No major barriers and obstacles exist. Comprehensive conservation programmes are in place

Please provide further details. If barriers and obstacles have been identified, please list them:

N/A

40. If your country has existing ex situ collections of animal genetic resources, are there major gaps in these collections (SP 9, Action 5)?

- a. Yes
- b. No

If yes, have priorities for filling the gaps been established?

- a. Yes
- b. No, but action is planned and funding identified
- c. No, but action is planned and funding is sought
- d. No

Please provide further details:

41. Are arrangements in place in your country to protect breeds and populations that are at risk from natural or human-induced disasters (SPA 3)?

- a. Yes, arrangements have been in place since before the adoption of the GPA
- b. Yes, arrangements put in place after the adoption of the GPA
- c. No, but action is planned and funding identified
- d. No, but action is planned and funding is sought
- e. No

Please provide further details:

42. Are arrangements in place in your country for extraction and use of conserved genetic material following loss of animal genetic resources (e.g. through disasters), including arrangements to enable restocking (SP 9, Action 3)?

- a. Yes, arrangements have been in place since before the adoption of the GPA
- b. Yes, arrangements put in place after the adoption of the GPA
- c. No, but action is planned and funding identified
- d. No, but action is planned and funding is sought
- e. No

Please provide further details:

43. Is your country conducting research to adapt existing, or develop new, methods and technologies for in situ and ex situ conservation of animal genetic resources (SP 11, Action 1)?

- a. Yes, research commenced before the adoption of the GPA
- b. Yes, research commenced since the adoption of the GPA
- c. No, but action is planned and funding identified
- d. No, but action is planned and funding is sought
- e. No

Please provide further details. If yes, please briefly describe the research:

44. Does your country implement programmes to promote documentation and dissemination of knowledge, technologies and best practices for conservation (SP 11, Action 2)?

- a. Yes, programmes commenced before the adoption of the GPA

- b. Yes, programmes commenced since the adoption of the GPA
- c. No, but action is planned and funding identified
- d. No, but action is planned and funding is sought
- e. No

Please provide further details:

45. What are your country's priority requirements for enhancing conservation measures for animal genetic resources? Please list and describe them:

1. Strengthening the livestock breeding stations and institutional livestock farms
2. Encouraging livestock farmers to form breeds associations
3. Carrying out a livestock census to determine breeds at risk
4. Collaborating with the Sub- Regional Focal Point on Animal Genetic Resource for West Africa and Central Africa to have a gene bank in the region where some genetic material can be stored.

46. Please provide further comments describing your country's activities related to Strategic Priority Area 3: Conservation (including regional and international cooperation)

Note: It is not necessary to duplicate information provided in previous sections. Where relevant, please provide cross-references.

1. Ghana maintains six livestock breeding stations where local animal genetic resources (Djallonke sheep, Ashanti Dwarf pigs, Sanga cattle, West African Dwarf Goats, Ghana Sanga cattle are being kept ex situ in vivo.
2. Ghana is collaborating with the Sub-regional Focal Point on Animal Genetic Resources for West and Central Africa to propose the establishment of a sub-regional gene bank for animal genetic resources
3. Ghana in collaboration with other animal breeders are collaborating to put up a proposal on conservation of the Djallonke sheep in West Africa. The proposal is ready and was prepared with support of ILRI-SLU and will be presented for funding this year.

STRATEGIC PRIORITY AREA 4: POLICIES, INSTITUTIONS AND CAPACITY-BUILDING IMPLEMENTATION AND FINANCING OF THE GLOBAL PLAN OF ACTION FOR ANIMAL GENETIC RESOURCES

- The state of national institutions for planning and implementing animal genetic resources measures
- The state of information sharing
- The state of educational and research facilities capacity for characterization, inventory, and monitoring, sustainable use, development, and conservation
- The state of awareness of the roles and values of animal genetic resources
- The state of policies and legal frameworks for animal genetic resources

47. Does your country have sufficient institutional capacity to support holistic planning of the livestock sector (SP 12, Action1)?

- a. Yes, sufficient capacity has been in place since before the adoption of the GPA
- b. Yes, sufficient capacity is in place because of progress made after the adoption of the GPA
- c. No, but action is planned and funding identified
- d. No, but action is planned and funding is sought
- e. No

Please provide further details:

Involvement of stakeholders

48. What is the current status of your country's national strategy and action plan for animal genetic resources (SP 20)?

Glossary: National strategy and action plan for animal genetic resources: a strategy and plan, agreed by stakeholders and preferably government-endorsed, that translates the internationally agreed Global Plan of Action for Animal Genetic Resources into national actions, with the aim of ensuring a strategic and comprehensive approach to the sustainable use, development and conservation of animal genetic resources for food and agriculture.

- a. Previously endorsed national strategy and action plan is being updated (or new version has been endorsed)
- b. Completed and government-endorsed
- c. Completed and agreed by stakeholders
- d. In preparation
- e. Preparation is planned and funding identified
- f. Future priority activity
- g. Not planned

Please provide further details. If available, please provide a copy of your country's national strategy and action plan as a separate document or as a web link:

The preparation of the NSAP was discussed at the consultative committee meeting and a proposal put together to solicit for funding for stakeholder consultation.

49. Are animal genetic resources addressed in your country's National Biodiversity Strategy and Action Plan (<http://www.cbd.int/nbsap/>)?

- a. Yes
- b. No, but they will be addressed in forthcoming plan
- c. No

Please provide further details:

N/A

50. Are animal genetic resources addressed in your country's national livestock sector strategy, plan or policy (or equivalent instrument)?

- a. Yes
- b. No, but they will be addressed in a forthcoming strategy, plan or policy
- c. No, animal genetic resources are not addressed
- d. No, the country does not have a national livestock sector strategy, plan or policy

Please provide further details. If available, please provide the text of the strategy, plan or policy or a web link to the text:

The policy addresses conservation and development of locally adapted breeds of all major livestock species. The importation of the breed of exotic cattle for dairy, and pigs and poultry for commercial production.

51. Has your country established or strengthened a national database for animal genetic resources (independent from DAD-IS) (SP 15, Action 4)?

- a. Yes, a national database has been in place since before the adoption of the GPA
- b. Yes, a national database is in place because of progress made since the adoption of the GPA
- c. Yes, a national database is in place but still requires strengthening (progress since adoption of the GPA)
- d. Yes, a national database is in place but still requires strengthening (no progress since adoption of the GPA)
- e. No, but action is planned and funding identified
- f. No, but action is planned and funding is sought

- g. No

Please provide further details:

National Agriculture census planned and is at preparation stage that will include AnGR.

52. Have your country's national data on animal genetic resources been regularly updated in DAD-IS?

Note that the Commission on Genetic Resources for Food and Agriculture has requested FAO to produce global status and trends reports every two years.

- a. Yes, regular updates have been occurring since before the adoption of the GPA
- b. Yes, regular updates started after the adoption of the GPA
- c. No, but it is a future priority
- d. No

Please provide further details:

Information is being gathered for update before the dosing date.

53. Has your country established a National Advisory Committee for Animal Genetic Resources (SP 12, Action 3)?

- a. Yes, established before the adoption of the GPA
- b. Yes, established after the adoption of the GPA
- c. No, but action is planned and funding identified
- d. No, but action is planned and funding is sought
- e. No

Please provide further details. If a National Advisory Committee has been established, please list its main functions:

Preparation of country report. Preparation of NSAP. Taking stock of GPA implementation.

54. Is there strong coordination and interaction between the National Focal Point and stakeholders involved with animal genetic resources, such as the breeding industry, livestock keepers, government agencies, research institutes and civil society organizations (SP 12, Action 3)?

- a. Yes, strong coordination has been in place since before the adoption of the GPA
- b. Yes, strong coordination was established after the adoption of the GPA
- c. No, but action is planned and funding identified
- d. No, but action is planned and funding is sought
- e. No

Please provide further details:

Policy discussions, information dissemination to action planning usually among stakeholders, NFP, research, livestock keepers etc.

55. Does the National Focal Point (or other institutions) undertake activities to increase public awareness of the roles and values of animal genetic resources (SP 18)?

- a. Yes, activities commenced before the adoption of the GPA
- b. Yes, activities commenced after the adoption of the GPA
- c. No, but activities are planned and funding identified
- d. No, but activities are planned and funding is sought

- e. No

Please provide further details:

The NFP through livestock officers on the field educate farmers, also on radio programmes but inadequate financial support limit those activities.

56. Does your country have national policies and legal frameworks for animal genetic resources management (SP 20)?

- a. Yes, comprehensive national policies and legal frameworks were in place before the adoption of the GPA and are kept up to date
- b. Yes, comprehensive and up-to-date national policies and legal frameworks in place because of progress made since the adoption of the GPA
- c. Yes, some national policies and legislation in place (strengthened since the adoption of the GPA)
- d. Yes, some national policies and legislation in place (not strengthened since the adoption of the GPA)
- e. No, but action is planned and funding identified
- f. No, but action is planned and funding is sought
- g. No

Please provide further details:

N/A

57. Which of the following options best describes the state of training and technology transfer programmes in your country related to inventory, characterization, monitoring, sustainable use, development and conservation of animal genetic resources (SP14, Action 1)?

- a. Comprehensive programmes have been in place since before the adoption of the GPA
- b. Comprehensive programmes exist because of progress made since the adoption of the GPA
- c. Some programmes exist (further progress since the adoption of the GPA)
- d. Some programmes (no further progress since the adoption of the GPA)
- e. None, but action is planned and funding identified
- f. None, but action is planned and funding is sought
- g. None

Please provide further details:

Programmes on characterisation and sustainable use.

58. Have organizations (including where relevant community-based organizations), networks and initiatives for sustainable use, breeding and conservation been established or strengthened (SP 14, Action 3)?

- a. Yes, comprehensive organizations, networks and initiatives have existed since before the adoption of the GPA
- b. Yes, comprehensive organizations, networks and initiatives exist because of progress made since the adoption of the GPA
- c. Yes, some organizations, networks and initiatives exist (established or strengthened since adoption of the GPA)
- d. Yes, some organizations, networks and initiatives exist (but no progress made since adoption of the GPA)
- e. No, but action is planned and funding identified
- f. No, but action is planned and funding is sought
- g. No

Please provide further details:

N/A

59. Are there any national NGOs active in your country in the fields of:

Characterization?

- a. Yes
- b. No

Sustainable use and development?

- c. Yes
- d. No

Conservation of breeds at risk?

- e. Yes
- f. No

If yes, please list the national NGOs and provide links to their web sites:

No NGOs involved in conservation, only Government is involved.

60. Has your country established or strengthened research or educational institutions in the field of animal genetic resources management (SP 13, Action 3)?

- a. Yes, adequate research and education institutions have existed since before the adoption of the GPA
- b. Yes, adequate research and education institutions exist because of progress made since the adoption of the GPA
- c. Yes, research and education institutions exist but still require strengthening (progress made since the adoption of the GPA)
- d. Yes, research and education institutions exist but still require strengthening (no progress made since the adoption of the GPA)
- e. No, but action is planned and funding identified
- f. No, but action is planned and funding is sought
- g. No

Please provide further details:

N/A

61. Please provide further comments describing your country's activities related to Strategic Priority Area 4: Policies, Institutions and Capacity-building (including regional and international cooperation)

Note: It is not necessary to duplicate information provided in previous sections. Where relevant, please provide cross-references.

Ghana needs a lot of support to improve on its human resource capacity. Currently very few Animal Breeders are available. The Department of Animal Science of the University of Ghana is leading a crusade to train more animal breeders. Already students are engaged in phenotypic and genetic characterisation of local AnGR but there is a need for equipment and collaboration with other institutions to enable students to get more exposure to some techniques in molecular characterisation. Our famers also need to be trained in record keeping and also the value of local AnGR. Ghana is an active member of the Sub-Regional Focal Point on AnGR for West Africa and Central Africa and we look forward to collaborating with the other countries to have regional projects. We will continue to look up to the donor community particularly FAO and the EU for support.

IMPLEMENTATION AND FINANCING OF THE GLOBAL PLAN OF ACTION FOR ANIMAL GENETIC RESOURCES

- The state of international collaboration for planning and implementing animal genetic resources measures
- The state of financial resources for the conservation, sustainable use and development of animal genetic resources

62. Has your country established or strengthened international collaboration in (SP 16):
Characterization?

- a. Yes
- b. No, but action is planned and funding identified
- c. No, but action is planned and funding is sought
- d. No

Sustainable use and development?

- e. Yes
- f. No, but action is planned and funding identified
- g. No, but action is planned and funding is sought
- h. No

Conservation of breeds at risk?

- i. Yes
- j. No, but action is planned and funding identified
- k. No, but action is planned and funding is sought
- l. No

Please provide further details:

Characterisation of local chickens was carried out in the sub regional DURAS project which involved Ghana, Cote d'Ivoire and Benin with the support of INRA in France . Currently students are being thought the principles of characterisation using the guidelines which have been developed by the FAO. Characterisation of grasscutter in collaboration with Japan. However, a lot still remains to be done.

63. Are there any international NGOs active in your country in the fields of:

Characterization?

- a. Yes
- b. No

Sustainable use and development?

- c. Yes
- d. No

Conservation of breeds at risk?

- e. Yes
- f. No

If yes, please list the international NGOs:

Heifer International

64. Has national funding for animal genetic resources programmes increased since the adoption of the GPA?

- a. Yes

- b. No

Please provide further details:

N/A

65. Has your country received external funding for implementation of the GPA?

- a. Yes
 b. No
 c. No, because country generally does not receive external funding

Please provide further details:

N/A

66. Has your country supported or participated in international research and education programmes assisting developing countries and countries with economies in transition to better manage animal genetic resources (SP 15 and 16)?

- a. Yes, support or participation in place before the adoption of the GPA and strengthened since
 b. Yes, support or participation in place before the adoption of the GPA but not strengthened since
 c. Yes, support or participation in place since the adoption of the GPA
 d. No, but action is planned and funding identified
 e. No, but action is planned and funding is sought
 f. No

Please provide further details:

N/A

67. Has your country supported or participated in programmes aimed at assisting developing countries and countries with economies in transition to obtain training and technologies and to build their information systems (SP 15 and 16)?

- a. Yes, support or participation commenced before the adoption of the GPA and strengthened since
 b. Yes, support or participation commenced before the adoption of the GPA but not strengthened since
 c. Yes, support or participation commenced since the adoption of the GPA
 d. No, but action is planned and funding identified
 e. No, but action is planned and funding is sought
 f. No

Please provide further details:

N/A

68. Has your country provided funding to other countries for implementation of the Global Plan of Action?

- a. Yes
 b. No, but action is planned and funding identified
 c. No, but action is planned and funding is sought
 d. No
 e. No, because country is generally not a donor country

Please provide further details. If relevant, specify whether funding was bilateral or multilateral; research cooperation or aid; and to whom and for what it was given:

N/A

69. Has your country contributed to international cooperative inventory, characterization and monitoring activities involving countries sharing transboundary breeds and similar production systems (SP 1, Action 5)?

- a. Yes
- b. No, but action is planned and funding identified
- c. No, but action is planned and funding is sought
- d. No

Please provide further details:

N/A

70. Has your country contributed to establishing or strengthening global or regional information systems or networks related to inventory, monitoring and characterization of animal genetic resources (SP 1, Action 6)?

- a. Yes
- b. No, but action is planned and funding identified
- c. No, but action is planned and funding is sought
- d. No

Please provide further details:

Ghana contributes information to DAD-IS.

71. Has your country contributed to the development of international technical standards and protocols for characterization, inventory and monitoring of animal genetic resources (SP2)?

- a. Yes
- b. No, but action is planned and funding identified
- c. No, but action is planned and funding is sought
- d. No

Please provide further details:

N/A

72. Has your country contributed to the development and implementation of regional in situ conservation programmes for breeds that are at risk (SP 8, Action 2; SP 10, Action 1)?

- a. Yes
- b. No, but action is planned and funding identified
- c. No, but action is planned and funding is sought
- d. No

Please provide further details:

N/A

73. Has your country contributed to the development and implementation of regional ex situ conservation programmes for breeds that are at risk (SP 9, Action 2; SP 10, Action 3; SP 10, Action 4)?

- a. Yes
- b. No, but action is planned and funding identified
- c. No, but action is planned and funding is sought
- d. No

Please provide further details:

N/A

74. Has your country contributed to the establishment of fair and equitable arrangements for the storage, access and use of genetic material stored in supra-national ex situ gene banks (SP9, Action 3)?

- a. Yes
- b. No, but action is planned and funding identified
- c. No, but action is planned and funding is sought
- d. No

Please provide further details:

N/A

75. Has your country participated in regional or international campaigns to raise awareness of the status of animal genetic resources (SP19)?

- a. Yes
- b. No, but action is planned and funding identified
- c. No, but action is planned and funding is sought
- d. No

Please provide further details:

--

76. Has your country participated in reviewing or developing international policies and regulatory frameworks relevant to animal genetic resources (SP 21)?

- a. Yes
- b. No, but action is planned and funding identified
- c. No, but action is planned and funding is sought
- d. No

Please provide further details:

N/A

EMERGING ISSUES

77. In view of the possibility that at some point countries may wish to update the GPA, please list any aspects of animal genetic resources management that are not addressed in the current GPA but will be important to address in the future (approximately the next ten years). Please also describe why these issues are important and indicate what needs to be done to address them.

Issues to be addressed in future

Issues to be addressed in future (next ten years)	Reasons	Actions required
---	---------	------------------

Submit by Email