منظمة الأغذية والزراعة للأمم المتحدة | 联合国粮食及农业组织 | Food and Agriculture Organization of the United Nations | Organisation des Nations Unies pour l'alimentation et l'agriculture | Продовольственная и сельскохозяйственная организация Объединенных Наций | Organización de las Naciones Unidas para la Alimentación y la Agricultura

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: Oman

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).

Oman is endowed with its rich biodiversity as it has not only diversified traditional agriculture involving almost all types of animal and crop species but also vast rangelands especially in Dhofar having various pasture species. In Oman there are approximately 47 species of terrestrial mammals and around 10 domesticated species. Under the leadership of His Majesty Sultan Qaboos, Oman is well aware of the importance of its own animal genetic resources and hence attained the status of constituent member of the Global Plan of Action for food and agriculture through the Royal Decree 10/97 in 1997. Further, Oman has leaped forward to take steps of conservation of its animal genetic resources either individually or globally in collaboration with international organizations/ institutes. It has signed several agreements and passed Royal Decrees and Regulations related to the protection and conservation of both plant and animal genetic resources. In respect of animal genetic resources, there are various activities in the Sultanate, which related to conservation and utilization of large and small ruminants like camels, cattle, sheep and goats, and poultry birds. In the Ministry of Agriculture & Fisheries, four Livestock Research Centers/ Stations located in Rumais, Wadi Quriyat, Jabal Akhdar and Salalah have been established with objectives to conserve indigenous species. There exists large scope to look ahead the country's rich animal genetic resources in retrospect towards conserving and enhancing their status for better utilization in diversifying the national economy in respect of country's food security and sustainable development. Presently, the intensive efforts are going on as per the Orders of His Majesty to establish Animal & Plant Genetic Resources Center in the Sultanate under the umbrella of The Research Council. It will have mission to promote the recognition, sustainable exploitation and valuation of the genetic diversity inherent in Oman's animals, plants and microorganisms as a natural heritage resources and goal to have Oman's collaborative organization for advancing sustainable use of animal and plant genetic resources through education, research and innovation and vision to enable APGRC to develop as a collaborative hub for all animal and plant genetic resources activities in the coming decades. It will promote the sustainable use of knowledge across economic sectors and social segments and create value from world-class research and practical innovation. This national collaborative effort will be open to the world of international science and have a specific concern for building a recognized local capacity in the field of genetic resources.

During the five-year strategic plan (2010-2015) for agriculture and livestock research, the ministry of agriculture and

fisheries conducted many regional and national programs to develop and guarantee the sustainable use of the animal genetic resources in Oman. Oman government supports a number of international agreements to encourage the Conservation and sustainable use of AnGR. Significant progress has been made by MECA to strengthen action in relation to biodiversity, including through the Convention on Biological Diversity (CBD). The ministry of agriculture and fisheries (MAF) do many efforts to conserve and maintain the local breeds in different livestock species with collaboration with the ministry of environment and climatic affairs and the royal court affairs. MAF is supervising the existing protected areas in Dhofar and monitoring these areas to develop, maintain and conserve the breeds. It has determined the breeds, which are in dangers. Only Dhofari sheep and local poultry breeds in Dhofar are defined as breeds at risk. There are challenges in animal genetic resources management in particular to increase the awareness for the farmers and children. In addition, there is a need to increase the training and capacity building. The government contributes greatly to develop the infrastructure and capacity building through the university graduation and missions sent abroad. The government contributes to the extension and supporting farmer services to improve the technical level for them. The ministry of education started last year to include some syllabuses related to understanding of AnGR for students at the primary schools. The future vision of the State of AnGR addresses the following:

- Initiate the genetic characterization at the molecular level for all local breeds which is already finished at the phenotypic level i.e. cattle and sheep.
- Registration for the local Omani breeds to preserve the property rights.
- Activate of the existing coordination between the researchers and farmers.
- Initiate a comprehensive approach that regulates the work between conservation and utilization of animal genetic resources.
- Provide the requirements of manpower and financial resources needed for the maintenance of AnGR.
- Establish the database for farm animal genetic diversity.
- Conduct more research work on breed evaluation and preparation of a national applied research program on livestock and improving the efficiency and spread of extension services.
- Enhance the cooperation between the Sultanate and the neighbouring gulf countries in the basic and applied research like breeding and improvement of local breeds of poultry, sheep, goats and camels; developing and transferring appropriate biotechnologies and establishing joint projects between them.
- Promoting collaboration between the Sultanate and countries of Gulf Cooperation Council in developing information systems and communication networks, in addition to control epidemic diseases through a joint strategy to control animal movement involving other concerned countries.

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.

The pattern of gene flow in Oman did not affect by the other neighbor countries. However, one of the most famous goat breed (Jabal Akhdar) may affect the gene flow in UAE as many breeders came to Oman and by the best animals for this breed and take it with them to Emarates. Also, for the south cattle breed there is a thought that it may have some genes from Yemen.

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).

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.

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.

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	medium	• Establish more nucleus herd/flock i.e Aljabal AlAkhdar goat breed • More protected areas
Changing demand for livestock products (quality)	medium	medium	Some research work have been done on carcass quality esp. for camel and goat meet.
Changes in marketing infrastructure and access	medium	medium	

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 retailing	low	low	
Changes in international trade in animal products (imports)	medium	medium	Increase imported live animals, products and carcass.
Changes in international trade in animal products (exports)	low	low	Some local goat breed are moved to other gulf countries.
Climatic changes	low	low	
Degradation or improvement of grazing land	low	low	Increasing in rainfall reflecting increase the grazing land. No degradation.
Loss of, or loss of access to, grazing land and other natural resources	low	low	Rainfall increased during the last 5 years so, the greasing areas increased and no loss occur.
Economic, livelihood or lifestyle factors affecting the popularity of livestock keeping	low	low	The popularity of livestock keeping does not change too much but some farmers interpreted to breed a pure animals such as specific goat breed (Aljabal AlAkhdar) because its high demand from other gulf countrie.
Replacement of livestock functions	none	none	
Changing cultural roles of livestock	medium	medium	There are many campaign to increase the concept and understanding the AnGR between the farmers family.
Changes in technology	low	low	Private sector in livestock products is very limited in Oman most of the produces are imported for gulf countries.
Policy factors	medium	medium	Issuing new regulations and legislation to organize coming and outing of life animals through borders.
Disease epidemics	low	low	The Veterinary Research Center conducting an animal disease mapping for Zoonotic and Communicable Animal Diseases. Which covered a viral (rabies), bacterial (brucellosis & Johne's disease) and a parasitic (Echinococcosis) disease in the livestock of the Sultanate. Geographic information system (GIS) based disease mapping system was developed based on 1. retrospective analysis / passive surveillance (animal rabies), 2. a cross-sectional serological study (brucellosis & Johne's disease), 3. an abattoir based cross-sectional study and cross-sectional serological study (Echinococcosis).

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)	0	0
Cattle (specialized beef)	0	0
Cattle (multipurpose)	2	1
Sheep	2	1
Goats	6	0
Pigs	0	0
Chickens	1	2
Dromedaries	1	0

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	none	none	none	none	none	none
Cattle (specialized beef)	0	0	none	none	none	none	none	none
Cattle (multipurpose)	2	1	high	low	low	low	medium	none
Sheep	2	1	high	none	low	none	medium	none

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
Goats	6	4	high	medium	low	low	medium	low
Pigs	0	0	none	none	none	none	none	none
Chickens	1	1	high	medium	none	low	none	medium
Dromedaries	1	1	low	none	low	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	medium
Awareness	low
Infrastructure	low
Stakeholder participation	low
Policies	medium
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	The ministry of education started last year to include some syllabuses related to understanding of AnGR for students at the primary schools.
Research	Lots of research work is on going for improving AnGR.
Knowledge	The information available for AnGR need to be complete, still some breeds need to be characterized especially at the molecular level.
Awareness	There is a need to increase the awareness of understanding the AnGR for the animals owners.
Infrastructure	More nucleus herd/flock and protected areas need to be established to increase the on-farm conservation.
Stakeholder participation	• No breed associations or societies for livestock exist. • It is important to organize the participation for the stakeholder with the researchers.
Policies	Lots of declarations and decision have been taken to regulate the coming and outing of animals form the gulf countries but the implementation is too low.
Policy implementation	There are low monitoring for implementations of the polices decision.
Laws	There are enough laws issued.
Implementation of laws	The implementation of laws need to be monitoring to be sure that the laws are applicable.

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).

- The government contributes greatly to develop the infrastructure and capacity building through the university graduation and missions sent abroad. The government contributes to the extension and supporting farmer services to improve the technical level for them.
- The governments did registration for the local Omani breeds to preserve the property rights and initiated the existing coordination between the researchers and farmers.

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)	no	no	no	no	no	no	no
Cattle (specialized beef)	no	no	no	no	no	no	no
Cattle (multipurpose)	yes	yes	no	no	no	no	no
Sheep	yes	yes	no	no	no	no	no
Goats	yes	yes	no	no	no	no	no
Pigs	no	no	no	no	no	no	no
Chickens	yes	no	no	no	no	no	no
Dromedaries	yes	yes	no	no	no	no	no

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

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 (multipurpose)	2	0	2	0	0	0	0	0	1	0	0	0	0	0	2	1
Sheep	2	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0
Goats	6	0	5	0	0	0	0	0	5	0	5	0	5	0	0	0
Dromedaries	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Chickens	1	2	1	2	1	0	1	0	1	0	1	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 (multipurpose)	2	0	0	0
Sheep	2	0	0	0
Goats	6	0	0	0
Dromedaries	1	0	0	0
Chickens	1	0	0	0

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

Species	Training	Research
Cattle (specialized dairy)	none	none
Cattle (specialized beef)	none	none
Cattle (multipurpose)	low	medium
Sheep	low	medium
Goats	low	medium
Pigs	none	none
Chickens	none	low

Species	Training	Research
Dromedaries	none	none

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)	none
Cattle (specialized beef)	none
Cattle (multipurpose)	low
Sheep	low
Goats	low
Pigs	none
Chickens	none
Dromedaries	none

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.

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

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

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.

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)	no
Cattle (specialized beef)	no
Cattle (multipurpose)	yes
Sheep	yes
Goats	yes
Pigs	no
Chickens	yes
Dromedaries	no

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)	
Cattle (specialized beef)	
Cattle (multipurpose)	• Genetic improvement for local farm animal breeds started in the 1990's with the aim of conserving the indigenous breeds by conducting genetic improvement using a clear selection programs of the productive and reproductive traits especially milk and meat production. • The first goal for this program is to increase the genetic potential for Omani local breeds with respect to milk, meat and other reproductive traits. • The artificial insemination research lab provides high quality semen produced from local improved bulls, for using in artificial insemination at the breeders in different governorates of the Sultanate. This is useful in accelerating the processes of genetic improvement by reducing the generation interval as well as the possibility of testing bulls by doing the progeny test.
Sheep	The ministry of agriculture and fisheries distributes every year a large numbers of improved Rams to the farmers to do genetic improvement for their flock and monitor the performance of these distributed animals on farm.
Goats	The ministry of agriculture and fisheries distributes every year a large numbers of improved Bucks to the farmers to do genetic improvement for their herds and monitor the performance of these distributed animals on farm.
Pigs	
Chickens	MAF distribute local chicken to the farmers in the south part of Oman.

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)	
Cattle (specialized beef)	
Cattle (multipurpose)	The breeding policies apply only for the experimental herds/flocks and it is need to establish breed association to participate with the stakeholders to utilize a breeding programmes.
Sheep	Distributing an improved rams to the farmers and breeders help them to increase the productivity of their animals.
Goats	Same like sheep as the dissemination of the improved bucks to the farmers resulting in increasing the twining rate for the goats owners.
Pigs	
Chickens	

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.

Main constraints to the implementation of breeding programme are:

- Lack of awareness of the importance of AnGR.
- No recording system at the farmers herd/flocks.
- Gap between the research and extension.

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)	
Cattle (specialized beef)	
Cattle (multipurpose)	• Initiate the genetic characterization at the molecular level for all local breeds which is already finished at the phenotypic level. • Establish the database for farm animal genetic diversity.
Sheep	• Conducting a national recording system for the breeds owned by the farmers • Test the performance of the small ruminant at the breeders and compare it with research station results
Goats	• Apply the AI service for goats to use the improved prolific males to inseminate the animals at the farmers to increase the twining rate. • Establish a breed society or association to apply the selection programs at the breeder's animal.
Pigs	
Chickens	

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)	none	none	none
Cattle (specialized beef)	none	none	none
Cattle (multipurpose)	high	none	medium
Sheep	high	none	none
Goats	high	none	none
Pigs	none	none	none
Chickens	medium	none	none

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	yes
Genetic uniqueness	yes
Genetic variation within the breed	yes
Production traits	yes
Non-production traits	no
Cultural or historical importance	no
Probability of success	no

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	yes	yes	yes	yes	no	yes	yes	yes	yes	no	yes	yes
Private sector	no	no	no	no	no	no	no	no	no	no	no	no
Cattle (specialized dairy)	no	no	no	no	no	no	no	no	no	no	no	no
Cattle (specialized beef)	no	no	no	no	no	no	no	no	no	no	no	no
Cattle (multipurpose)	yes	yes	no	no	yes	yes	yes	no	no	yes	no	no
Sheep	no	yes	no	no	yes	yes	yes	no	no	no	yes	yes
Goats	no	yes	no	no	yes	yes	yes	no	no	yes	yes	no
Pigs	no	no	no	no	no	no	no	no	no	no	no	no
Chickens	no	no	no	no	yes	yes	yes	no	no	no	yes	yes

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.

- Establishing more nucleolus herd/flock for indigenous breeds.
- Exchange animals (males) between research station and farmers.
- Applying AI tools for farmers cow using local improved males.

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.

- MAF started a program in 2010 to conserve AnGR *Ex Situ* by establishing an international artificial insemination laboratory at Livestock Research Center with the aim of collecting and preservation of semen produced from local improved bulls in order to maintain. Now it became a national gene bank for cryoconservation of sperms, ova and embryos.

- It preserve sperms only at present and by the end of year 2014, Ova and Embryos also will be preserved.

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	yes
Embryos	no
Oocytes	no
Somatic cells (tissue or cultured cells)	no
Isolated DNA	yes

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)	0	0	no	no	no	no	no
Cattle (specialized beef)	0	0	no	no	no	no	no
Cattle (multipurpose)	2	2	yes	no	yes	no	no
Sheep	0	0	no	no	no	no	no
Goats	0	0	no	no	no	no	no
Pigs	0	0	no	no	no	no	no
Chickens	0	0	no	no	no	no	no
Dromedaries	0	0	no	no	no	no	no

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.

We use semen collected from improved local bulls to perverse it at the gene bank in order to use it later to inseminate the local cows at the farmers to improve their milk and meat traits.

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.

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.

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.

	Biotechnologies								
Species	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 (multipurpose)	medium	none	none	low	none	none	none	low	none
Sheep	none	none	none	none	none	none	none	none	none
Goats	none	none	none	none	none	none	none	low	none
Chickens	none	none	none	none	none	none	none	low	none

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

Using biotechnologies are applied only at the experimental research work for cow, goat and chicken.

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	yes	no	no
Embryo transfer	no	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.

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	yes	no
In vitro fertilization	no	no
Cloning	no	no
Genetic modification	no	no
Use of molecular genetic or genomic information for estimation of genetic diversity	yes	no
Use of molecular genetic or genomic information for prediction of breeding values	yes	no
Research on adaptedness based on molecular genetic or genomic information	yes	no

30.1. Please briefly describe the research.

- Biotechnologies in Oman is focused to know the relationship between the small ruminant breed in particular goat breed.
- Genetic characterization study of indigenous goat populations of Oman using microsatellite DNA markers was done to know the relationship between the local goat breeds in all governorates in Oman.
- In this study, a total of 23 SSR markers were used across 16 Omani goat breeds for their characterization and discrimination. The total number of alleles found was 743. The number of alleles per locus ranged from 12 alleles (ETH10) to 58 alleles (BM6444), with an average of 32.3 alleles across 23 loci obtained in the study. The

polymorphic information content values ranged from 0.593 for MAF209 to 0.949 for BM6444 with an average mean 0.839 over all the markers. BM6444 was found the best marker for the identification of 16 genotypes as revealed by PIC values. The pair-wise genetic dissimilarity co-efficient indicated that the highest genetic distance (0.586) was between Musandem (MU) and Dhofari breeds (DO) while the smallest genetic distance (0.220) was observed between Al Sharqiyah (JSQ) and Al dakhliya (DK). The microsatellite marker based molecular fingerprinting could serve as a sound basis in the identification of genetically distant breeds as well as in the duplicate sorting of the morphologically close breeds. This study is the first one to investigate the genetic diversity in Omani goat breeds using molecular techniques. The information obtained from this study will provide a useful genetic background for conserving and utilizing native goat breeds in the sultanate of Oman. The study indicates significant genetic diversity among Omani goat breeds. There was a close relationship between Jabali Al Sharqiyah and Al Jabal Al Akhdar goat breeds however; there was a wide genetic distance between Sahrawi Musandem and Dhofari goat breeds.

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 (multipurpose)	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	low	none	low	none	low
Artificial insemination using nationally produced semen from exotic breeds	low	none	low	low	low
Artificial insemination using imported semen from exotic breeds	low	none	low	low	low
Natural mating	high	high	high	high	medium

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.

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

2. Please describe any other types of 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

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

- Lack of people awareness on the important of AnGR.
- Increase the workshops and seminars that produce the meaning of AnGR and how can we conserve it.
- Conducting on-field meeting with the animal owners.

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

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).

- There are some efforts to regulate the greasing system in the south part of Oman
- There is a gene bank for seeds responsible for collecting the seeds from different part of Oman
- Oman started last year to use the Wastewater after treatments to use it if the planting the animal green fodder.
- Some concentrate factories are established to use by-products from agriculture and manufactories to exploiting the natural local resources

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).

The outcomes are increasing the space for greasing in the south, increase the green fodder to feed animals, reduce the amount of imported materials used in the concentrate feeding.

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).

In the south part of Oman, most of the animals are raised outdoor. The are greasing all the day and come back by the sunset. More than 60% of the cattle and camels are kept in the south so, organizing and regulating the ecosystem affect positively with the conservation of AnGR.

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).

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).

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.

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.

Benefits from regulating ecosystem processes e.g. disease control (disease map for epidemic disease in Oman). We do not have examples or information about this question.

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.

Support Services
Services necessary for the production of all other ecosystem services such as soil formation, nutrient cycling and primary production.

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.

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:

- 80 % of all livestock species is covered.
- still more work need to be done in all Camels types/breed.

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:

Cattle, sheep and goats are well characterized in all arias (morphology, performance, location, production environments) only camels not complete.

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:

Molecular characterization done for only goat and chicken breeds but nothing for sheep.
Some work started in local cattle but still on going.

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:

A questionnaire is prepared to cover all Oman to do characterization for camel breed and to start work also at the molecular level.

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:

The research council in Oman established an animal and plant genetic resource center to be the main center responsible for monitoring the status of animal genetic resources with collaboration with the ministry of agriculture (MAF) and fisheries and ministry of environments and climate faeries (MECA).

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:

The Oman animal and plant genetic resource center is newly established and still in the first step, it has fund but still not start work yet.

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:

There is an agriculture census every 10 years conducted by ministry of agriculture and fisheries and other one every 5 years by ministry of environment for monitoring the population status and trends for animal genetic resources.

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:

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:

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:

- some protocols are conducted to evaluate the local goat and cattle breeds.
- recently a method is developed to characterize the chicken breed at the molecular level.

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:

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:

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.

- The MECA is finalizing the second biodiversity strategy for 2020, which aims to halt the loss of biodiversity and ecosystem services with good collocation with MAF, and high supports of the Convention on Biological Diversity (CBD) commitments made in Nagoya in 2010. In particular, Action 10 of the Strategy.
- The existing breeding program has pedigree registration and accurate recording systems.
- MAF is supervising the existing protected areas in Dhofar and monitoring these areas to develop, maintain and conserve the breeds. It has determined the breeds, which are in dangers. Only Dhofari sheep and local poultry breeds in Dhofar are defined as breeds 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:

In 2012, His Majesty Sultan Qaboos issued a royal decree to establish Oman animal and plant genetic resources center (OAPGRC). An impressive amount of efforts has been in establishing an Animal and Plant Genetic Resources Center.
The aims OAPGRC are:

- Establishing a nucleus herds and flock for the breeds which defined to be at risk
- Create a comprehensive gene bank database in Oman and connected it with other gulf countries.
- Conserve animal and plant genetic resources using in-situ and ex-situ conservation.
- OAPGRC is proposing to start a big campaign mainly aiming to establish a platform for mutual learning and

dissemination of knowledge for understanding the concept of the genetic resources by strengthening the dialogue between scientists and the community.
- Educate and raise awareness on genetic resources to non-experts and professionals.
- Participating with other related organizations to implement the action plan that includes taking forward work on the conservation, characterization and sustainable use of animal and plant genetic resources in Oman.

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:

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:

The breeding programs are exist and reviewed regularly for cattle, sheep, goat and poultry BUT not for other species. it could be summarized the existing breeding programs as :
Genetic improvement for local farm animal breeds started in the 1990's with the aim of conserving the indigenous breeds by conducting genetic improvement using a clear selection programs of the productive and reproductive traits especially milk and meat production. The selection program for improving indigenous cattle, sheep and goats breeds is a long-term program. The first goal for this program is to increase the genetic potential for Omani local breeds with respect to milk, meat and other reproductive traits. The objectives of the breeding program are to
1) Determine the genetic potential of the indigenous breeds and identify molecular markers linked to quantitative traits loci (QTL) for production traits using molecular techniques.
2) Perform the progeny test for the improved males.
3) To have a sufficient and efficient database with full pedigree information.
The ministry of agriculture and fisheries distributes every year a large numbers of improved males to the farmers to do genetic improvement for their herds/flock and monitor the performance of these distributed animals on farm.

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:

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:

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.

f. No

Please provide further details:

There were a trial for crossing the local cow, sheep and goats with exotic breeds but it failed and ended since 2004.

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:

Recording system is existing ONLY at research stations with total number for all species around 5000 head.

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:

Still there are some gaps between the stakeholders and the researchers, but there is a thought to establish a farmers societies in different governorate in Oman.

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:

The OAPGRC started a gig campaign to increase the awareness of AnGR by making an on-farm days and science café.

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:

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:

The extension department at MAF has an intensive training programs in a project for the sons of the breed owner to train them for the new technology and tools regarding to feeding system and breeding programs.

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:

It is identified and the action will take by the OAPGRC.

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:

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:

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

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.

The MAF has a separate program in its 5 years strategic plan with theme: Conservation of indigenous genetic resources for sustainability.

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:

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:

North local sheep is affected by some factors, it called Dhofari sheep and there were no information available for that breed at the first report for AnGR in Oman. In 2013, a selected pure animal was collected from the farmers to establish a nucleus herd and the breeding program was adapted to the herd in order to improve the target productive and reproductive traits.
The numbers of the breed is very low and no improving done for it because it is owned by few farmers in small heads, it raised under medium -input production system and used for milk and meat production.

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:

Still the camels breed not identified in a proper way. and the local chicken population is low and at risk, and the clear plan not set yet to conserve the breed.

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:

MAF and OAPGRC set up a plan to evaluate the conservation programmes regularly and the project fund is under estimating.

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:

We have *in situ* conservation for sheep and cattle breeds and some goat breeds. only at the research stations in different parts of Oman.

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:

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:

MAF started a program in 2010 to conserve AnGR Ex Situ by establishing an international artificial insemination laboratory at Livestock Research Center with the aim of collecting and preservation of semen produced from local improved bulls in order to maintain. Shortly, this lab will be a national gene bank for cryoconservation of sperms, ova and embryos.

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:

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

- ○ a. Yes
- ○ b. No

Please provide further details:

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:

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:

For local south sheep, in year 2014 to conserve the Dhofari sheep breed (South local sheep) which is at risk. A selected nucleus flock was established at its native place to conserve the breed and do apply an intensive breeding program to improve productive and reproductive traits. But for local chicken still no action made.

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:

Yes, one of the objectives for MAF and OAPGRC is to set up a national conservation program.

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

1. Establish a breed society or associations.
2. Conducting a national recording system for the breeds.
3. Increase the awareness of AnGR to the farmers.

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.

MAF distributes every year a large numbers of improved males (local sheep and goats breeds) to the farmers in all parts of Oman to do genetic improvement for their herds/flock and monitor the performance of these distributed animals on farm.

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:

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:

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:

The ministry of environment and climate affairs (MECA) is finalizing the second biodiversity strategy for 2020, which aims to halt the loss of biodiversity and ecosystem services with good collocation with MAF, and high supports of the Convention on Biological Diversity (CBD) commitments made in Nagoya in 2010. In particular, Action 10 of the Strategy.

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:

A present, MAF with collaboration with FAO is preparing a national strategy for Agriculture and livestock sector in Oman.

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:

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:

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:

Very recently, the research council in Oman established a scientific committee for AnGR under the supervision of OAPGRC.

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:

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 OAPGRC started this activity with supporting from MAF.

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:

The government, in more than anything else, enacts legislation and issues the regulations related to the development and maintenance of AnGR. Several legislations and regulations have been issued since the past 10 years that deal with conservation and utilization of AnGR. Most of them were issued in the form of royal decrees addressing specific issues as follows:

- The Royal Decree No. 119/1994 on approving to join Oman in the biodiversity agreement,
- The Royal Decree No. 43/1996 concerning the law on the veterinary business and opening the private veterinary clinics,
- The Royal Decree No. 114/2001 concerning the law on conservation of the environment and prevention of pollution,
- The Royal Decree No. 6/2003 related to the law on natural reserves and wildlife conservation,
- The Royal Decree No. 8/2003 on the law of rangelands and animal wealth management,
- The Royal Decree No. 45/2004 on the law ok veterinary quarantine,
- The Royal Decree No. 48/2004 on setting up the agriculture and fisheries developmental funds,
- The Royal Decree No. 48/2006 on law of agriculture.

The implementation of these lows and regulations need to be monitored effectively to have positive impact on the utilization and conservation animal genetic resources and to take advantage of opportunities that arise with them.

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:

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:

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:

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:

Research work on the field of AnGR is exist but not enough and the institutions is established but still in the processing stage (OAPGRC).

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.

There are challenges in animal genetic resources management in particular to increase the awareness for the farmers and children. In addition, there is a need to increase the training and capacity building. The government contributes greatly to develop the infrastructure and capacity building through the university graduation and missions sent abroad. The government contributes to the extension and supporting farmer services to improve the technical level for them. The ministry of education started last year to include some syllabuses related to understanding of AnGR for students at the primary schools. The future work of the State of AnGR in Oman are:

- Initiate the genetic characterization at the molecular level for all local breeds which is already finished at the phenotypic level i.e. cattle and sheep.
- Establish the database for farm animal genetic diversity(set up a recording system for the breeders).

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:

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:

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

- (●) a. Yes
- ( ) b. No

Please provide further details:

As mentioned before, for the MAF strategy for livestock research there is a separate program for conservation AnGR for sustainability and its budget increased a lot within the last 5 years.

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:

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:

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:

There are many agreements between MAF and other developing countries in this issue.

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:

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:

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:

May be will be establish with other gulf countries in the future.

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:

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:

In Situ conservation and management of AnGR in the country are carried out by the Ministry of Agriculture and Fisheries and the Ministry of Environment and Climatic Affairs (MECA). MAF is concentrating on the conservation and management of indigenous species whereas MECA has reserved areas in different part of the country with the aim of conserving the ecosystems. In 2004 a special program started to do classification and identification for the local small ruminant and cow breeds in Oman. MAF has nucleus herd/flocks in different area in Oman to maintain and preserve the local breeds at their native place. There exist numerous activities towards conservation of local breeds in different species, through on-form management since early 1990's. In case of cows and small ruminants, MAF takes responsibilities to carry out genetic improvement at its different research centers and stations using a reliable selection program and distribute the selected improved rams/bucks to the farmers and small holders to improve their herds/flocks. However, there is a need for extending such activities towards improving indigenous breeds of AnGR.
In 2013, a nucleus herd of Al-Jabal Al-Akhdar goat breed was established in Aljabl Al-Akhdar city to conserve the breed. Al-Jabal Al-Akhdar breed is an important goat breed in Oman and some other gulf countries, it is a promise breed. The breed is widely used for meat production. This activity carried out to maintain the breed (*in-Situ*) conservation as an important genetic resource in Oman. The main objectives for this activity are:
1) Conserve and maintain Al-Jabal Al-Akhdar goat breed in its native place (*in-Situ*),
2) Preservation the breed from the genetic degradation and random crossing,
3) Genetic improvement for the productive and reproductive traits for sustainability and to propagate the breed and disseminate the selected improved males to the farmers at the target areas.

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:

By establishing the Oman gene bank and OAPGRC, it will be easy to do that as the fund is available and the human resources will be trained.

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:

See comments in Q 73.

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:

A big campaigns is started by MAF, OAPGRC and the ministry of educations to increase the awareness for the farmers, students and public people.

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:

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

Issues to be addressed in future (next ten years)	Reasons	Actions required
- Initiate the genetic characterization at the molecular level for all local breeds which is already finished at the phenotypic level i.e. cattle and sheep. - Registration for the local Omani breeds to preserve the property rights. - Activate of the existing coordination between the researchers and farmers. - Initiate a comprehensive approach that regulates the work between conservation and utilization of animal genetic resources. - Provide the requirements of manpower and financial resources needed for the maintenance of AnGR. - Establish the database for farm animal genetic diversity. - Conduct more research work on breed evaluation and preparation of a national applied research program on livestock and improving the efficiency and spread of extension services. - Enhance the cooperation between the Sultanate and the neighbouring gulf countries in the basic and applied research like breeding and improvement of local breeds of poultry, sheep, goats and camels; developing and transferring appropriate biotechnologies and establishing joint projects between them. - Promoting collaboration between the Sultanate and countries of Gulf Cooperation Council in developing information systems and communication networks, in addition to control epidemic diseases through a joint strategy to control animal movement involving other concerned countries.	It is impertinent to know the relations between the breeds and to complete the characterization in both phenotypic and genetic.	Starting to put the plan and train someone to do the DNA work.

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