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: Republic of Korea

## 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).

**I. EXECUTIVE SUMMARY**

1) Key trends and driving forces affecting animal genetic resources management in Korea

❒ Changes in policy: The Republic of Korea's livestock industry has developed into an environment-friendly, healthy and sustainable industry, and in order to protect the livestock industry from overseas malignant diseases, starting from 2003, Korea implemented the “Livestock Industry Registration System” for cow, hog, poultry and duck-raising farms equipped with certain facilities. Starting from 2013, breeding stock business, incubation business, semen treatment business and animal breeding business over certain sizes were also changed to be subject to permission. It is expected that the Permit System for Livestock Breeding will be expanded until 2016.

❒ Changes in industry: During the past 10 years (2003~2013), the number of head being raised in the Republic of Korea's livestock industry has increased, but it showed a decreasing trend for the number of breeding farms. This was clearly shown in industries of high percentages, such as beef cattle, pig, chicken and duck. In comparison to 2002, the average number of heads raised per household in 2012 was 7.9~20.8 heads for Korean native cattle, 49.4~69.9 heads for dairy cattle, 605.6~1,641.7 heads for pig, 27,444.2~46,703.4 heads for chicken and 902.0~3,966.8 heads for duck. This sort of decreasing trend can be seen as a process of developing into a technology-intensive industry.

❒ Changes in economy: During the past 10 years, the amount of agricultural production recorded US$ 34,656 million, showing an average growth of 3.93%. Among them, the percentage accounted by livestock industry is an average of 34.07% at US$ 12,081 million, showing an annual average growth of 6.09%, which is a higher growth rate compared to other agricultural areas. The livestock industry's percentage in agriculture has shown an increasing trend every year to account for more than 37% starting from 2010. This is because of the increasing demand for animal protein

after the increase in national income, as well as the increasing demand for high-quality animal protein also rising together.

❒ Conclusion: The key trends and driving forces that had positive effects on the animal genetic resources management include: ① the government's strong will and policy implementation for the development of livestock industry; ② the farm's efforts to improve productivity through technology accumulation and technology intensive investments; and ③ the changes in consumption due to the improvement of national income.

2) Strengths, weaknesses and gaps in capacity to manage animal genetic resources in Korea

❒ In 2011, the Korean government enacted the “Law for Conservation, Management and Use of Genetic Resources of Agriculture and Fisheries” and has been implementing this Law since 2013.

❒ Also, in order to efficiently manage animal genetic resources scattered in the region, starting from 2008, nine of the local government's livestock research institutes were designated and operated as “genetic resources management institutes” where 2 national universities participated.

❒ The establishment of administrative and institutional areas are at the stage of completion, but there is a huge difference in the perception of the importance for genetic resources management at industrial and farm levels.

- This is because there are restrictions to the use of the animal genetic resources management focusing on native domestic animals due to low productivity, etc. Therefore, it is necessary to develop technology policies that can improve future uses.

3) Key constraints and challenges with respect to animal genetic resources management in Korea

❒ Occurrence of infectious diseases being transmitted from overseas

- During the past 10 years, there were two occurrences of foot-and-mouth diseases and four occurrences of highly pathogenic avian influenza (AI) in Korea. These occurrences brought massive direct damages to the economy. In 2010, the foot-and-mouth disease caused damages to 6,241 farms, buried 3,480 thousand heads, while the AI caused damages to 287 farms and buried 6,473 thousand heads.

- Due to the lack of breeding resources needed for improvement, large quantities of resources were brought in from foreign countries.

4) Priorities and strategic directions for future action (focusing particularly on the next ten years)

❒ Adapting to an environment-friendly livestock industry by utilizing idle mountainous areas
❒ Developing and finding breeding resources for climate change response
❒ Producing high value-added livestock products by using native breeds
❒ Recording region growing species and tracking the breeding process
❒ Evaluating and applying the risk of extinction

## 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 genetic resources are mainly North American and European commercial varieties imported by the private sector and the Korean government collects statistical data on them.

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.*

In the case of pigs and chickens, domestic breeding stocks are economically scarce, which is why most of them are imported from advanced countries. The Korean government conserves and manages domestic livestock genetic resources and finds ways to utilize them.

Due to the occurrence of foot-and-mouth disease (FMD) between 2010 and 2011, the import of pig breeding stocks rapidly increased temporarily. The FMD caused the population of breeding farms that have been improved for a long period of time to disappear, allowing the dependence on foreign countries for breeding pigs to increase. Also, since many heads of breeding pigs were being temporarily imported, it brought concerns about the quality decline of breeding pigs because the capacity of imported breeding pigs had to deteriorate. In the case of farms that imported breeding pigs, since they could not import enough heads of breeding pigs to secure genetic diversity, it caused problems like difficulty in managing the rate of inbreeding and the capacity. These problems could be resolved through exchanging genes between farms, etc., but it wasn't easy to exchange genetic resources because of differences in the hygiene levels between farms. Therefore, it is believed that there will continue to be the problem of depending on imports to maintain farms.

## 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) | high | high | The dependence on economically feasible products has increased. |
| Changing demand for livestock products (quality) | high | high | The phenomenon of concentrating the demand on specific breeding stocks occurred due to changes in the objectives of breeding programmes. As a result, there is the genetic diversity for the whole population has decreased. It is expected that the demand for environment-friendly livestock products and welfare farm livestock products will increase in the future. |
| Changes in marketing infrastructure and access | high | high | The channel for native resources has been acquired because of increased accessibility between producers and consumers, including online marketing, etc. The resource management has been expanded by acquiring channels for small-scale species. |
| Changes in retailing | high | high | The size of farms increased because of the expansion of large-sized stores. Due to the increase of online stores, direct dealing with consumers has been made possible, which expect to bring the market segmentation and the diversification of breeding population. |
| Changes in international trade in animal products (imports) | high | medium | Breeding stocks that utilized domestic genetic resources are being developed for the purpose of replacing some breeding stocks being imported. |
| Changes in international trade in animal products (exports) | low | low | There is little amount being exported with little effect. |
| Climatic changes | low | low | There might be factors that deter industrial development, such as the cost of feed skyrocketing and also problems of maintaining the diversity of breeding stocks, etc., but there won't be direct impacts from climatic changes in Korea. |
| Degradation or improvement of grazing land | low | medium | There are plans to develop hill pastures, but there won't be a huge effect. |
| Loss of, or loss of access to, grazing land and other natural resources | low | low | |
| Economic, livelihood or lifestyle factors affecting the popularity of livestock keeping | low | low | |

| 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 |
|---|---|---|---|
| Replacement of livestock functions | low | low | |
| Changing cultural roles of livestock | low | low | |
| Changes in technology | medium | high | The application of biotechnology will be expanded in genetic resources management due to the development of conservation and restoration technologies for genetic resources. |
| Policy factors | medium | high | The introduction of the permit system for livestock industry has increased the entry barriers for livestock industry, which is expected to decrease livestock farms to a certain level. However, it is expected that there won't be a huge change in the size of the whole population because the average number of heads being raised per farm has increased. Despite this, it is likely that the genetic diversity will decrease since the direction of managing livestock population will be determined by a minority of people as they become specialized and commercialized, compared to before when many people raised livestock. |
| Disease epidemics | high | high | Since the importance of managing breeding stocks increased because of mass culling, etc., policies have been established and implemented at the government level to disperse and breed breeding stocks, etc. However, it is necessary to disperse and conserve for the acquisition of genetic diversity. |

## 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) | 1 | 0 |
| Cattle (specialized beef) | 4 | 3 |
| Cattle (multipurpose) | 0 | 0 |
| Sheep | 1 | 0 |
| Goats | 3 | 0 |
| Pigs | 3 | 10 |

| Species | Locally adapted breeds | Exotic breeds |
|---|---|---|
| Chickens | 11 | 8 |
| Deer | 1 | 2 |

## 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) | 1 | 1 | high | medium | high | medium | medium | medium |
| Cattle (specialized beef) | 3 | 1 | high | high | high | high | high | high |
| Cattle (multipurpose) | 0 | 0 | none | none | none | none | none | none |
| Sheep | 0 | 0 | none | low | low | low | low | low |
| Goats | 3 | 3 | medium | medium | low | medium | low | low |
| Pigs | 5 | 5 | high | medium | high | medium | high | high |
| Chickens | 12 | 12 | medium | medium | low | medium | low | medium |

## 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 | high |
| Research | high |
| Knowledge | high |
| Awareness | medium |
| Infrastructure | high |
| Stakeholder participation | high |
| Policies | high |
| Policy implementation | high |
| Laws | high |
| Implementation of laws | high |

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 | High-quality technical professionals have been produced, mainly from 24 universities related to livestock across the nation. |
| Research | 1 national research institute, 9 local research institutes, 2 cooperative research institutes and other private research institutes |
| Knowledge | National institutions or resource management institutions regularly hold workshops, seminars, etc. to acquire knowledge |
| Awareness | There is a lack of perception about the future value of genetic resources, as well as a lack of awareness among farms or private associations compared to national institutions or researchers. |
| Infrastructure | The facilities, manpower and budgets have been acquired. |
| Stakeholder participation | There is a lack of participation by the private sector and farms. |
| Policies | National strategies and management systems for genetic resources have been established based on laws. |
| Policy implementation | Policies have been implemented as national strategies. |
| Laws | The Law for Conservation, Management and Use of Genetic Resources of Agriculture and Fisheries and the Livestock Industry Act. |
| Implementation of laws | Policies are being implemented according to the above laws. |

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).*

Technology workshops and farming utilization proposals to distribute research technologies mainly by central and local governments.

## BREEDING PROGRAMMES

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

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

10. Who operates breeding programmes in your country?

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

| Species | Government | Livestock keepers organized at community level | Breeders' associations or cooperatives | National commercial companies | External commercial companies | Non-governmental organizations | Others |
|---|---|---|---|---|---|---|---|
| Cattle (specialized dairy) | yes | no | yes | no | yes | no | no |
| Cattle (specialized beef) | yes | no | yes | no | no | no | no |
| Cattle (multipurpose) | no | no | no | no | no | no | no |
| Sheep | no | no | no | no | no | no | no |
| Goats | no | no | no | no | no | no | no |
| Pigs | yes | no | yes | yes | yes | no | no |
| Chickens | yes | no | yes | yes | yes | no | no |
| Horses | yes | yes | no | yes | 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 (specialized dairy) | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 |
| Cattle (specialized beef) | 3 | 0 | 1 | 0 | 4 | 0 | 4 | 0 | 0 | 0 | 2 | 0 | 2 | 0 | 4 | 3 |
| Pigs | 3 | 0 | 2 | 4 | 3 | 0 | 3 | 10 | 3 | 0 | 1 | 2 | 1 | 4 | 3 | 1 |
| Chickens | 0 | 0 | 1 | 4 | 0 | 0 | 5 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 0 |
| Goats | 3 | 0 | 0 | 0 | 3 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Horses | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| Deer | 0 | 0 | 0 | 3 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sheep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

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

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

| Species | Breeding method | | | |
|---|---|---|---|---|
| | Straight/pure-breeding only | | Straight/pure-breeding and cross-breeding | |
| | Loc | Ex | Loc | Ex |
| Cattle (specialized dairy) | 0 | 1 | 0 | 0 |
| Cattle (specialized beef) | 1 | 0 | 0 | 0 |
| Pigs | 3 | 4 | 0 | 0 |
| Chickens | 6 | 4 | 0 | 0 |
| Horses | 0 | 1 | 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) | high | high |

| Species | Training | Research |
|---|---|---|
| Cattle (specialized beef) | high | high |
| Cattle (multipurpose) | none | none |
| Sheep | none | none |
| Goats | medium | medium |
| Pigs | high | high |
| Chickens | medium | medium |

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

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

| Pigs | Government | Research organizations | Breeders' associations or cooperatives | Individual breeders/livestock keepers | National commercial companies | External commercial companies | Non-governmental organizations | Others |
|---|---|---|---|---|---|---|---|---|
| Setting breeding goals | high | medium | high | high | high | | | |
| Animal identification | medium | medium | high | high | high | | | |
| Recording | high | high | high | high | high | | | |
| Provision of artificial insemination services | low | high | high | high | high | | | |
| Genetic evaluation | high | high | high | high | high | | | |

| Chickens | Government | Research organizations | Breeders' associations or cooperatives | Individual breeders/livestock keepers | National commercial companies | External commercial companies | Non-governmental organizations | Others |
|---|---|---|---|---|---|---|---|---|
| Setting breeding goals | high | high | medium | medium | high | | | |
| Animal identification | high | high | low | low | high | | | |
| Recording | high | high | low | low | high | | | |
| Provision of artificial insemination services | high | high | low | low | high | | | |
| Genetic evaluation | high | high | low | low | high | | | |

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

| Horses | 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 | high | none | low | none | low | none | none |
| Animal identification | high | low | high | high | none | low | none | none |
| Recording | high | low | high | high | none | high | none | none |
| Provision of artificial insemination services | low | low | low | low | none | none | none | none |
| Genetic evaluation | medium | low | medium | low | none | low | 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.

- The Korea Animal Improvement Association (KAIA) is an organization for farms that breed cows and pigs, which carries out the function of acting as an association for registering species, as well as fulfilling the function of testing, recording and managing the pig performance.
- The National Agricultural Cooperative Federation (NACF) collects the herd book and the performance testing record of dairy cattle and supplies semen production for dairy cattle.
- The Korea Racing Authority (KRA) carries out the role of managing herds of racehorses (thoroughbreds) and evaluates their performances.
- The National Institute of Animal Science (NIAS), a national institution and a research institute, establishes improvement objectives for livestock, develops plans for improvement programmes and evaluates the genetic performances of Korean beef cattle, dairy cattle and pigs.
- The Korea Institute for Animal Products Quality Evaluation (KAPE) oversees tracking systems for cattle and pigs.
- In the case of cattle, there is almost no participation from the private sector excluding the NACF and the KAIA, but improvement programmes are being implemented in private breeding pig farms for pigs or chickens.
- In the case of tracking systems, the KAPE distinguishes IDs centrally for cattle, but in the case of finishing pigs, IDs distributed by the KAPE are used, while in the case of breeding pigs, the KAIA issues breeding registration numbers to be used.

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

| Species | Policies or programmes |
|---|---|
| Cattle (specialized dairy) | yes |
| Cattle (specialized beef) | yes |
| Cattle (multipurpose) | no |
| Sheep | no |
| Goats | no |
| Pigs | yes |
| Chickens | yes |

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

| Species | Description of policies or programmes |
|---|---|
| Cattle (specialized dairy) | Improvement objectives for livestock are established led by the government. |
| Cattle (specialized beef) | Improvement objectives for livestock are established led by the government. |
| Cattle (multipurpose) | |
| Sheep | |
| Goats | |
| Pigs | • Improvement objectives for livestock are established led by the government.<br>• Breeding programmes are currently being implemented using locally adapted breeds supported by the government. |
| Chickens | • Improvement objectives for livestock are established led by the government.<br>• Breeding programmes are currently being implemented using locally adapted breeds supported by the government. |

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) | Improvement made to suit the Korean environment increased local adaptability and productivity. |
| Cattle (specialized beef) | Improvement of breeds that met domestic consumer tastes acquired economic feasibility.<br>Improvement that leaned towards specific traits decreased genetic diversity. |
| Cattle (multipurpose) | |
| Sheep | |
| Goats | |
| Pigs | Huge reliance on imports from foreign countries.<br>Breeding program to replace imported breeding stocks is in its early stage. |
| Chickens | Huge reliance on imports from foreign countries.<br>Breeding program to replace imported breeding stocks in its early stage. |

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.

[Obstructive factors]
- Genetic diversity has decreased because of improvements being one-sided on specific traits.

[Success cases]
- Korean beef cattle: improved productivity and settled the market by improving meat to suit the preference of domestic consumers.

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) | • The focus of improvement has changed from milk quantity to milk quality.<br>• The development and application of technologies for genomic selection. |
| Cattle (specialized beef) | • The improvement objective for meat that used to be mainly on marbling score has been reviewed to change towards diversification to suit the changing preferences of consumers.<br>• The development and application of technologies for genomic selection. |
| Cattle (multipurpose) | |
| Sheep | |
| Goats | |
| Pigs | • The direction on improvement traits has been changed.<br>• The breeding stocks are being developed by using domestic genetic resources to replace imports of breeding stocks from foreign countries.<br>• The development and application of technologies for genomic selection. |
| Chickens | • The breeding stocks are being developed by using domestic genetic resources to replace imports of breeding stocks from foreign countries. |

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

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

- ○ yes
- ◉ no

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

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

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

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

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

Management and economic and technological supports are provided for farms that conserve native chickens.

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.

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 | yes |
| Oocytes | no |
| Somatic cells (tissue or cultured cells) | yes |
| 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) | 1 | 1 | yes | no | no | no | no |
| Cattle (specialized beef) | 7 | 1 | yes | no | no | no | no |
| Cattle (multipurpose) | 0 | 0 | no | no | no | no | no |
| Sheep | 0 | 0 | no | no | no | no | no |
| Goats | 1 | 0 | no | no | no | no | no |
| Pigs | 4 | 0 | no | no | no | no | no |
| Chickens | 1 | 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.

- In the case of chickens, there are plans to use cryopreservation of PGCs.
- There are plans to establish a system that can acquire certain amounts for restoration to be utilized if needed.

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 (specialized beef) | high | high | high | low | low | low | low | low | low |
| Pigs | high | low | low | low | low | low | low | medium | low |
| Chickens | medium | low | low | low | low | low | low | medium | low |
| Cattle (specialized dairy) | high | medium | low | low | medium | low | low | medium | low |

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

- In the case of cattle and pigs, artificial insemination is widely used.
- The artificial insemination of chickens is being conducted for the conservation of breeding stocks and genetic resources.

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 | yes | yes | yes | yes | yes |
| Embryo transfer | yes | yes | yes | yes | yes | yes |

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.

Public sector and breeders' associations or cooperatives are using artificial insemination and embryo transfer to establish and implement the national breeding strategy.

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 | yes |
| Embryo transfer or MOET | yes | yes |
| Semen sexing | yes | no |
| *In vitro* fertilization | yes | yes |
| Cloning | yes | yes |
| Genetic modification | yes | yes |
| 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 | yes |
| Research on adaptedness based on molecular genetic or genomic information | yes | yes |

30.1. Please briefly describe the research.

- Usually the artificial insemination, embryo transfer or MOET, semen sexing, cloning, etc. are conducted at the national level. Also, artificial insemination and embryo transfer are established as technologies that can be easily utilized in the field by policy so that they are utilized in the technology for improving livestock.
- In the case of in vitro fertilization, utilizations are limited because there is the possibility of reproductive cells originated from an object of unknown lineage.

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

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

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

| Cattle (specialized beef) | 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 | n/a | n/a | high | high | n/a |
| Artificial insemination using nationally produced semen from exotic breeds | n/a | n/a | none | none | n/a |
| Artificial insemination using imported semen from exotic breeds | n/a | n/a | none | none | n/a |
| Natural mating | n/a | n/a | none | none | n/a |

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

| Chickens | 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 | n/a | n/a | low | low | n/a |
| Artificial insemination using nationally produced semen from exotic breeds | n/a | n/a | high | high | n/a |
| Artificial insemination using imported semen from exotic breeds | n/a | n/a | none | none | n/a |
| Natural mating | n/a | n/a | low | low | n/a |

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.

- Artificial insemination and embryo transfer were usually used in improving Korean beef cattle native to Korea and Holstein dairy cattle, as well as used industrially by utilizing in the technology for increasing outstanding Korean beef

cattle. Also, cloning was utilized as a means of restoring native livestock with the risk of extinction, as well as utilized in cloning special purpose dogs.

- In the case of pigs and chickens, artificial insemination that uses fresh semen was used for the purpose of improvement.

## 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 | extensive | The integrated management of genetic resources of animals, plants, forests and seas implemented by the Law for Conservation, Management and Use of Genetic Resources of Agriculture and Fisheries (hereinafter referred to as the `Agriculture and Fisheries Law). |
| Collaboration in the characterization, surveying or monitoring of genetic resources, production environments or ecosystems | limited | The responsible institution carries out the role for genetic resources by field in accordance with the Agriculture and Fisheries Law. |
| Collaboration related to genetic improvement | limited | Independently carried out according to related laws by item. In the case of animal genetic resources, the Livestock Industry Act is applied. |
| Collaboration related to product development and/or marketing | limited | Independently carried out according to related laws by item. In the case of animal genetic resources, the Livestock Industry Act is applied. |
| Collaboration in conservation strategies, programmes or projects | extensive | The integrated management of genetic resources of animals, plants, forests and seas implemented by the Agriculture and Fisheries Law. |
| Collaboration in awareness-raising on the roles and values of genetic resources | extensive | Workshops, seminars, symposiums, etc. are held for stakeholders (government, research institutes, organizations, academic world, etc.) or the public. |
| Training activities and/or educational curricula that address genetic resources in an integrated manner | limited | Responsible institutes by genetic resource provide education and training on conservation, management, evaluation, etc. for the working-level by field. |
| Collaboration in the mobilization of resources for the management of genetic resources | extensive | An integrated information system for genetic resources and an information system by genetic resource are in place. |

2. Please describe any other types of collaboration.

**Benefits by strengthening collaboration**
Strengthening the integrated management at national level and the response to international issues across the board of genetic resources of food and agriculture.

**Plans to increase collaboration**
In order to deal with ABS (access to genetic resources and benefit-sharing) through the integration of all genetic resources, opinions are being collected from government agencies, academic world, organizations (associations), research institutes, etc. for the enactment of law and the establishment of system.

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

**Benefits by strengthening collaboration**
Strengthening the integrated management at national level and the response to international issues across the board of genetic resources of food and agriculture.

**Plans to increase collaboration**
In order to deal with ABS (access to genetic resources and benefit-sharing) through the integration of all genetic resources, opinions are being collected from government agencies, academic world, organizations (associations), research institutes, etc. for the enactment of law and the establishment of system.

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

**Factors that facilitate collaboration**
The realization of the importance of integrated management at national level instead of responding independently by each field of genetic resources.

**Factors that constrain collaboration**
There was a huge difference in the conservation and management system, the international trend and the response method of each genetic resource.

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

It is necessary to integrate the opinions of relevant institutions and provide an integrated management by enacting manifold laws, by taking into consideration of the difference in characteristics, international trends and response methods by genetic resource.

## 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).*

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).

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).

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.

- The emergence of the grazing-type livestock industry that uses mountains instead of intensive factory-type livestock industry, the maintaining of soil fertility and soil ecosystem through providing fertilizer, the fulfillment of the role of nutrient cycle, etc.
- Controlling the production and environment through the permit system for livestock industry.

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.

The ecosystem is preserved and utilized by developing environment-friendly livestock and hill pasture.

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:

- Annual report on the status of Korean livestock genetic resources focusing on indigenous breeds is prepared every year
- National Institute of Animal Science (NIAS) also operate the web site gathering information on livestock genetic resources

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:

Phenotypic characterization of several livestock species including caw and pig is conducted by Korea Animal Improvement Association.

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 using microsatellite markers and mitochondria sequence has been performed by National Institute of Animal Science(NIAS) and several universities related.

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 baseline survey of population status on cattle, pig and chicken has been undertaken.

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:

National Institute of Animal Science(NIAS) is in charge of the responsibilities.

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:

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

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

Please provide further details:

The complete enumeration survey and sample surveys are conducted by the Statistics Korea on the present status and trends of cattle and pigs.

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:

At present, we(Korea) has the draft of national criteria, but that is not applied yet.

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

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

Please provide further details:

Researches are performed to develop protocols for the molecular characterization and the comparisons.

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)

- [x] 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:

Researches are performed to develop protocols for the molecular characterization and the comparisons.

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

- [x] 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:

Our major obstacles are insufficient amount of funding and scarce human resource.

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:

Securing the human resource and the funding.

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.*

Strengthen the related laws for enhancing the characterization of gene resources and the supervision over consignment organization.

## 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:

Established the law related to Ensuring, Management and Use of Bioresearch Resources Act(2009).

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:

"Livestock breeding goals" are renewed every 5 years by Rural Development Administration(RDA).

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:

Lack of understanding about economical value of animal genetic resource in related industry.

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.*

b. Yes, assessments were introduced before the adoption of the GPA

Please provide further details:

Exotic breeds are used in major livestock industry including caw, pig, chicken.

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:

ID numbers are given to all cattle and managed by a cattle tracking system.

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:

Technology information provided irregularly by the government and academic world (symposiums, workshops, etc.).

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:

Information provided easily and conveniently through government approval and issuance of sire index (NACF).

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:

Trainings on breeding and reproductive technologies were carried out through the registration system for the livestock industry.

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:

Regular technical trainings were held for the local government in stage 1 and expanded to farmers in stage 2.

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:

Media advertisements led by producer associations and the government to raise the awareness.

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

Priority requirements are the characteristics of animal genetic resources and the evaluation of those values.

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.*

Providing the technical and financial support to the developing country for the management and characterization of animal genetic resource.

## 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:

Destroying livestock for the control of animal disease such as food and mouth disease(FMD)
Since livestock industry focused on the production of animal that has economical values, traditional animals are in danger of extinction.

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:

Starting from the 1970s, programmes to restore indigenous native chickens and indigenous native pigs were implemented and currently some of the breeds have been commercialized.

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:

The present status is identified and measures taken through an annual research report.

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:

Carried out by farms, local governments, the private sector, universities, etc.

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:

Redundant conservation measures in place for cattle, pigs and chickens.

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:

Cryopreservation of reproductive cells and somatic cells for cattle, pigs and chickens.

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:

AGRIMS (http://angr.nias.go.kr), BRIS (http://wwwbris.go.kr)

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:

We have two major obstacles. Firstly, difficulty of the selection for conservation because of ambiguous standards in the characterization and the evaluation. Secondly, insufficient facilities specialized long-term conservation and lack of funds.

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:

The development of conservation technologies for species and breeds with difficulty of ex situ cryopreservation.

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:

The Act on the Prevention of Contagious Animal Diseases is in place to protect from livestock diseases.

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:

The plan to restore genetic resources is implemented by conserving livestock and frozen resources.

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:

Researches on developing propagation technologies are conducted to increase the diversity of species and breeds.

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:

Researches on developing genetic resources management technologies are conducted to increase the diversity of species and breeds.

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

Control of disease, improvement of technology for reproduction and freeze preservation.

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.*

Surveying the biological resources every 5 year at national level.
Preparing the long-term road map to secure the biological resources.

## 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:

The supports on overall plans for the livestock industry are provided by the Livestock Industry Act, which was enacted in 1963.

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 National Biodiversity Strategy and part of the Action Plan are handled under the cooperation with the Ministry of Environment.

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:

Handled by the Livestock Industry Act and the Law for Conservation, Management and Use of Genetic Resources of Agriculture and Fisheries.

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:

Bio Resources Information Service (BRIS) and Animal Genetic Resources Information Management System (AGRIMS): national databases for agricultural genetic resources and livestock genetic resources.

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:

Updates have been made in 2012 and there will be an update in 2014. Regular updates are expected to take place in the future.

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:

The Review Committee for Genetic Resources of Agriculture reviews the following:
1. The establishment of a basic plan on the conservation, management and use of genetic resources of agriculture;
2. The provision of major policies on the development of researches, technologies and human resources for genetic resources of agriculture;
3. The provision of important information about acquiring and distributing genetic resources of agriculture; and
4. Other information that is deemed necessary for the conservation, management and use of genetic resources of agriculture by the Minister of Agriculture, Food and Rural Affairs.

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:

There is a system for exchanging collaborations by establishing national policies for stakeholders to follow.

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 National Focal Point carries out activities to occasionally promote the importance of animal genetic resources and promote the role of the nation.

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 animal genetic resources that were part of the Livestock Industry Act have been updated by changing into the Genetic Resource Act.

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:

Related trainings are provided by designating the managing authority.

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:

There is a network of managing authorities between the government and local governments or between local governments.

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:

- Korea Animal Improvement Association (KAIA) (http://www.aiak.or.kr/)
- National Agricultural Cooperative Federation (NACF) (http://www.nonghyup.com/eng/main/main.aspx/)

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:

There are the national research institutes and research departments related to livestock at 24 universities.

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.*

Ministry for Food, Agriculture, Forestry and Fisheries performed "Golden Seed Project".

## 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:

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:

Direct supports provided by establishing government-led multilateral food and agriculture cooperation initiatives for Asia and Africa.
- The Korea-Africa Food & Agriculture Cooperation Initiative (KAFACI)
- Asian Food & Agriculture Cooperation Initiative (AFACI)

Participations and supports through non-agriculture organizations.

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:

Direct supports provided by establishing government-led multilateral food and agriculture cooperation initiatives for Asia and Africa: KAFACI, AFACI

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:

Supports provided to 27 AFACI member countries and KAFACI member countries.

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:

Activities for listing are carried out through the Domestic Animal Genetic Resources Information System (DAGRIS) of the African region jointly with the International Livestock Research Institute.

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:

Starting from 2012, supports are provided for the development of the Domestic Animal Genetic Resources Information System (DAGRIS) of the African region jointly with the International Livestock Research Institute.

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:

Starting from 2002, Korea is participating in the characteristic evaluation of goat molecules through the International Livestock Research Institute (ILRI).

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:

Korea supports the genetic resource inventory through programmes conducted by the AFACI and the KAFACI.

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:

Korea has plans to provide technology transfer on artificial insemination for African native cattle.

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:

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:

The AFACI's Mongolian Genetic Resources Meeting aired on Mongolia's national television in 2013.

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:

Korea sent experts in livestock at international meetings related to ABS.

## 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 |
|---|---|---|

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