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: Denmark

## 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).

Denmark - Geography, climate and agriculture

Denmark is a Nordic country in Europe and a member state of the European Union. Denmark consists of the peninsula, Jutland, and many islands, most notably Zealand, Funen, Lolland, Falster and Bornholm, as well as more than 400 minor islands. Denmark covers a total area of 43,100 km$^2$ (43,100,000 ha), with about 7,500 km coastline. Denmark is a relatively flat and low-lying country, and the highest point in the country is no more than 173 m above sea level.

Denmark has a mild and temperate climate, with four seasons which means warm summer days, colorful autumns, green springs and cold, snowy winters. It rains or snows in average every second day (during the wintertime it snows seven days a month). Within the year, the average temperature ranges from 0°C in January to 16°C in August with considerable variation.

The agricultural land covers approximately 62 % of Denmark. The most important productions of commercial use are pork, milk from dairy cattle, beef and calf meat, broilers, egg-laying hens and fur from mink. The animal production systems are mainly housed om large farms and the breeds used for production are generally exotic adapted breeds selected for high productivity. See also Denmark's Report for the State of the World's Biodiversity for Food and Agriculture.

Danish Animal Genetic Resources

Of native or locally adapted breeds are three horses, five cattle, two pigs, two sheep, one goat, one poultry, one goose, one duck, three pigeons, one bee and four dogs. The native or locally adapted breeds are mainly kept by small scale farmers. As these breeds are recognized as Danish husbandry animal genetic resources, this report focus primarily on those.

The Danish effort for preserving animal genetic resources for food and agriculture are coordinated by the Ministry of Environment and Food of Denmark. Denmark has comitted itself through signing the Convention on Biological Diversity and the Interlaken Declaration on Animal Genetic Resources. Since 1985, a Danish Advisory Board for the Conservation of Animal Genetic Resources has existed, which assists and advises the ministry. The current board was formed in 2013 with a majority of breeders elected through direct referandum. The Danish conservation work is concentrated around native or locally adapted breeds, which are at risk of extinction.

The Ministry of Environment and Food of Denmark administer the Danish gene bank for animal genetic resources containing semen from cattle, pigs, sheep, horses and goats, and embryos from cattle, pigs and sheep, generally from the native or locally adapted breeds. Bull semen from the gene bank are routinously handed out to farmers for free.

The Danish Board for Conservation of Animal Genetic Resources has in 2016 developed a strategy for 2016 to 2020, which focus on action that contribute to preservation work on the long-term perspective. The Danish conservation work is funded annually through the national budget.

Future trends and priorities

The general trend in danish husbandry is larger herds and new technology is a driving force to affect management of animals. As less than 5 % of the population works within the agricultuaral sector and related industry, it is important to keep the consumers interest, awareness and knowledge on food production. For native and locally adapted animal genetic resources communication through news and homepage is a priority.

The consumption of animal produce in Denmark is not assumed to increase the coming years however a higher demand for niche products are expected, as people seems more aware of animal welfare and the climate and environmental effect of animal production. This provide an opportunity for a greater genetic diversity in products. It is though important to focus on value creation, increase the production of niche products and make new concepts to increase the sale of products from locally adapted breeds, as they have a lower productivity.

It is a strength for in-vivo conservation of animal genetic resources that both livestock keepers and breeder associations are very active both regarding effective surveillance and conservation programmes for locally adapted livestock breeds. Networks are considered a priority to maintain knowledge and cooperation - also through involving new breeders and involving breeder associations for small livestock.

For each population of breed in the Danish conservation programme it is a priority to prepare a SWOT-analyse and a plan for future breeding. To maintain the diversity of breeds for food production it is important to maintain breeding of native and/or locally adapted breeds.

Expansion of the Danish gene bank through ex-situ conservation of genetic material is continuously a priority.

## 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.

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).

Based on data from "Danmarks Statistik". *ANI9: Slagtning og eksport efter kategori og enhed*, year 2006-2015 (Data not collected from the government). Data for export of living animals available.
Link: http://www.statistikbanken.dk/10473
Animals which are covered within the above mentioned data: Horses, cattle, pigs, poultry and sheep.

| Export of living animal (1.000 pcs.) | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|---|---|---|---|---|
| Horses | 2 | 1,9 | 1,6 | 1,7 | 1,2 | 1,3 | 1,6 | 1,6 | 1,8 | 2,4 |
| Cattle, total | 28 | 25,7 | 22,8 | 16,7 | 21,5 | 20,7 | 40,6 | 60,7 | 70 | 83,1 |
| Pigs, total | 3658,4 | 4363,4 | 4935,9 | 6306,1 | 8292,4 | 8405,4 | 8539,5 | 9694,8 | 10034,1 | 11280,1 |
| Sheep and lamb, total | 15,2 | 14,9 | 9,7 | 8,3 | 4,6 | 1,8 | 3,5 | 1,7 | 0,3 | 1,5 |
| Poultry, total | 25116 | 22220,7 | 18121,2 | 25128,4 | 26561 | 34817,5 | 40021,9 | 46313,2 | 45872,2 | 48759,1 |

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.

The export of cattle, pigs and poultry has generally increased much the last ten years, and the export of sheep and lambs has decreased. The data do not reflect if they mainly cover animals exported for slaughter or live use. In the same period, the number of animals slaughtered in Denmark have though decreased.

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.*

The intensive production reflected in 2.2. of pigs, cattle and poultry in Denmark in larger facilities initiates new technology, which gives higher demands for biosecurity and management in general.

Animals are imported to Denmark from international breeding companies, mainly poultry.

Some exotic breeds are imported to Denmark, i.e. with the main purpose of crossbreeding with dairy cattle.

## 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 | Increased demand of different organic animal products.<br><br>Increase in export of piglets and decrease in export of living cattle. |
| Changing demand for livestock products (quality) | high | high | Higher gross national income (GNI) (primary around capitals/ larger cities) and more awareness on quality, environment and health as well as animal welfare and local produce. Higher demand on niche products. |
| Changes in marketing infrastructure and access | low | medium | Livestock keepers have opportunities for accessing markets for their own products - mainly through coorporatives (for exotic breeds). |
| Changes in retailing | low | medium | Animal genetic resources and their management have only had little or no effect on retailing. It is not assumed to have an influence the next ten years.<br><br>Local production more widespread in retailstores.<br><br>Growing internet sale/boxschemes and farm shops. |
| Changes in international trade in animal products (imports) | low | low | Little import of living animals to Denmark, and it is not expected to increase in the future. |

| Drivers of change | Impact on animal genetic resources and their management over last ten years | Future impact on animal genetic resources and their management (predicted for the next ten years) | Describe the effects on animal genetic resources and their management |
|---|---|---|---|
| Changes in international trade in animal products (exports) | high | medium | Increase in export over the last ten years has increased the national production of animals. More pressure on management - higher demands on animal welfare. Consumers in developed countries become more aware of animal health and production methods. The export is expected to still have an impact on animal genetic resources and management<br><br>Effective breeding programmes. |
| Climatic changes | low | low | Change in feed, i.e. increase in use of corn silage instead of grass silage.<br><br>Some exotic animal diseases might spread to Denmark. |
| Degradation or improvement of grazing land | none | low | |
| Loss of, or loss of access to, grazing land and other natural resources | none | none | Not relevant. |
| Economic, livelihood or lifestyle factors affecting the popularity of livestock keeping | medium | medium | Larger farms.<br>Lower price of animal products leads to an increase in herd size. Better opportunities for use of native or locally adapted breeds. |
| Replacement of livestock functions | none | none | No change. |
| Changing cultural roles of livestock | none | none | No change. |
| Changes in technology | high | high | New technologies concerning i.e. management, farmland, breeding, genes, monitoring, processing |
| Policy factors | high | high | Market regulation: Higher income and higher demand on quality.<br><br>The funding for conservation of animal genetic resources in Denmark is based on political agreements. |
| Disease epidemics | medium | medium | More control on farms.<br>More awareness on biosecurity.<br><br>Might have a future effect due to import of excotic diseases as a result of global trade and/or climate changes, which might affect certain breeds or production systems. |

## OVERVIEW OF ANIMAL GENETIC RESOURCES

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

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

| Species | Locally adapted breeds | Exotic breeds |
|---|---|---|
| Cattle (specialized dairy) | 2 | 10 |
| Cattle (specialized beef) | 1 | 22 |
| Cattle (multipurpose) | 2 | 6 |
| Sheep | 2 | 25 |
| Goats | 1 | 8 |
| Pigs | 2 | 7 |
| Chickens | 1 | 146 |
| Horses | 3 | 28 |
| Rabbits | 1 | 61 |
| Pigeons | 3 | 275 |
| Geese | 1 | 18 |
| Ducks | 1 | 22 |

## 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) | 2 | 2 | high | high | low | high | high | high |
| Cattle (specialized beef) | 1 | 1 | high | high | none | high | high | low |
| Cattle (multipurpose) | 2 | 2 | high | high | none | high | high | high |
| Sheep | 2 | 2 | high | high | low | high | low | low |
| Goats | 1 | 1 | high | high | none | high | low | low |
| Pigs | 2 | 2 | high | high | low | high | high | high |
| Chickens | 1 | 1 | high | high | low | low | low | low |

## 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 | high |
| 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 | Educational system are highly developed and both teaching in animal husbandry and breeding are offered on professional bachelor level. |
| Research | Universities coorporate with farmers, the Ministry of Environment and Food of Denmark and different firms. Research has been done in genomes from many of the exotic, native or locally adapted populations of breeds, which helps to characterize breeds. |
| Knowledge | The Danish farmers are generally well educated. |
| Awareness | Public awareness of breeds in risk of extinction is low. A Danish veterinary alert unit as well as programmes for eliminating specific animal diseases is well established. |
| Infrastructure | Veterinary geographical barrier for trade of living cattle due to salmonella dublin. |
| Stakeholder participation | Many stakeholders are involved. Example: A national process established for releasing old bull semen produced before 1991 in compliance with veterinary regulations and for use in native and locally adapted breeds of cattle. |
| Policies | High focus on animal health and veterinary status. |
| Policy implementation | High on animal health and veterinary status. |
| Laws | Implemented all EU-regulation in the area. |
| Implementation of laws | One common market for 28 EU countries. |

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).*

Many farmers are member of different breeder associations and societies, which exist for different breeds in Denmark, both native, locally adapted and exotic breeds. Through these, farmers gather to talk and share knowledge and experience with each other. Breeder associations are an important means to connect different stakeholders such as farmers, advicers, breeding companies, The Ministry of Environment and Food of Denmark, SEGES and universities.

The Danish Advisory Board for Conservation of Animal Genetic Resources has members, which are both farmers, member of different associations and non-governmental organizations.

## BREEDING PROGRAMMES

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

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

## 10. Who operates breeding programmes in your country?

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

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

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

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

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

| Species | Tools | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Animal identification | | Breeding goal defined | | Performance recording | | Pedigree recording | | Genetic evaluation (classic approach) | | Genetic evaluation including genomic information | | Management of genetic variation (by maximizing effective population size or minimizing rate of inbreeding) | | Artificial insemination | |
| | Loc | Ex | Loc | Ex | Loc | Ex | Loc | Ex | Loc | Ex | Loc | Ex | Loc | Ex | Loc | Ex |
| Cattle (specialized dairy) | 2 | 10 | 2 | 4 | | 4 | 2 | | 2 | 4 | 2 | | 2 | | 2 | 4 |
| Cattle (specialized beef) | 1 | 22 | 1 | | | 16 | 1 | | 1 | | 1 | | 1 | | 1 | 16 |
| Cattle (multipurpose) | 2 | 6 | 2 | | | | 2 | | 2 | | 2 | | 2 | | 1 | |
| Sheep | 2 | 25 | 2 | | | | 2 | | 2 | | 2 | | 2 | | 2 | |
| Goats | 1 | 8 | 1 | | | | 1 | | 1 | | 1 | | 1 | | 1 | |
| Pigs | 2 | 3 | 2 | 3 | | 3 | 2 | | 2 | | 2 | 3 | 2 | | 1 | 3 |
| Chickens | | | | | | | | | 1 | | 1 | | 1 | | | |
| Horses | 3 | 28 | 3 | | | | 3 | | 3 | | 3 | | 3 | | 3 | |

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) | 2 | | | 10 |
| Cattle (specialized beef) | 1 | | | 22 |
| Cattle (multipurpose) | 2 | | | 6 |
| Sheep | 2 | | | 25 |
| Goats | 1 | | | 8 |
| Pigs | 2 | | | 7 |
| Chickens | 1 | | | 146 |
| Horses | 3 | | | 30 |

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

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) | medium |
| Cattle (multipurpose) | medium |
| Sheep | low |
| Goats | low |
| Pigs | high |
| Chickens | low |

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

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

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

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.

Regarding breeding goals, identification and recording of animals, it is mostly breeders/livestock keepers together with breeders' associations, advicers or cooperatives, which are the largest stakeholders. Breeders/livestock keepers record relevant measurements to breeders' cooperatives (for cattle, pigs, horses, goats and sheep), and according to EU/national legislation

Native and locally adapted breeds:
The Ministry of Environment and Food of Denmark administer the gene bank for animal genetic resources of native and locally adapted breeds, which contains cryopreserved semen from cattle, pigs, sheep, horses and goats, and embryos from cattle, pigs and sheep. The bull semen are routinely used for local breeds, though there are limits for doses on stock and veterinary restrictions for elder semen. The Ministry supports breeders, breeders' associations and projects in conservation work through national funds. The conservation work is mainly communicated by the Ministry through the Advisory Board, a newsletter, a yearly meeting for breeders and the homepage for animal genetic resources.

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

| Species | Policies or programmes |
|---|---|
| Cattle (specialized dairy) | yes |
| Cattle (specialized beef) | yes |
| Cattle (multipurpose) | yes |

| Species | Policies or programmes |
|---|---|
| Sheep | yes |
| Goats | yes |
| 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) | The Danish effort for preserving animal genetic resources is managed by the Ministry of Environment and Food of Denmark and is coordinated by The Advisory Board for Conservation of Animal Genetic Resources, which work to preserve old Danish native and locally adapted breeds that are threatened with extinction. The Board has given high priority to in-situ conservation and has worked focused to ensure registration of herds of locally adapted breeds. The Board also advice about the national Genebank.<br>Support programme for owners of breeding animals of native and locally adapted breeds of cattle, sheep, goats, pigs and horses are in place, which aims at more new breeders and an increase in animal numbers.<br><br>For exotic breeds, the breeder association Viking Genetics work with breeding programmes. |
| Cattle (specialized beef) | For endangered species (See comment above). |
| Cattle (multipurpose) | For endangered species (See comment above). |
| Sheep | For endangered species (See comment above). |
| Goats | For endangered species (See comment above). |
| Pigs | For endangered species (See comment above).<br>The company "DanAvl", which is owned by a farmers cooperative, works with breeding programmes for exotic breeds. |
| Chickens | For endangered species (See comment above). |

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) | The national programme contributes to cooperation and communication about as well as description and especially pure breeding of the native and locally adapted breeds. |
| Cattle (specialized beef) | See comment above. |
| Cattle (multipurpose) | See comment above. |
| Sheep | See comment above. |
| Goats | See comment above. |

| Species | Description of consequences |
|---|---|
| Pigs | See comment above. |
| Chickens | See comment above (only subsidy for projects and associations). |

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.

For locally adapted breeds:

- There have generally been a discussion about what should be preserved for certain breeds (amount of purity). Discussions between farmers.
- For some species, it is voluntary to register ancestry (sheep, goats, especially pigs and partly cattle) and it can therefore be difficult to get an exact number of the total population size based on specific breed criteria. Only if the breeder chooses to participate in the voluntary subsidized breeding programme is information of descent a liability. Herdbook recording can therefore be difficult to use as a tool to select breeding animals if the information is inadequate.
- Lack of set-up for routinely cryopreservation of genes from other species than cattle and partly pigs.
- Population numbers low.
- Involvment of a new generation of farmers.
- Valuation of produce of native and locally adapted breeds to cover the higher costs of breeding of the less productive locally adapted breeds.
- Reaching the consumers / communication and marketing

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) | For exotic breeds further improvement of functional traits using genomic selection.<br><br>For native and locally adapted breeds a coherent breeding plan for each breed is a priority. |
| Cattle (specialized beef) | For exotic breeds further improvement of functional traits using genomic selection.<br><br>For native and locally adapted breeds, see comment above. |
| Cattle (multipurpose) | For native and locally adapted breeds, see comment above. |
| Sheep | For native and locally adapted breeds, see comment above. |
| Goats | For native and locally adapted breeds, see comment above. |
| Pigs | For exotic breeds further improvement of functional traits including litter size.<br><br>For native and locally adapted breeds, see comment above. |
| Chickens | Establishing of in-vivo gene banks by the farmers association for the native breed. |

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

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

- (•) yes
- ( ) no

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

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

| | Considered in formal prioritization approaches |
|---|---|
| Risk of extinction | yes |
| Genetic uniqueness | yes |
| Genetic variation within the breed | no |
| Production traits | no |
| Non-production traits | no |
| Cultural or historical importance | yes |
| Probability of success | no |

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

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

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

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

The Danish effort on preserving animal genetic resources for food and agriculture is coordinated by the Ministry of Environment and Food of Denmark. Denmark has committed itself internationally through Convention on Biological Diversity and the Interlaken Declaration on Animal Genetic Resources. Since 1985, a Danish Avisory Board for Conservation of Animal Genetic Resources has existed. The current Advisory Board was formed in 2013 with a directly elected majority of breeders, and assists and advises the ministry. The Danish conservation work is concentrated around native or locally adapted breeds, which are at risk of extinction.
The Ministry of Environment and Food of Denmark supports breeders, breeders' associations and projects in conservation work through national funds. The conservation work is mainly communicated by the Ministry through the Board, a newsletter, a yearly meeting for breeders and the homepage for animal genetic resources.

In situ preservation is highly prioritized by the Committee and much effort is done to register the stocks of native and locally adapted breeds.

Subsidies are used as a monetary supplement to increase the stocks of native or locally adapted breeds, to get new livestock keepers involved and to get breeders to register breeding information.

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) | no |
| Isolated DNA | yes |

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

| Species | Number of breeds for which material is stored | Number of breeds for which sufficient material is stored | Does the collection include material from not-at-risk breeds? | Have any extinct populations been reconstituted using material from the gene bank? | Have the gene bank collections been used to introduce genetic variability into an in situ population? | Have the gene bank collections been used to introduce genetic variability into an ex situ population? | Do livestock keepers or breeders' associations participate in the planning of the gene banking activities? |
|---|---|---|---|---|---|---|---|
| Cattle (specialized dairy) | 2 | | yes | no | yes | yes | yes |
| Cattle (specialized beef) | 1 | | no | no | no | no | no |
| Cattle (multipurpose) | 2 | | no | yes | yes | yes | yes |

| 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? |
|---|---|---|---|---|---|---|---|
| Sheep | 2 | | no | no | no | no | yes |
| Goats | 1 | | no | no | no | no | yes |
| Pigs | 2 | | no | no | yes | no | yes |
| Chickens | | | no | no | no | no | yes |
| Horses | 3 | | yes | no | no | no | yes |

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.

Data in the scheme reflects only the activities in gene bank for native and locally adapted breeds.
Bull semen from native or locally adapted breeds are provided to breeders for free for supporting breeding of the breeds and to reduce inbreeding - only processing fee is paid. Material stored from other breeds are only from few breeds as Danish Jersey cattle, Danish Warmblood horse and Oldenborg horses.

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.

The population of Danish Black Pied Pigs have been increasing and is now in a situation where it is no longer at risk (>300 pigs). The breed has become popular due to the demand for niche products. Numbers of animals have increased in a few herds. The population is still vulnerable.

## REPRODUCTIVE AND MOLECULAR BIOTECHNOLOGIES

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

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

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

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

There has been a development on reproduction technologies which has improved the storage of genetic material. Routine in the use of these technologies for other species than cattle or pigs is limited or non-existing.

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 | no | yes | no | no | yes | yes |
| Embryo transfer | no | no | no | no | yes | no |

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

The inseminations of cattle and pigs are mainly done by the livestock keepers themselves or trained personal. When considering cattle it is often trained personal from the company "Viking Genetics" owned by breeders.

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 | no | no |
| Embryo transfer or MOET | yes | yes |
| Semen sexing | no | no |
| *In vitro* fertilization | yes | yes |
| Cloning | yes | no |
| Genetic modification | yes | no |
| Use of molecular genetic or genomic information for estimation of genetic diversity | yes | yes |
| Use of molecular genetic or genomic information for prediction of breeding values | yes | yes |
| Research on adaptedness based on molecular genetic or genomic information | yes | no |

30.1. Please briefly describe the research.

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

Patent taking of technology.
Artificial insemination with frozen semen is routinely used for cattle, as well as with fresh semen in the intensive pig production with exotic breeds.

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

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

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

| | Extent of collaboration | Description |
|---|---|---|
| Development of joint national strategies or action plans | none | |
| Collaboration in the characterization, surveying or monitoring of genetic resources, production environments or ecosystems | none | |

| | Extent of collaboration | Description |
|---|---|---|
| Collaboration related to genetic improvement | none | |
| Collaboration related to product development and/or marketing | none | |
| Collaboration in conservation strategies, programmes or projects | limited | |
| Collaboration in awareness-raising on the roles and values of genetic resources | none | |
| Training activities and/or educational curricula that address genetic resources in an integrated manner | limited | |
| Collaboration in the mobilization of resources for the management of genetic resources | extensive | Same branch for both animal and plant genetic resources. |

2. Please describe any other types of collaboration.

Through NordGen Husdyr.

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

Greater collaboration between animal, plant and forest sectors could facilitate possibilities for using animals to grass larger areas (use animals to graze land). This could increase the sustainable use of native and locally adapted breeds.

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

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

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

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

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

- (●) yes
- ( ) no

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

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

The Danish Rural Development Programme (European Commission, 2015) for the period 2014 to 2020 is supporting organic farming. Another focus is support for grassing of high natur value (HNV) areas.

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).

In the Danish Rural Development Programme period 2014 - 2020 it is envisaged to support the organic area and have a target of 90.000 hectares of HNV-areas are serviced.

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.

The environmental problem related to livestock production are dealt with in the environmental regulation.

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).

Not relevant.

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).

Not relevant.

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.

Not relevant.

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.

Preserving nature of grassland.

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.

See 6.1.2.

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.

Not relevant.

## 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:

According to EU legislation all livestock keepers are registered with herds in The Central Livestock Register.

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:

Information about phenotype are available for some breeds through DAD-IS.

The breeding companies use data for phenotype together with the genotyping in their breeding programme.

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:

See 2.

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:

See answer to question 1. Population status is available for some species through DAD-IS (both for native and locally adapted breeds and for some exotic breeds).

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

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

- ◉ a. Yes, responsibilities established before the adoption of the GPA

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

Please provide further details:

The Ministry of Environment and Food of Denmark is responsible for implementing the Global Plan of Action.
The farmer owned advicer company SEGES are responsible for a database for cattle, sheep and goats called "Webdyr".

## 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:

Registrered in DAD-IS.

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

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

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

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

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

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

Please provide further details:

Since 1985 an advisory board for conservation of animal genetic resources has existed, which works to preserve native and locally adapted Danish animal breeds. Breeders who have received grants are obligated to inform the Board in advance if they sell their entire herd for slaughter, so the Board gets a chance for exchanging the herd for further live use. In the national gene bank semen and embryos from native and locally adapted breeds are stored.

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

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

Please provide further details:

Research has also commenced after the adoption of the GPA.

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

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

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

As it is voluntary, it is difficult to get all farmers to participate.

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:

Not relevant, see 11.

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.*

## 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:

Different executive orders have been made.
Subsidies for breeders and projects.
Strategy (recently 2016-2020).
Information about animal genetic resources in Denmark see: http://lfst.dk/landbrug/genetiske-ressourcer/husdyrgenetiske-ressourcer/

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:

The Danish Advisory Board for Conservation of Animal Genetic Resources recommend in-situ preservation, through keeping breeds in the environment in which they evolved. The Board thinks it in a modern context mostly is seen in organic production, as set in EU-regulation of organic produce.

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:

Information on some exotic and locally adapted breeds are provided through DAD-IS which is public.

Some breeding associations cooperates with the public sector about breeding programs.

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:

See the Advisory Board for Conservation of Animal Genetic Resources strategi for 2016-2020 - link:
http://lfst.dk/fileadmin/user_upload/NaturErhverv/Filer/Landbrug/Genetiske_ressourcer/Husdyr/Udvalg/Strategi_for_Bevaringsudvalgets_arbejde_med_husdyrgenetiske_ressourcer_2016-2020.pdf

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

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

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

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

*Glossary:*

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

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

Danish native and locally adapted breeds are only relevant in niche production.
Exotic breeds have completely outperformed the native and locally adapted breeds - especially in terms of productivity.

Please provide further details:

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:

- Local associations have established breeding programmes for both native, locally adapted and exotic breeds.

- For cattle, pigs, sheep, goats and poultry, the farms register their animals in the Central Animal Register, which is a database created to track down outbreaks of diseases.

- "Webdyr" is interlinked with the Central Animal Register. Here the farmers can note different informations about individual animals (By law for cattle and optional for sheep and goats).

- For locally breeds of pigs (Danich Landrace anno 1970 and Danish Black Pied pig), a database is used to register breeding animals. The database is administrated by the Ministry of Environment and Food of Denmark.

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:

A large network is developed including research, farmers, advisory and education services.

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

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

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

Please provide further details:

"The Central Animal Register" provides information of individual cattle and "Webdyr" provides information for each farmer about their animals (cattle, sheep and goats).
Overview on homepage of seemen and embryoes stored in the Danish Gene Bank.

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:

Executive orders in relation to production of genetic material and for subsidies for projects and associations.
Link: https://www.retsinformation.dk/Forms/R0710.aspx?id=186181
Link: https://www.retsinformation.dk/Forms/R0710.aspx?id=180393

Link: http://svana.dk/natur/biodiversitet/hvordan-bevarer-vi-biodiversiteten/globalt-2020-maal/abs-protokol/

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:

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:

In example, a mentoring scheme between breeders of native and locally adapted breeds is being established.

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:

Subsidies for breeders, breeder associations and projects in relation to conservation of native or locally adapted animal genetic resources.

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:

- Only few niche products enter the national market in a larger scale:
    - Meat from Danish Black Pied Pig
    - Milk from Danish Red Cattle anno 1970 (expected)
- Some niche products have developed locally:
    - Honey from the Nordic brown bee.

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

See link for strategy: http://lfst.dk/fileadmin/user_upload/NaturErhverv/Filer/Landbrug/Genetiske_ressourcer/Husdyr/Udvalg/Strategi_for_Bevaringsudvalgets_arbejde_med_husdyrgenetiske_ressourcer_2016-2020.pdf

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.*

Nordic cooperation through the Action plan for Nordic Brown Bee.

## 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:

Factors and actions are assessed through collaboration between the Ministry of Food and Agriculture of Denmark together with the Danish Advisory Board for Conservation of Animal Genetic Resources.

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:

For native or locally adapted breeds:

- The old Danish breeds are not economically competitive in productive systems.

- Product prices of produce from old Danish breeds are often higher than similar products sold from exotic animal husbandry due to higher production costs.

- A few breeders of the old Danish breeds do not register breeding information for their animals, which makes it difficult to use these animals in the breeding programme. Some pigs without heritage have been incorporated into the breeding programme through genetic tests proving their relation to the population of the respective breed.

- Exotic breeds are used instead of native or locally adapted breeds.

- Crossbreeding with exotic breeds - in example horse breeds.

- Genetic drift due to small populations.

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:

The Danish Advisory Board for Conservation of Animal and Genetic Resources supervise the Ministry of Food and Agriculture of Denmark about different programs for supporting their preservation of native or locally adapted breeds (see definition of the Advisory Boards tasks in II. 22.1).

- Support of breeders organizations;
- Support to owners of breeding animals of native or locally adapted breeds (Specific breeds of cattle, horses, pigs, sheep, goats and bees);
- Support of projects that are related to preservation of native or locally adapted breeds.

## 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:

## 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:

See question 32.

In addition, DAD-IS are regularly updated with population data both for locally adapted and exotic breeds.

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:

Very few animals of native or locally adapted breeds are kept in zoological parks.

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:

The Danish gene bank for animal genetic resources contains cryopreserved semen from cattle, pigs, sheep, horses and goats, and embryos from cattle, pigs and sheep.

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:

http://lfst.dk/landbrug/genetiske-ressourcer/husdyrgenetiske-ressourcer/genbanken/#c8767

See also question 36.

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

- ○ a. Yes
- ○ b. No

Please provide further details:

Not relevant.

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:

See strategy: http://lfst.dk/fileadmin/user_upload/NaturErhverv/Filer/Landbrug/Genetiske_ressourcer/Husdyr/Udvalg/Strategi_for_Bevaringsudvalgets_arbejde_med_husdyrgenetiske_ressourcer_2016-2020.pdf

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:

Part of the strategy is to develop a plan for involving breeder associations in gene bank activities. Gene bank collections is still ongoing.

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 Danish Gene Bank contains semen and embryos from mainly native or locally adapted breeds. There are many samples from some of the native or locally adapted cattle breeds, but more samples from other breeds are necessary in order to protect them from natural or human-induced disasters. In general Denmark has a veterinary preparedness through The Veterinary Control Offices, which maintain emergency measures against infectious 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:

Material from most breeds are stored in the Danish Gene Bank. See also question 41.

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:

Research still ongoing.

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:

Programmes are implemented through cooperation between the Ministry, universities, livestock keepers and breeding associations as well as on a nordic level (NordGen).

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

Strategy toward 2020 for native or locally adapted breeds:
- Carrying out SWOT-analysis.
- Breeding plans for populations of all breeds.
- Collaboration with breeders of poultry, rabbit and dogs for the purpose of gaining information regarding population size and potential needs for support.
- Focus on expanding the genebank.

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.*

Regional and international collaboration, especially through NordGen.

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

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

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

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

Please provide further details:

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

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

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

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

http://lfst.dk/fileadmin/user_upload/NaturErhverv/Filer/Landbrug/Genetiske_ressourcer/Husdyr/Udvalg/Strategi_for_Bevaringsudvalgets_arbejde_med_husdyrgenetiske_ressourcer_2016-2020.pdf

The present strategy for the work of the Advisory Board focuses on what is prioritized and achievable for the period of the strategy.

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:

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:

This is adressed through the market.

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:

Most breeds are identified in The Central Livestock Register managed by SEGES or in the Ministrys database (for the two native/locally adapted Landrace breeds of pig).

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

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

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

Please provide further details:

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

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

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

Since 1985, a Danish Advisory Board for Conservation of Animal Genetic Resources has existed. The current

Committee was formed in 2013 with a majority of directly elected breeders which assists and advises the ministry. The Danish conservation work is concentrated around original or locally adapted breeds, especially those in risk of extinction.

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:

Members of the Danish Advisory Board for Conservation of Animal Genetic Resources includes both livestock keepers, farmer associations, government agencies and research institutes.

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:

Newsletter for stakeholders.
Articles/publications/news.
Lectures etc. at yearly meeting for breeders.
Through support programmes, example for livestock shows.
Ordered research within the area for use in the administration.

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:

This is a part of the EU-regulation.

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:

The Central Animal Register / Webdyr
Database for horses
Database for pigs
Projects for genomic sequencing of pigs

Further genetic analyses of populations have been made.

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

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

Please provide further details:

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

Characterization?

- ◉ a. Yes
- ○ b. No

Sustainable use and development?

- ◉ c. Yes
- ○ d. No

Conservation of breeds at risk?

- ◉ e. Yes
- ○ f. No

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

Seges - https://www.seges.dk/
Randers Regnskov (Tropical Zoo) - http://www.regnskoven.dk/en/
Dyrenes Beskyttelse - http://www.dyrenesbeskyttelse.dk/
Økologisk Landsforening - http://okologi.dk/
Center for Bio-diversitet - http://www.biodiverse.dk/english/about.htm
Domestic Animal Information Center - http://www.daic.dk/index.php?page=index

Danske Husdyr - http://www.dkhusdyr.dk/ (farmer association)
Foreningen Gamle Danske Husdyrracer - http://www.gamle-husdyrracer.dk/

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

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

Please provide further details:

Research on genetic resources is undertaken by the 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.*

## 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:

Through FAO, ERFP and NordGen.

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:

Additional national funds were added for the period 2015-2018.

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

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

Please provide further details:

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

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

- ○ f. No

Please provide further details:

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

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

Please provide further details:

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

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

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

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

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

Please provide further details:

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

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

- ○ d. No

Please provide further details:

Through NordGen (Nordic Brown Bee), NordMilk (dairy cattle) and ADAPTmap (goats).

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:

DAD-IS through EFABIS and NordGen, and national databases.

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:

For Nordic Brown Bee through NordGen.

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:

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:

Only a supra-national gene bank for plant genetic resources (NordGen) - not for animal genetic resources, which are stored in the Danish Gene Bank.

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:

Through NordGen, ERFP and FAO.

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:

Primarily through NordGen.

## 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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