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: Thailand

## 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).

The progress report of second report on the State of the World's Animal Genetic Resources for Food and Agriculture in Thailand is concluded by data collecting from surveying, database of Department of Livestock Development, and National policy and action plan. It presented the state of biodiversity of animal genetic resources for food and agriculture in livestock sector (the origin and development of applications and the distribution and sharing, risks and threats, and the ability of institutions to manage these resources policy and legislative framework, structure and species conservation). The needs and challenges that have been evaluated in the context of driving forces changes in livestock production. Tools and methods to increase the use and development of genetic resources of animals are explored in a manner to improve the genetic evaluation of economic and conservation. In animals at the part of breeding and control combined with the effects of natural selection will cause great genetic diversity among livestock population diversity, High production animal breeds in the food supply under management control is with stored multi breed. Small farmers mostly are in low external input production systems.

The efficient management of the genetic diversity of animals is essential for food security, sustainable development, and human livelihoods. Livestock sector is faced with several challenges that need rapidly increasing for livestock products, animal disease resistance, climate change adaptation. Many species have a unique or a combination of traits, disease resistance, tolerance of climatic extremes or supply of a particular product that might lead to meet these challenges, but evidence suggests that it has genetic erosion. The Department of Livestock Development is responsibility national organization for animal genetic resource management. We survey, collect, and gather, the data of animal genetic resources for food and agriculture more than 40 breeds. Only 0.5 percents of the breeds is at risk, Kow Lamphun cattle. But it has been resolved by the Department of Livestock Development, FAO, Chiang Mai University, and farmers. Now the number of Kow Lamphun cattle increased. These numbers just presented some pictures of the erosion of genetic diversity. Inventories and especially the survey of population size and structure of breeds, there are not enough now. It is completed just the number of population, but for more information of the breeds should be more categorized. In addition, several of the most widely used, most breeds of high yielding cows within breed, genetic diversity is erosion by the use of cross breeding of species, ignoring to keep pure breed. Genetic diversity is identified to be the most important focus on

the production system. traditional and local breeds associated mainly driven spread rapidly. Intensive livestock production often use a narrow range of breeds to produce meat, milk and eggs is based more on a limited number of breeds to use of the most profitable in the industrial production process. This force has been driven by demand for increased animal products and has been facilitated. Genetic material, production technology, and inputs can be exchanged around the world and industry are involved in increasing the export of livestock production and feeding an increasing human population. Despite policy measures are needed to reduce losses potential of public goods embodied in a variety of animal genetic resources.

Acute threats such as major disease epidemics and disasters of various kinds (droughts, floods, etc.) are also a concern particularly in the case of small, geographically concentrated breed populations. Threats of this kind cannot be eliminated, but their impacts can be mitigated. Fundamental to such plans, and more broadly to the sustainable management of genetic resources, is improved knowledge of which breeds have characteristics that make them priorities for conservation, and how they are distributed geographically and by production system. Policies and legal frameworks influencing the livestock sector are very low progress to the sustainable utilization of animal genetic resources. Development interventions and disease control strategies can also pose a threat to genetic diversity. Development and post disaster rehabilitation programmes that involve livestock should assess their potential impacts on genetic diversity and ensure that the breeds used are appropriate to local production environments and the needs of the intended beneficiaries. Culling programmes implemented in response to disease outbreaks need to incorporate measures to protect rare breeds; revision of relevant legislation may be necessary. Where the evolution of livestock production systems threatens the ongoing use of potentially valuable genetic resources, or to safeguard against sudden disastrous losses, breed conservation measures have to be considered. In vivo conservation options include dedicated conservation farms or protected areas, and support of production factor measures for those who keep risk breeds within their production environments. In vitro conservation of genetic material in liquid nitrogen can provide a valuable complement to in vivo approaches. Where feasible, facilitating the emergence of new patterns of sustainable utilization should be an objective. Particularly in developed countries, niche markets for specialized products, and the use of grazing animals for nature or landscape management purposes, provide valuable opportunities. Well-planned genetic improvement programmes will often be essential if local breeds are to remain viable livelihood options for their keepers. A small number of community based conservation and breeding programmes have begun to address. The approach needs to be further developed. Effective management of animal genetic diversity requires resources including well trained personnel and adequate technical facilities. Sound organizational structures (e.g. for animal recording and genetic evaluation) and wide stakeholder (particularly breeders and livestock keepers) involvement in planning and decision making are also essential.

In a time of rapid change and widespread privatization, national planning is needed to ensure the long-term supply of public goods. Livestock sector development policies should support equity objectives for rural populations so that these populations are able to build up, in a sustainable way, the productive capacity required to enhance their livelihoods and supply the goods and services needed by the wider society. The management of animal genetic resources needs to be balanced with other goals within the broader rural and agricultural development framework. The historic gene flows and current patterns of livestock distribution in the future, genetic resources are exchange among each country. There is a need for the international community to accept responsibility for the management of these shared resources. Support for neighbor countries to characterize, conserve and utilize their livestock breeds may be necessary. Wide access to animal genetic resources for farmers, herders, breeders and researchers is essential to sustainable use and development. Frameworks for wide access, and for equitable sharing of the benefits derived from the use of animal genetic resources, need to be put in place at both national and international levels. It is important that the distinct characteristics of agricultural biodiversity created largely through human intervention and requiring continuous active human management are taken into account in the development of such frameworks.

International cooperation, and better integration of animal genetic resources management into all aspects of livestock development, will help to ensure that the livestock biodiversity is suitably used and developed for food and agriculture, and remains available for future generations.

## 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.

There are gene flow into and out of Thailand of animal as follows:
**1. Beef cattle.** Thailand importsbeef cattle as breeders, frozen semenandfrozen embryosfor genetic improving of beef cattle and to produce commercial breed for fattening.

- **Breeders.** Thailand imports breeders both male and female for Brahman to produce replacement of sire and dam.Brahmanbullcanbeusedtoimproveherdgenetics both natural mating and collecting of frozen semen. Brahmansemenusedtoenhancemore progeny. The other breeds of bulls are imported to produce frozen semen, such as, Charoles and Angus.
- **Frozen semen.** Thailand imports frozen semen of Brahman, Charoles, Angus, Wagyu, and Simental to produce pure breed (Brahman), commercial breed for fattening (Brahman, Charoles, Angus, Wagyu), and dual purpoae (Simental).
- **Frozen embryo.** Thailand imports frozen embryo of Brahman to produce Breeders.

**Sources:** America, Australia, and Europe

There are exports of beef cattle as breeders to Vietnam, Laos, and Cambodia. Breeds are Thai Brahman and Kampaengsan cattle. Including Thailand supports frozen semen of Thai Brahman to Laos, Cambodia, and Myanmar.

**2. Dairy cattle.** Thailand importsdairy cattle as frozen semen for genetics improvement of dairy cow. The major group is Holstein Friesian from Australia, New Zealand, Canada, Europe, and America.
There are exports of dairy cattle as breeders to Vietnam. Thailand also supports frozen semen of dairy cattle to Laos and Myanmar.

**3. Buffalo.** Thailand exports Swamp buffalo as breeders to Cambodia, Vietnam, and China.

**4. Pig.** Thailand imports pig as GGP for genetics improvement of pig. The major group is Large White, Landrace, and Duroc. The minor group is PietrainandHamshire.
**Sources:** America, Britain, and Europe.

There are exports of pig as GP to Vietnam, Laos, and Cambodia. Breeds are Large White, Landrace, and Duroc.

**5. Goat.** Thailand imports both dairy goat and meat goat for genetic improvement as breeders and frozen semen.

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).

There have been no significant changes in patterns of gene flow in Thailand in the last ten years. Because the number import animals is very small compared with the total population.
1. Beef cattle :
Population 9,112,093 heads.
Import: Breeders = 50 heads, Export = 9,150 heads.
Import: frozen semen = 10,391 doses.

2. Dairy cattle:
Population 469,937 heads.
Import: frozen semen = 1 03,442 doses.

3. Buffalo:
Population 1,359,807 heads.
Import: Export = 8,276 heads.

4. Pig:
Population 7,740,575 heads.
Import: Breeders = 257 heads, Export = 104,023 heads.
Import: semen = 690 doses.

5. Goat:
Population 374,029 heads.
Import: Breeders = 151 heads

6. Sheep:
Population 43,733 heads.
Import: Bulls = 11 heads

7. Broiler:
Population 137,725,351 heads.
Import: Breeders = 891,724 heads, Export = 417,361 heads.

8. Layer:
Population 40,861,102 heads.
Import: Breeders = 259,248 heads, Export = 124,594 heads.

9. Native chicken:
Population 57,017,113 heads.
Export: Breeders= 28,810 heads.

10. Duck:
Population 22,722,647 heads.
Import: Breeders= 24,071 heads.

Source: http://www.dld.go.th/ict/stat_web/yearly/yearly51/imex51.html
http://www.dld.go.th/ict/stat_web/yearly/yearly51/stat51.html

## 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.

There have been no significant changes in patterns of gene flow in Thailand in the last ten years because the number import animals is very small compared with the total population.

## 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.*

There have been no significant changes in patterns of gene flow in Thailand in the last ten years because the number import animals is very small compared with the total population.

## 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 | • Genetic improvement for high production, using animal genetic resources in country.<br>• It is risk for native animal. Farmers prefer crossbred.<br>• For high production, small holder farms will decrease, causing decrease of native animal.<br>• It will be developed to mono producing type. |
| Changing demand for livestock products (quality) | high | high | • Genetic improvement for high production, using animal genetic resources in country.<br>• It is risk for native animal. Farmers prefer crossbred.<br>• For high production, small holder farms will decrease, causing decrease of native animal.<br>• It will be developed to mono producing type.<br>• Some demand is increased, such as native chicken, supporting conservation. |
| Changes in marketing infrastructure and access | high | high | They are in big company more than in small holder farm. |
| Changes in retailing | high | high | They are in big company more than in small holder farm |
| Changes in international trade in animal products (imports) | high | high | Import increasing. |
| Changes in international trade in animal products (exports) | high | high | Increasing in some animal, such as, chicken. |
| Climatic changes | high | high | It is country policy to produce animal product in term of adaptation to climate change and mitigation co-benefit to climate change. |
| Degradation or improvement of grazing land | high | high | It changes highly in genetic improvement of grasses and legumes. |
| Loss of, or loss of access to, grazing land and other natural resources | high | high | Loss of grazing land is cause from many factors. But it decrease grazing land for animal. |

| Drivers of change | Impact on animal genetic resources and their management over last ten years | Future impact on animal genetic resources and their management (predicted for the next ten years) | Describe the effects on animal genetic resources and their management |
|---|---|---|---|
| Economic, livelihood or lifestyle factors affecting the popularity of livestock keeping | high | high | Decrease of livestock keeper. |
| Replacement of livestock functions | high | high | Some animal species are decrease and risk, such as buffalo, cattle. |
| Changing cultural roles of livestock | high | high | Use of native cattle and buffalo is decrease. It is risk for endanger. |
| Changes in technology | high | high | Easily to increase population and genetic improvement, such as, dairy, beef, buffalo, goat, and sheep. |
| Policy factors | high | high | EIn Thailand, there is policy to support animal conservation. |
| Disease epidemics | high | high | Loss of AnGR, such as in period of Avian Influenza Virus. |

## 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) | 3 | 0 |
| Cattle (specialized beef) | 8 | 0 |
| Cattle (multipurpose) | 1 | 0 |
| Sheep | 1 | 2 |
| Goats | 1 | 5 |
| Pigs | 6 | 0 |
| Chickens | 4 | 3 |
| Ducks | 3 | 1 |
| Buffaloes | 1 | 0 |

## CHARACTERIZATION

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

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

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

| Species | Baseline survey of population size | Regular monitoring of population size | Phenotypic characterization | Molecular genetic diversity studies – within breed | Genetic diversity studies based on pedigree | Molecular genetic diversity studies – between breed | Genetic variance component estimation | Molecular genetic evaluation |
|---|---|---|---|---|---|---|---|---|
| Cattle (specialized dairy) | 1 | 1 | medium | none | none | none | medium | low |
| Cattle (specialized beef) | 3 | 3 | medium | low | low | low | medium | low |
| Cattle (multipurpose) | 0 | 0 | medium | none | none | none | low | low |
| Sheep | 1 | 1 | low | none | none | none | none | none |
| Goats | 1 | 1 | medium | low | none | none | low | low |
| Pigs | 1 | 1 | medium | low | low | low | medium | medium |
| Chickens | 5 | 5 | low | low | none | low | medium | medium |
| Ducks | 5 | 5 | low | none | none | none | none | none |
| Buffaloes | 1 | 1 | high | low | low | none | 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 | low |
| Research | medium |
| Knowledge | medium |
| Awareness | low |
| Infrastructure | low |

| | Score |
|---|---|
| Stakeholder participation | medium |
| Policies | medium |
| Policy implementation | low |
| Laws | low |
| Implementation of laws | low |

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

| | Description |
|---|---|
| Education | The knowledge materials of AnGR are put in lesson and KM of secondary, high school, and university. In Department of Livestock Development, there are training courses and e-learning course of local animal genetic resources to implement for ABS in CBD. |
| Research | The researches are done in university and Department of Livestock Development about genetics, breeding, utilization, feeding, farm management and climate change of AnGR. |
| Knowledge | Knowledge are extended by training, promoting, document, and IT. |
| Awareness | Awareness was done by training and promoting to stakeholders in agriculture, rural development and environmental management. Especially, it is done by including in lessons of primary and secondary school in community to aware the values of AnGR. |
| Infrastructure | Niche market for native animal, conservation promotion in farmers |
| Stakeholder participation | • *in situ* conservation in contracted farm<br>• *in situ* conservation in private company<br>• learning center for student, farmer in each community by farmers |
| Policies | AnGR is put in National economic, social development plan in part of biodiversity. |
| Policy implementation | Policy implementation is done by training and promoting in farmers, students, and other stakeholders. |
| Laws | • Commission regulation, biodiversity conservation and utilization of the principles and methods of access to biological resources and the benefits of biological resources<br>• Act of Promotion and conservation of native animals (Draft) |
| Implementation of laws | • About ABS, now we use Commission regulation, biodiversity conservation and utilization of the principles and methods of access to biological resources and the benefits of biological resources<br>• Act of Promotion and conservation of native animals (Draft), it is in process of submission<br>• These 2 laws are implemented to CBD. |

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).*

- Now, we have livestock keepers' organization.
- Act of Promotion and conservation of native animals (Draft), it is in process of submission, so we use Commission regulation, biodiversity conservation and utilization of the principles and methods of access to biological resources and the benefits of biological resources to implement for ABS by work together among farmers, Local Administration,

Department of Livestock Development, and other stakeholders. It is in the stage of start. Now farmers in each local area registered local breed.

## BREEDING PROGRAMMES

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

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

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

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

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

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

University

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

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

| Species | Tools | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Animal identification | | Breeding goal defined | | Performance recording | | Pedigree recording | | Genetic evaluation (classic approach) | | Genetic evaluation including genomic information | | Management of genetic variation (by maximizing effective population size or minimizing rate of inbreeding) | | Artificial insemination | |
| | Loc | Ex | Loc | Ex | Loc | Ex | Loc | Ex | Loc | Ex | Loc | Ex | Loc | Ex | Loc | Ex |
| Cattle (specialized dairy) | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Cattle (specialized beef) | 4 | 0 | 4 | 0 | 4 | 0 | 4 | 0 | 4 | 0 | 0 | 0 | 4 | 0 | 4 | 0 |
| Cattle (multipurpose) | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Sheep | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 |
| Goats | 1 | 3 | 1 | 3 | 1 | 3 | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| Pigs | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 0 | 3 | 2 | 3 | 2 | 3 |
| Chickens | 6 | 2 | 6 | 2 | 6 | 0 | 6 | 0 | 2 | 0 | 1 | 0 | 2 | 2 | 4 | 2 |
| Ducks | 2 | 0 | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Buffaloes | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |

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

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

| Species | Breeding method | | | |
|---|---|---|---|---|
| | Straight/pure-breeding only | | Straight/pure-breeding and cross-breeding | |
| | Loc | Ex | Loc | Ex |
| Cattle (specialized dairy) | 0 | 0 | 1 | 0 |
| Cattle (specialized beef) | 0 | 0 | 4 | 0 |
| Cattle (multipurpose) | 0 | 0 | 1 | 0 |
| Sheep | 0 | 0 | 1 | 2 |
| Goats | 0 | 0 | 1 | 3 |
| Pigs | 0 | 0 | 3 | 3 |
| Chickens | 0 | 0 | 4 | 2 |
| Ducks | 0 | 0 | 2 | 0 |
| Buffaloes | 1 | 0 | 0 | 0 |

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

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

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

| Species | Organization of livestock keepers |
|---|---|
| Cattle (specialized dairy) | low |
| Cattle (specialized beef) | medium |
| Cattle (multipurpose) | none |
| Sheep | none |
| Goats | low |
| Pigs | medium |
| Chickens | medium |
| Ducks | none |
| Buffaloes | 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 | high | medium | medium | low | low | none | none | medium |
| Animal identification | high | low | medium | medium | medium | none | none | medium |
| Recording | high | low | medium | medium | low | none | none | medium |
| Provision of artificial insemination services | high | low | medium | medium | low | none | none | medium |
| Genetic evaluation | medium | low | low | low | none | none | none | high |

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

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

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

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

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

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

University

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.

Government do this role by function. The main government organization is Department of Livestock Development. The research organization do as funding support and join as policy makers. University join as consultant.

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

| Species | Policies or programmes |
|---|---|
| Cattle (specialized dairy) | yes |
| Cattle (specialized beef) | yes |
| Cattle (multipurpose) | yes |
| Sheep | yes |
| Goats | yes |
| Pigs | yes |
| Chickens | yes |
| Ducks | yes |
| Buffaloes | 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) | Genetics improve by upgrading with Holstein Friesian, not more than 94%. The aims are optimum milk production and tropical adaptation. |
| Cattle (specialized beef) | Breeding systems are pure breed (native and Brahman), rotational crossing, upgrading with Brahaman, Charoles. The aims are optimum production, tropical adaptation, and good fertility trait from native. |
| Cattle (multipurpose) | Meat and milk from Brahman x simental breeding program to establish new breed. |
| Sheep | Cross breeding for optimum production (meat and wool) and tropical adaptation |
| Goats | Cross breeding for optimum production (meat and wool) and tropical adaptation |
| Pigs | Cross breeding for optimum production and tropical adaptation |
| Chickens | Pure breed in native chicken |
| Ducks | Pure breed in native duck |
| Buffaloes | Pure breed in swamp buffalo |

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) | • Increasing in milk production<br>• Decreasing of fertility |

| Species | Description of consequences |
|---|---|
| Cattle (specialized beef) | • Increasing in milk production<br>• Decreasing of fertility |
| Cattle (multipurpose) | • Increasing in milk production<br>• Decreasing of fertility |
| Sheep | Increasing in production |
| Goats | Increasing in production |
| Pigs | Increasing in production |
| Chickens | • support conservation and utility of AnGR<br>• food security |
| Ducks | • support conservation and utility of AnGR<br>• food security |
| Buffaloes | • support conservation and utility of AnGR<br>• food security |

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 cattle, conservation breeding program of native cattle is overlapped by cross breeding. Farmers don't like to keep pure breed, even though, native cattle have high fertility traits, disease resistance, heat tolerance, and easily raising. If we cannot solve this problem, we cannot conserve native breed.

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) | • Optimum milk production<br>• High fertility<br>• Disease resistant<br>• Adaptation to climate change |
| Cattle (specialized beef) | • Developing native breed in term of pure breed for conservation, utility, and adaptation to climate change<br>• Cross breeding for 1) optimum production, 2) high fertility, 3) disease resistant and 4) adaptation to climate change |
| Cattle (multipurpose) | Cross breeding for 1) optimum production, 2) high fertility, 3) disease resistant and 4) adaptation to climate change |
| Sheep | • Developing native breed in term of pure breed for conservation, utility, and adaptation to climate change<br>• Cross breeding for 1) optimum production, 2) high fertility, 3) disease resistant and 4) adaptation to climate change |
| Goats | • Developing native breed in term of pure breed for conservation, utility, and adaptation to climate change<br>• Cross breeding for 1) optimum production, 2) high fertility, 3) disease resistant and 4) adaptation to climate change |
| Pigs | Pure breed and cross breeding for 1) optimum production, 2) high fertility, 3) disease resistant and 4) adaptation to climate change |
| Chickens | • Developing native breed in term of pure breed for conservation, utility, and adaptation to climate change<br>• Cross breeding for 1) optimum production, 2) high fertility, 3) disease resistant and 4) adaptation to climate change |
| Ducks | Developing native breed in term of pure breed for conservation, utility, and adaptation to climate change |

| Species | Description of future objectives, priorities and plans |
|---|---|
| Buffaloes | Developing native breed in term of pure breed for conservation, utility, and adaptation to climate change |

## CONSERVATION

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

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

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

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

| Species | In situ conservation | Ex situ in vivo conservation | Ex situ in vitro conservation |
|---|---|---|---|
| Cattle (specialized dairy) | low | low | low |
| Cattle (specialized beef) | medium | high | medium |
| Cattle (multipurpose) | none | none | none |
| Sheep | low | medium | none |
| Goats | medium | medium | none |
| Pigs | none | low | none |
| Chickens | medium | medium | none |
| Ducks | medium | low | none |
| Buffaloes | 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 | yes |
| Production traits | yes |
| Non-production traits | yes |
| Cultural or historical importance | yes |
| Probability of success | yes |

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

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

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

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

- Registration of local native animal in each province.
- Registration of farmers that raise local native animal
- Local native animal database system establishment
- Breeding program of local native animal
- Breed certification
- Promotion and supporting local native animal in conservation, utilization, niche market, tourism benefit.
- Promotion and supporting conservation contracted farm for local native animal to work with local culture
- Capacity building in officer, farmers, student.

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.

Department of Livestock Development conserves frozen semen and embryo in gene bank only native cattle and buffalo

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) | 1 | 1 | yes | no | yes | yes | yes |
| Cattle (specialized beef) | 3 | 3 | yes | yes | yes | yes | yes |
| Cattle (multipurpose) | 1 | 1 | yes | no | no | yes | no |
| Sheep | 0 | 0 | no | no | no | no | no |
| Goats | 0 | 0 | no | no | no | no | no |
| Pigs | 1 | 1 | no | no | no | yes | no |
| Chickens | 0 | 0 | no | no | no | no | no |

| 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? |
|---|---|---|---|---|---|---|---|
| Ducks | 0 | 0 | no | no | no | no | no |
| Buffaloes | 1 | 1 | yes | yes | yes | yes | 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.

Expand of *ex situ* conservation in pig, chicken, duck, sheep, and goat to collect tissue, DNA, semen, and embryo by recognizing genetic variability similar to *in situ* conservation.

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.

Planning of establishment of biodiversity research center. One activity is to collaboration about AnGR and gene bank in Asia countries and other bilateral cooperation country out of Asia. (Just only start to discuss)

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.

Kow Lamphun cattle is Thai indigenous cattle. Around 15 years ago, by surveying, there are less than 800 Kow Lampoon dams. Department of Livestock Development worked with expert from FAO, Chiangmai University, contracted farms to set breeding program to conserve Kow Lampoon cattle. First of all, Department bought Kow Lampoon dams from farmers to raise at Payao Livestock Research and Testing Station and Phrae Livestock Research and Testing Station. At that time we had 4 herds of Kow Lampoon cattle. Working group of Kow Lampoon conservation established for Kow Lampoon characteristics following local philosopher of Kow Lampoon cattle. Breeding and selection program were set to establish Kow Lampoon cattle with characteristics following philosopher of Kow Lampoon cattle. In breeding program among 4 herds, there are exchanging of bull and separated to sub herds to prevent from inbreeding. The number of animal were expanded to contracted farms. Now there are more than 1000 Kow Lampoon dam in Thailand. Kow Lampoon is very important because it is cultural, historical heritage. Now contracted farmers raise them integrate with longan orchard and for tourist. More important, Kow Lampoon cattle are used in Royal Ploughing Ceremony.

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

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

Artificial insemination was used to improve genetic of dairy and beef cattle and buffalo in all part of Thailand. Department of Livestock Development has frozen semen producing center. Top bull are selected from herds of Department of Livestock Development and some of them are imported. About AI service is free service charge for farmers. Now there are contracted frozen semen center working under Department of Livestock Development. In other way, Department of Livestock Development used AI for progeny test in dairy cattle.

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

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

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

Artificial insemination is provided by Department of Livestock Development for dairy and beef cattle and buffalo. It is free charge service. The ET program is done only in research. In Breeders' association or cooperatives they work in AI and ET only for there members. Some private company support buffalo bull to Department of Livestock Development for collecting semen support farmers in production and conservation.

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

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

30.1. Please briefly describe the research.

- Artificial insemination research is undertaken in Department of Livestock Development and University.
- Embryo transfer or MOET research is undertaken in Department of Livestock Development and University.
- Semen sexing research is undertaken in University (cattle and pig).
- *In vitro* fertilization research is undertaken in Department of Livestock Development and University.
- Cloning research is undertaken in Department of Livestock Development and University.
- Use of molecular genetic or genomic information for estimation of genetic diversity research is undertaken in

Department of Livestock Development and University.

- Use of molecular genetic or genomic information for prediction of breeding values research is undertaken in University.
- Research on adaptedness based on molecular genetic or genomic information is undertaken in Department of Livestock Development especially in climate change and selection for low carbon emission.

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

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

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

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

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

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

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

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

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

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

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.

In dairy cattle, they used artificial technology to improve genetics and improve reproductive. About molecular biotechnology, they used only in research.

In beef cattle and buffalo, they use artificial technology and natural mating. About molecular biotechnology, they used only in research.

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

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

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

| | Extent of collaboration | Description |
|---|---|---|
| Development of joint national strategies or action plans | extensive | Under biodiversity strategy plan. |
| Collaboration in the characterization, surveying or monitoring of genetic resources, production environments or ecosystems | extensive | Under biodiversity strategy plan. |
| Collaboration related to genetic improvement | extensive | Under biodiversity strategy plan and animal species community strategy plan. |
| Collaboration related to product development and/or marketing | limited | Under biodiversity strategy plan. |
| Collaboration in conservation strategies, programmes or projects | limited | Under biodiversity strategy plan. |
| Collaboration in awareness-raising on the roles and values of genetic resources | limited | Under biodiversity strategy plan. |
| Training activities and/or educational curricula that address genetic resources in an integrated manner | limited | Under biodiversity strategy plan. |
| Collaboration in the mobilization of resources for the management of genetic resources | extensive | Under biodiversity strategy plan |

2. Please describe any other types of collaboration.

Collaboration with other genetic resources in field of organic agriculture and climate change.

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

- They are collaboration under green agriculture production policy. It is suitable for Thailand because farmers have a little number of land for agriculture. They can use land efficiently, low cost production.
- They can use water supply efficiently.
- Farmers can use manure as fertilizer to support adaptation and co-benefit mitigation in term of climate change.
- To support green agriculture production policy.
- Farmers can use buffalo as draft power integrate with plant.

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

- Production planning
- Farm management

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

- If production planning is not balance between animal and plant, it will course not succeed.

## 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).*

Animal genetic resources integrate with plant genetic resources regulatory ecosystem services provided by livestock, they can bring seed of wheat in dung or with their coat. They can promote plant growth and enrich soil formation by their manure. They promote carbon sequestration through dunging in climate change. Animal can use crop residues as feed. They can destroy pest habitat. They can destroy disease vectors and habitats.

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

The outcome are low production cost, green environment, and low emission GHG.

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).

The animal genetic resources were improved and conserved.

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.

- Genetic improvement for adaptation, heat tolerance, optimum for tropical area.
- Improve feeding management for low residual feed intake related to low carbon emission
- Optimum grazing management to keep ecosystem of pasture

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).

- Decrease of pasture ecosystem destruction
- Low carbon production

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).

The animal genetic resources were improved and conserved.

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.

About livestock keepers, they are small holder farms. They raise cattle, buffalo integrate with crop production, such as, paddy rice, fruit orchard, or vegetable orchard. They raise their animal in the cropland after harvesting. The minor group, they raise in public pasture or natural pasture near forest area. The major group is raising in farmer's land. By this reason, plants and animal can get benefit each other. Plant can use animal manure as fertilizer. Animal can use grass and residues in farm as their feed.
There is one sample for ecosystem services about swamp buffalo herd fed in the area of Thale Noi Waterfowl Park (fresh water lagoon, connect with south china sea), Phatthalung Province. They are let to go into the lagoon which there are a lot of seaweed. They are fed with seaweed as roughage. This area is protected by Department of National Park and Wild Life Conservation. But feeding buffalo in this lagoon, farmer do for along time before they protect this area. They protect for waterfowl. This area is one part of Songkla lagoon. The local farmer around this area do many things to be their career, fisherman, duck raising, buffalo raising, tourism. Farmers let them be fed with seaweed in lagoon in daytime. They build mound in lagoon to let buffalo rest on night, give birth. The population size is around 4,000 heads in 2,800 hectare. This activity is recognized by local administration, people and farmers around Thale Noi Waterfowl Park. So there is no problem about this activity.

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.

There is one sample for ecosystem services about swamp buffalo herd fed in the area of Thale Noi Waterfowl Park (fresh water lagoon, connect with south china sea), Phatthalung Province. They are let to go into the lagoon which there are a lot of seaweed. They are fed with seaweed as roughage. This area is protected by Department of National Park and Wild Life Conservation. But feeding buffalo in this lagoon, farmer do for along time before they protect this area. They protect for waterfowl. This area is one part of Songkla lagoon. The local farmer around this area do many things to be their career, fisherman, duck raising, buffalo raising, tourism. Farmers let them be fed with seaweed in lagoon in daytime. They build mound in lagoon to let buffalo rest on night, give birth. The population size is around 4,000 heads in 2,800 hectare. This activity is recognized by local administration, people and farmers around Thale Noi Waterfowl Park. So there is no problem about this activity.

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

The Ministry of Agriculture and Cooperatives has policy of agricultural development plan in each province. It will focus on five main subject, 1) Zoning agriculture, 2) Food safety, 3) Green Agricultural production. These activities concern to green environment. By the activity of agricultural zoning, it supports ecology security.

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.

The Ministry of Agriculture and Cooperatives has policy of agricultural development plan in each province. It will focus on five main subject, 1) Zoning agriculture, 2) Food safety, 3) Green Agricultural production. These activities concern to green environment. By the activity of agricultural zoning, it supports ecology security. This policy includes both plant and animal.

## 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:

It completed before the adoption of GPA. It is compiled as book. After adoption of GPA, there is surveying and characterization of AnGR again. The new breeds from surveying is put in inventory system. They were monitored and characterized again. Some of them are put in website and some are still in book. It is in Thai language.

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:

Comprehensive studies were undertaken before the adoption of the GPA. We recognized the importance of AnGR. Study about phenotypic characterization  covering morphology, performance, location, production environments and specific features in all livestock species of economic importance were undertaken during development of animal

production. Even though, some information has been generated before the adoption of GPA. The situation of country has no enough information. The action is planned and funding to work continuing.

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:

Comprehensive studies were undertaken before the adoption of the GPA, but are done under research program. Even though, some information has been generated before the adoption of GPA, The situation of country has no enough information. The action is planned and funding to work continuing.

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:

Yes, a baseline survey has been undertaken for some species (coverage not increased since the adoption of the GPA). Even though, some information has been generated before the adoption of GPA. The situation of country has no enough information. The action is planned and funding to work continuing.

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:

Yes, responsibilities established before the adoption of the GPA. Responsibilities were established but there is no enough fund to work.

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)?

- [x] 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:

Yes, protocols established before the adoption of the GPA. Responsibilities were established but there is no enough fund to work.

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)
- [x] 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:

No, but action is planned and funding identified. There are population status and trends monitoring but do not separate into each breed.

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).*

- [x] 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:

FAO criteria. Kow Lamphun cattle, there are less than 1000 cows. They are risk as endanger.

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

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

Please provide further details:

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:

To continue work, this action has to have fund to work.

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

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

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

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

- Depend on family income.
- Farmers want to change their career
- Farmers want to raise exotic breed.

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.*

Characterization, inventory and monitoring of trends are generated in some breed. Funding is necessary to generate this action.

## 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:

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:

To generate this action, we have to be supported fund.

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:

To generate this action, we have to be supported fund to generate research.

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

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

Please provide further details:

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

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

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

- Small population
- Farmers don't like native breed to down exotic breed.

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.*

c. Yes, assessments were introduced after the adoption of the GPA

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:

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:

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:

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:

This action is implement to Nagoya protocol. Now we have national regulation.

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:

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

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

Please provide further details:

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

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

Please provide further details:

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

Funding support.

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.*

Native breed research.

## STRATEGIC PRIORITY AREA 3: CONSERVATION

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

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

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

Please provide further details:

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

- Family income.
- Farmers go out their farming career.
- Farmers prefer to raise cross breed than native breed. They don't keep native breed.

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:

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:

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

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

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

Please provide further details:

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

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

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

Please provide further details:

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://www.dld.go.th/trub_ubt/e-Book/hen_porn.html
http://www.dld.go.th/breeding/b/Ready/66yaer_dld_aniversary.html
http://www.dld.go.th/th/

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

- ○ a. Yes
- ○ b. No

Please provide further details:

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

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

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

- Budget
- Income
- Crossbred breed

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:

1. In vivo ex situ conservation. Department of Livestock Development has a project of in vivo ex situ conservation of native animal. About this project, the process is very expensive. There is limited of animal size. By this reason, we will face with inbreeding problem. We solve this problem by joined working with in situ conservation.
2. In vitro ex situ conservation. We can do well in only 2 species, beef and dairy cattle, but not all breeds. In other species, we cannot process the variance of collection similar to population.

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

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

Please provide further details:

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

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

Please provide further details:

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

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

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

- Embryo transfer.
- Frozen semen.
- Contracted conservation farm.

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

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

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

Please provide further details:

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

- ABS of animal genetic resources research.
- Conservation promote.
- Income.

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.*

- Contracted conservation farm.
- Traditional knowledge of animal genetic resources.
- In situ conservation.
- Ex situ conservation in vivo.
- Ex situ conservation in vitro.

## 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://www.dld.go.th/th/

## 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:

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

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

Please provide further details:

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

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

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

Please provide further details:

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

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

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

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

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

Please provide further details:

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

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

Please provide further details:

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:

It is also implemented in CBD.

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

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

Please provide further details:

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

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

Please provide further details:

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

Characterization?

- ◉ a. Yes
- ○ b. No

Sustainable use and development?

- (●) c. Yes
- ( ) d. No

Conservation of breeds at risk?

- (●) e. Yes
- ( ) f. No

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

Thai buffalo conservation and development center (http://www.thaibuffaloconservation.com/book.html).

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:

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.*

Traditional knowledge, culture (sport) support animal genetic resources conservation.
International collaboration about animal genetic resources is done only in research.
Financial resources for the conservation, sustainable use and development of animal genetic resources are from government annual budget, funding agency for research.

## 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:

My country established and strengthened international collaboration in Thai native chicken as collaboration research.

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:

There is national funding for animal genetic resources programmes but it is not increased. Because it is not the first priority in animal production.

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:

We used government budget for implementation.

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:

But we support or participated in animal production.

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:

But we support or participated to obtain training and technologies and to build their information systems in Southeast Asia under cooperative project.

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:

Yes in cooperative research.

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:

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

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

Please provide further details:

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

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

Please provide further details:

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:

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:

Yes (CBD and ABS in Southeast Asia in term of biodiversity).

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:

Yes (CBD and ABS in Southeast Asia in term of biodiversity).

## 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 |
|---|---|---|
| AnGR inventory system | Food security | It is in national action plan of biodiversity. |
| Submit Act of promotion and conservation of native animal | • Implementation of CBD<br>• Implementation of Nagoya protocol | It is in national action plan of biodiversity. |
| AnGR conservation | Food security | • *in situ* conservation<br>• *ex situ* in vivo conservation<br>• *ex situ* in vitro conservation |

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