

Defra Review of Policy on Genetic Resources for Food and Agriculture

Project Manager: Claire Wilding

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1. EXECUTIVE SUMMARY

1.1. The need for a comprehensive policy

Genetic resources are genetic material of current or potential use. The need for a new, comprehensive policy on conservation and sustainable use of genetic resources for food and agriculture (GRFA) is driven by the current lack of a strategic policy; the need to implement new and existing international obligations and commitments; and the creation of Defra, linking biodiversity and agriculture concerns with an emphasis upon sustainable development.

A policy is needed to:

- co-ordinate existing activities
- meet international obligations and commitments
- conserve agricultural biodiversity and support wider biodiversity
- support breeding programmes for sustainable agriculture
- support scientific research
- provide an insurance policy for the future
- conserve our heritage
- provide a resource for other countries

1.2. The policy review

This report is the result of a policy review that extended to all genetic resources relevant to food and agriculture, including plants, animals and microbes. Defra is responsible for policy in this area for England and Wales. The review process involved interviews with stakeholders; a conference bringing together stakeholders to determine priorities for a GRFA policy; a review of international commitments; and a review of GRFA policy in three other European countries.

1.3. Current situation

A number of organisations are involved in activities for the conservation and sustainable use of GRFA, including Defra, government agencies, research institutes, NGOs and industry. Defra currently has no strategic policy on GRFA. Responsibility is split between Research Policy and International Division, for plants and microbes, and a specialist post in Sustainable Agriculture and Livestock Products Directorate, dealing with farm animals. A number of other divisions are involved in activities and policies relevant to GRFA. Defra spends 545 K on supporting ex situ plant collections, and a negligible amount on animal collections. A number of Defra funded research projects are directly or indirectly related to GRFA.

1.4. Recommendations for a framework for GRFA

This report recommends development of a framework for future policy initiatives, consisting of eight key objectives. These would be achieved through a detailed programme covering plant, animal and microbial genetic resources, not yet costed, to be developed with stakeholders. Full recommendations and analysis are given in section 7.

1.4.1. A new framework for conservation and sustainable use of GRFA

Recommendation 1: A framework for conservation and sustainable use of GRFA should be developed as a reference point for further work by Defra and other organisations. Its aim should be the conservation and sustainable use of plant, animal and microbial genetic resources to support sustainable agriculture and horticulture, environmental improvements, rural development, scientific research and conservation of heritage and biodiversity, now and in the future.

Recommendation 2: The framework should be implemented through a detailed policy consisting of rolling programmes for plants, animals and microbes, developed in consultation with stakeholders and subject to available resources.

1.4.2. Scope of policy

Recommendation 3: GRFA policy should focus upon species, varieties and breeds that are not adequately covered by policies on biodiversity, fisheries and forestry.

Recommendation 4: Defra should work with DTI, DoH and other relevant departments to determine who should be responsible for microbial and genetic stock genetic resources, and to develop a suitable policy for their conservation and sustainable use.

Recommendation 5: Defra should work with the Forestry Commission where forest genetic resources and agricultural genetic resources overlap.

1.4.3. Main objectives of the framework

Recommendation 6: The main objectives of a framework for GRFA should be to:

- Co-ordinate activities and improve co-operation
- Facilitate sharing of information on GRFA
- Compile a National Inventory of GRFA
- Support conservation of ex situ GRFA
- Support conservation of in situ GRFA
- Support characterisation and evaluation of GRFA, with particular focus upon plant and animal health, environmental improvements, animal welfare and sustainable agriculture
- Raise awareness of the importance of GRFA with the public, scientific community, breeders, consumers and food industry
- Support GRFA through other Defra policies and programmes

These objectives are expanded in 1.5 below. Responsibility for achieving these objectives would be shared between Defra and stakeholders. The objectives take account of stakeholder priorities and the commitments and priorities of international obligations relevant to GRFA.

1.5. Recommendations for implementation of the framework

The following recommendations highlight key areas for action identified by the policy review. These need to be developed further in the context of the

programmes on plants, animals and microbes, subject to available resources and in consultation with stakeholders.

1.5.1. Co-ordinate activities and improve co-operation

7. Defra should work through existing stakeholder groups. Any initiative to appoint a national facilitator should come from stakeholders.

8. Defra should encourage regular meetings of representatives of the three communities to discuss issues of common interest and give feedback on GRFA policy.

9. UKPGR (UK Plant Genetic Resources Group) should continue to be the main interface between Defra and plant genetic resource stakeholders. Where relevant, Defra should consult other plant genetic resource interest groups not covered by UKPGR, e.g. nature conservation organisations.

10. A permanent National Steering Committee for Farm Animal Genetic Resources should be established.

11. Representatives of both mainstream and at risk farm animal breeds should be consulted.

12. The UK National Culture Collection and the UK Federation of Culture Collections should both be used to communicate with stakeholders in the microbial sector.

1.5.2. Facilitate sharing of information on GRFA

13. Defra should develop a national information system for GRFA, in order to provide information on activities by Defra and other organisations and links to resources including collection databases. The site should link up existing information resources.

14. A review of database projects both within and outside Defra should be carried out, drawing together information on all the current initiatives, with the aim of developing links and synergies.

15. Consideration should be given to developing the CBD National Focal Point as the portal for such an information system.

1.5.3. Develop a National Inventory of GRFA

16. Compilation of a national inventory of GRFA collections and sites should be a key priority. This should be done in collaboration with the devolved administrations and stakeholders, and should be made publicly available where appropriate.

1.5.4. Support conservation of ex situ GRFA

17. Key ex situ collections should be identified.

18. Defra should only commit to long term funding of collections where stringent conditions are met. In general, Defra should support key ex situ collections through other means, e.g. supporting research and co-ordinating activities of other organisations.

1.5.5. Support conservation of in situ GRFA

19. The policy should cover in situ plant GRFA, including wild growing plants, landraces and conservation varieties. In situ plant genetic resources should be included in a national inventory, as a basis for determining what further work is necessary.

20. Defra should work with nature conservation organisations on in situ plant GRFA.

21. Defra should consider the desirability of supporting indigenous breeds at risk where they have a positive contribution to make to the environment and heritage value of the countryside, for example, through the England Rural Development Programme. The planned consultation on the future of rural development programmes could provide an opportunity for seeking stakeholder views on the relative merits of this as against other objectives.

1.5.6. Support characterisation and evaluation of GRFA, with particular focus upon plant and animal health, environmental improvements, animal welfare and sustainable agriculture

22. Defra should co-ordinate stakeholders to develop a programmed approach to characterisation and evaluation of GRFA.

23. For plants, public funded development of GRFA is required to develop new genetic material for use in crop plants. Defra should learn from the German National Evaluation Programme, as a model for industry and government working together.

24. Defra should support development of GRFA, including for mainstream farm animal breeds, in order to meet objectives other than direct performance, such as animal health and welfare, biodiversity, reduced environmental emissions and development of industrial crops to support environmental objectives.

1.5.7. Raise awareness of the importance of GRFA with the public, scientific community, breeders, consumers and food industry

25. Defra should work with stakeholders to raise awareness of the importance of GRFA. Awareness raising should be linked to creation of markets to support GRFA.

26. This report should be published in order to communicate the importance of GRFA and the activities undertaken by government and others to conserve and sustainably use GRFA.

1.5.8. Support GRFA through other Defra policy and programmes

27. GRFA policy and biodiversity policy should be closely linked in order to identify possible synergies.

28. A key priority for future work should be a review of Defra policies impacting on GRFA, with the aim of building upon synergies and reducing or removing conflicts.

29. The review of policies should focus in particular upon the negative impacts identified by stakeholders of Defra policies upon breeds at risk.

2. THE NEED FOR A POLICY ON GENETIC RESOURCES FOR FOOD AND AGRICULTURE

2.1. Relationship to Defra's objectives

The conservation and sustainable use of genetic resources is relevant to Defra's objectives concerning a sustainable, competitive food supply chain, sustainable and adaptable farming and sustainable management of natural resources.

Diverse genetic resources are important for maintaining an efficient and sustainable farming industry, as this allows development of varieties and breeds to cope with new demands. Genetic selection also has important consequences for animal health and welfare, and could have a role to play in reducing environmental pollution from livestock. Conservation of biodiversity is one key aim for Defra, yet diversity of domesticated plants and animals has been somewhat neglected. There is therefore a strong argument for Defra to engage with genetic resources and to give direction to the collection, conservation, evaluation and use of genetic resources as a further tool in achieving its objectives.

2.2. The Rationale for a New Policy

The need for a new policy on conservation and sustainable use of genetic resources for food and agriculture (GRFA) is driven by the current lack of a strategic policy; the need to implement new and existing international obligations and commitments; and the creation of Defra, linking together biodiversity and agriculture concerns with an emphasis upon sustainable development.

The conservation and sustainable use of GRFA is also a widely supported international objective as a contribution to efforts to achieve poverty elimination and world food security. We have a continuing role to play in this. More detailed arguments for developing a new, broader policy on the conservation and sustainable use of all GRFA are outlined below.

2.2.1. To co-ordinate existing activities

Current Defra activities in this area (set out below) are fragmented, and would benefit from better co-ordination. Activities outside Defra would also benefit from some central facilitation. A policy on GRFA would help to reduce duplication of effort, increase efficiency and effectiveness and give direction to activities both within and outside government.

2.2.2. To meet international obligations and commitments

The UK has committed to take action to conserve GRFA through a range of international agreements, including the Convention on Biological Diversity, the Global Plan of Action on the Conservation and Sustainable Use of Plant Genetic Resources for Food and Agriculture and the International Treaty on Plant Genetic Resources. Work is progressing in the international arena, and it is likely that an agreement on farm animal genetic resources will be developed in the near future. We currently have no strategic approach to

meeting these obligations. A policy and programme for conservation and sustainable use of GRFA is essential if we are to fulfil these obligations. International commitments are examined below in section 4.

2.2.3. To conserve agricultural biodiversity and support wider biodiversity

Defra is committed to supporting biodiversity. However, while significant progress has been made on conserving “wild” biodiversity, far less has been done to conserve the diversity of domesticated plants and animals, many of which do not exist in the wild. A key argument in support of biodiversity is the need to protect species of potential use in the future; this argument is particularly strong where food-related species are concerned. Farming shapes over 70% of the UK landscape, so the plants cultivated and animals reared have a major impact upon biodiversity and on the character and appearance of the countryside. Synergies between native farm animal breeds and the management of biological diversity in environmentally sensitive areas could be usefully developed. A GRFA specific policy is required to conserve the diversity within agricultural and horticultural species not protected by biodiversity policy, and to exploit synergies between agricultural and wild biodiversity.

2.2.4. To support breeding programmes for sustainable agriculture

Conserving and using GRFA for breeding programmes is one important way of meeting Defra’s objective to “promote sustainable, diverse, modern and adaptable farming”. Development of genetic resources can help farmers make efficiency gains, and also adapt to changing diseases, environmental conditions and consumer demands. Development of industrial crops such as miscanthus requires characterisation and development of genetic resources; and it is likely that species of little economic value today could have industrial uses in the future. The vegetable gene bank at HRI, supported by Defra, provides an input to a number of Defra-funded research projects. Ex situ collections are also important for industry. For example, industry accounts for approximately 50% of use of the CABI Bioscience collection of fungi, bacteria and nematodes, and 40% of use of the National Cereal Collection.

2.2.5. To support scientific research

Research into plant genetics is important for the agriculture and horticulture industries, as well as for broader science. Ex situ collections are an important resource for this. For example, the John Innes Centre pea collection has been extensively used for genetics research; and work on the model plant arabidopsis by HRI and others is improving understanding of brassicas. Collections are also important for research not related to food and agriculture. For example, bacteria specimens from the CABI collection helped identify the mechanisms involved in antibiotic resistance.

2.2.6. To provide an insurance policy for the future

Genetic resources will be needed to help agriculture adapt to new challenges in the future. Species or varieties of little economic value today may become more important in the future, as research progresses and demands change. Some future needs may be predictable. For example, climate change could necessitate development of drought resistant crops and breeds; or public

demands could require use of plants and animals suited to less intensive farming systems. There will also be unpredictable challenges, such as new pests and diseases. Industry will not act to deal with distant or highly uncertain threats. This market failure is one reason for government to take action to conserve GRFA as an insurance policy for the future.

2.2.7. To conserve our heritage

Traditional British breeds, such as Saddleback pigs and Gloucester cattle are part of our cultural heritage. There is an argument for preserving these genetic resources regardless of their economic value, in the same way that we preserve non-living aspects of our heritage, like historic buildings. Some livestock breeds are an important part of regional identity – for example, Yorkshire’s Swaledale sheep, or Herdwick sheep in the Lake District. Other breeds have a part to play in encouraging regional tourism, e.g. at rare breed farm parks. Old plant varieties that are no longer commercially available are also seen as having heritage value.

2.2.8. To provide a resource for other countries

GRFA are also relevant to government policies on international development. The White Paper on International Development states that the UK will “continue to help poor people in developing countries ... to manage and benefit from their biodiversity”.¹ UK genetic resources are important in the international context. UK collections hold accessions of plant material from all over the world, and are a resource that may be used by all countries. The UK has a long history of supplying the world with improved animal genetic resources from the rich diversity of breeds adapted to the wide range of environmental conditions here.

2.3. Scope of the Review

Defra is responsible for policy on genetic resources for food and agriculture (GRFA) for England and Wales. This review is concerned with all GRFA, including micro-organisms, animals and plants. It is concerned with genetic resources of current or future use, including both cultivated and wild plants, and traditional and commercial livestock breeds. The review considers to what extent fish and forestry should be covered by a new policy. The review does not cover plant and animal pathogens.

The review is concerned with conservation of both conventional and genetically modified GRFA, and with potential uses of GRFA through both conventional and genetic modification techniques. However, the review stops short of considering whether genetic modification of plants, animals and microbes is desirable, or how such technology should be controlled. These questions are dealt with elsewhere in Defra.

The review is the first part of a two-stage process. Subject to availability of resources, it is intended that access and benefit sharing arrangements for GRFA will be reviewed separately next year.

¹ Eliminating World Poverty – A Challenge for the 21st Century

2.4. The Policy Review Process

The process of conducting this review involved speaking to individual stakeholders; a conference, “Harvesting Diversity”, which drew together the plant, animal and micro-organism sectors; visits to other European countries to learn about their approaches to GRFA; and a review of our international obligations. A wide range of stakeholders representing the different interest groups were consulted. Full details of stakeholders involved in the process are at annex 1.

3. CURRENT POSITION – UK

3.1. Current State of Genetic Resources for Food and Agriculture (GRFA)

A detailed commentary on the current state of GRFA in the UK is at annex 2. The following is a summary of the position.

3.1.1. Plants

All major commercial crops growing in the UK are of non-native origin. However, the UK holds ex situ collections of crop genetic resources that are internationally important, including potatoes, cereals, vegetables, top fruit, soft fruit, peas, hops, grasses and forages. There is little in situ conservation of crop genetic resources.

3.1.2. Animals

There is a wide diversity of native and imported farm animal breeds in the UK, including up to 85 sheep, 72 cattle, 15 pig and 8 goat breeds listed on the Defra national database. Farm animals can be divided into mainstream breeds, those widely used for commercial production; and breeds at risk, which includes locally adapted, distinctive and rare breeds. In situ conservation is the prime method of conserving farm animals, with ex situ methods used as a back up. Ex situ conservation involves cryopreservation of semen, eggs and/or embryos.

3.1.3. Micro-organisms

Micro-organism GRFA include bacteria, yeasts, fungi and algae. The UK National Culture Collection co-ordinates nine public service collections of micro-organisms, a number of which are relevant to food and agriculture. Collections are also held by a number of institutes, universities and researchers. Only a small percentage of the microbes in existence have been isolated in such collections. Soil biodiversity is potentially of major importance for food and agriculture, but our understanding of it is currently very low.

3.1.4. Genetic stocks

These are resources developed in the laboratory for genetics and genomics research. For example, the Nottingham Arabidopsis Stock Centre holds lines of arabidopsis, a simple brassica used as a model plant for research. Some genetic stocks are lodged with culture collections, but their maintenance may be subject to financial constraints.

3.1.5. Fish

Fisheries are conserved through management by the Environment Agency; the Common Fisheries Policy, which sets quotas in order to conserve stocks; and environmental policies protecting marine and fresh water habitats, such as the UK Biodiversity Action Plan. There are no activities specifically concerned with fish genetic resources.

3.1.6. Forestry

Forest genetic resources are the responsibility of the Forestry Commission. The Forestry Commission's work in this area is focussed upon the

provenance of planting material. It includes protecting the genetic integrity of ancient woodland nodes by surrounding them with buffer areas, planted with material of local provenance.

3.2. Current Policy and Activities

3.2.1. Defra policy

Defra has not previously had a strategic overarching policy on genetic resources for food and agriculture. Policy objectives were defined for conservation of ex situ plant genetic resources, these are at annex 3.

3.2.2. UK Country Report on Farm Animal Genetic Resources

Concurrently with this review, Defra formed a National Consultative Committee of animal genetic resource stakeholders to write a UK country report on farm animal genetic resources. This was recently submitted to FAO as the UK's contribution to the First Report on the State of the World's Animal Genetic Resources. The National Consultative Committee included stakeholders representing both mainstream and at risk breeds.

The National Report makes the following key recommendations for actions at national level:

- Create a national action plan for animal genetic resources
- Create a national steering committee on animal genetic resources
- More effective co-ordination of NGOs and breed organisations
- Harness UK's expertise in management of minority animal genetic resources and genetic conservation in order to disseminate a wider understanding of animal genetic resources.
- National co-operation between government, private organisations and individuals on breeds at risk, with pump-priming funding from government

Full details of the National Report's recommendations are at annex 4.

3.2.3. Funding of ex situ GRFA

Defra funds some collections of ex situ plant GRFA, detailed below. Blood samples from breeds at risk are being conserved as a resource for future research. As part of the National Scrapie Plan, Defra will soon be funding a gene bank to preserve scrapie-susceptible genotypes. Defra also funds the National Collection of Plant Pathogenic Bacteria, which lies outside the scope of this review.

Project	2002/3 funding, £'000	Institute
National Fruit Collection – curation and scientific direction. (Apples, pears, plums and other top fruit)	289	Brogdale Horticultural Trust (curation) and Imperial College at Wye (science)
Vegetable genebank	239	Horticulture Research International
National Pea Collection	17	John Innes Centre
Cryopreservation of blood samples from breeds at risk	10	Cellmark Diagnostics, Abingdon with RBST
Cryopreservation of semen	10	The Sheep Trust

from native sheep breeds during FMD.		
Total:		565

3.2.4. Research relevant to GRFA

Defra funds research specifically relevant to conservation of GRFA, outlined below.

Project	2002/3 funding, £'000	Institute
Ecogeographic distribution (exploring distribution of genetic variation in populations)	53	Birmingham University
Cryopreservation (of cultures)	60	CABI Bioscience
Forage genetic resources	37	IGER
Total:	150	

There are a number of other research projects that involve use or development of GRFA. A full list is at annex 5. Examples include:

- Miscanthus – investigating diversity in wild germplasm to support a breeding programme, including establishment of a collection;
- Oilseed rape - research on pod shatter resistance;
- Conservation grazing – exploring potential uses for breeds at risk;
- Sheep - identifying genetic markers for carcass and meat quality traits.

3.2.5. GRFA co-ordination

Defra also plays a role in co-ordination of organisations with an interest in genetic resources. For plants, Defra provides the secretariat to the UK Plant Genetic Resources group (UKPGR). This draws together various research institutes, NGOs and private companies with an interest in plant genetic resources. Defra provides the UK National Focal Points for plant and farm animal genetic resources, who represent the UK at the FAO Intergovernmental Commission on Genetic Resources for Food and Agriculture. Defra also currently chairs the steering committee for the European Regional Focal Point for animal genetic resources (see 4.2.3).

3.2.6. Other Defra activities

The UK National Co-ordinator for animal genetic resources keeps a national database of farm animal breeds,² linked to the FAO Domestic Animal Diversity Information System (DAD-IS), which relies upon information from NGOs and breed societies.

3.3. Activities by other Government bodies, NGOs and Industry

² Latest version contained in UK Country report, available at: <http://defraweb/science/publications/>. Defra plans to make the database publicly accessible in the future.

Details of activities by other government departments, agencies, sponsored bodies and other organisations are at annex 6. The following is a summary.

3.3.1. Other government departments

DTI, through OST and the BBSRC, funds activities related to the conservation and sustainable use of GRFA by a number of research institutes (including the John Innes Centre, the Roslin Institute and the Institute of Grassland and Environmental Research). DfID supports activities in developing countries, which can involve UK organisations.

3.3.2. Devolved administrations

SEERAD and DARDNI are responsible for GRFA policy in Scotland and Northern Ireland respectively. The Welsh Assembly does not have devolved responsibility in this area.

3.3.3. Advisory bodies and sponsored bodies

English Nature and the Countryside Council for Wales are responsible for SSSIs, Nature Reserves and the implementation of Biodiversity Action Plans. They currently have no role in conservation and sustainable use of GRFA. RBG Kew, CABI and HRI hold important collections of GRFA and conduct relevant research. Two levy bodies, MLC and HGCA, are active in the genetic improvement of certain farm animal species and crops respectively, and invest in national breeding programmes.

3.3.4. NGOs

There are three main NGOs (the Rare Breeds Survival Trust, Rare Breeds International and the Sheep Trust) which work in the conservation of rare or heritage farm animal breeds. The Henry Doubleday Research Association holds a collection of heritage vegetable varieties, the Heritage Seed Library, and works with amateur gardeners to ensure their conservation.

3.3.5. Industry

Commercial breeding companies and individual plant and animal breeders maintain their own collections, in the form of preserved seeds and tissues, cryopreserved semen and embryos or living organisms.

4. INTERNATIONAL AND EU

4.1. International obligations

International action in the field of conservation and sustainable use of genetic resources is increasing rapidly. Since the adoption of the Convention on Biological Diversity, a number of voluntary and legally binding agreements have been adopted or are under discussion. Significant agreements affecting conservation and sustainable use of genetic resources for food and agriculture (GRFA) are:

- The Convention on Biological Diversity (CBD)
- The International Treaty on Plant Genetic Resources for Food and Agriculture (IT)
- The Global Plan of Action for the Conservation and Sustainable Utilisation of Plant Genetic Resources for Food and Agriculture (GPA)

Many of the "obligations" of the CBD and IT are not specific obligations as such, and are conditioned by phrases such as "as far as possible" and "as appropriate". The GPA is an entirely voluntary agreement. However, having signed up to these instruments we have undertaken to implement them, and have a duty to do so as far as is possible and appropriate. We must therefore assess these obligations, principles and recommendations against our national needs and implement them in an appropriate way. Full details of these agreements are at annex 7.

4.1.1. Convention on Biological Diversity

The main obligations relevant to the conservation and sustainable use of GRFA relate to:

- Identification and monitoring of genetic resources important for their conservation and sustainable use (Article 7) – “paying particular attention to ... those which offer the greatest potential for sustainable use.”
- In situ conservation (Article 8);
- Ex situ conservation (Article 9);
- Sustainable use of genetic resources (Article 10); and
- Research and training (Article 12).

4.1.2. International Treaty on Plant GRFA (IT)

The objectives of the IT are the conservation and sustainable use of plant GRFA and the fair and equitable sharing of benefits with the aim of achieving sustainable agriculture and world food security. The key obligations are:

- To promote an integrated approach to the exploration, conservation and sustainable use of plant GRFA (Article 5). Possible actions identified include both ex situ and in situ conservation.
- To promote the sustainable use of plant GRFA (Article 6). Possible measures identified include promoting diverse farming systems, plant breeding efforts and expanded use of locally adapted crops and varieties.
- To integrate the above measures into agriculture and rural development policies (Article 7).
- To encourage all relevant institutions to participate in international networks (Article 16).

4.1.3. The Global Plan of Action for the Conservation and Sustainable Utilisation of Plant GRFA (GPA)

The GPA has 20 priority activity areas covering in situ conservation and development, ex situ conservation, utilisation of plant GRFA and institutions and capacity building. Priorities particularly relevant to a Defra policy on GRFA are:

- Surveying and inventorying plant GRFA
- Developing new markets for local varieties and diversity-rich products
- Building strong national programmes
- Constructing comprehensive information systems for plant GRFA

4.2. Other International activities

4.2.1. The Global Strategy for the Management of Farm Animal Genetic Resources

Work is less advanced for farm animals than for plants, but is gathering international momentum in view of the rapidly growing global demand for livestock products. National governments have been invited by FAO to participate in a Report on the State of the World's Animal Genetic Resources. The UK Country Report was completed in November 2002, and the global Report is due to be completed in 2005. Recommendations from the UK report are at annex 4.

4.2.2. The European Co-operative Programme for Crop Genetic Resources Networks

This is a collaborative programme among most European countries aimed at facilitating long-term conservation and increased utilisation of plant GRFA in Europe. The programme is financed by participating countries and is co-ordinated by the International Plant Genetic Resources Institute (IPGRI). A number of UK stakeholders are actively involved in a range of collaborative projects.

4.2.3. The European Focal Point for Animal Genetic Resources

The UK plays an active role in driving forward collaborative actions in support of conservation activities across Europe. A limited budget is provided by 10 donor countries including the UK. Two projects under the first call for action were approved in December 2002, one to draw up guidelines on ex situ conservation of animal breeds in Europe (9 participating countries) and the other on developing databases across Europe (16 countries).

4.2.4. Proposals for a Global Network of Biological Resource Centres

The UK is participating in negotiations facilitated by the OECD for the establishment of a global network of Biological Resource Centres. The negotiations follow recommendations made by an OECD Working Group.

4.3. European Union activities

4.3.1. GENRES

Council regulation EEC 1467/94 (known as GENRES) established a 5-year programme of funding for the conservation, characterisation, collection and utilisation of genetic resources in agriculture. Funding has come to an end, but the Commission has made proposals for a new regulation, likely to be adopted in 2003. In order to take advantage of funding under the new regulation, the UK will need to provide matching funding and develop a national programme on GRFA for the specific purposes of this regulation. The national programme must include a significant element of multinational projects.

4.3.2. Agri-environment

Article 13 of the implementation regulation of the Rural Development Regulation makes provision for payments in support of rare breeds and landraces in situ. Payments can be made to farmers “rearing farm animals of local breeds indigenous to the area and in danger of extinction” and “preserving plant genetic resources naturally adapted to the local and regional conditions and under threat of genetic erosion”. The genetic resources must play a role in maintaining the environment of the area.

These measures are not implemented in the UK due to budgetary constraints. Breeds at risk may be supported through the Rural Enterprise Scheme, under projects to develop new markets. However, support of breeds at risk is not a consideration in assessment of bids for agri-environment schemes. We are not aware of any landraces in England that would qualify for support under the in situ plant section.

4.3.3. Framework 6

The Sixth Framework Programme will provide more than £11 billion towards EU research and technological development between 2002 and 2006. There may be opportunities for projects concerning GRFA, but no specific provision has been made.

4.3.4. Plant varieties legislation

Plant varieties are controlled at both national and European level. Legislation can cause problems for growers interested in old heritage varieties and also for organic varieties. Changes to EU legislation in the area of heritage varieties are being discussed, which would establish implementing measures for the marketing of conservation and 'amateur' vegetable varieties and preservation mixtures. The Forum on Seeds for a Sustainable Environment (FOSSE), a stakeholder forum, is involved in discussion of these issues, in addition to the issue of possible changes to variety performance testing. The acceptance criteria applied to performance testing determine the nature and range of genetic resources available to farmers using agricultural crop varieties. Changes to increase the relevance of these criteria to low-input or organic growers are under discussion.

5. EXAMPLES FROM OTHER EUROPEAN COUNTRIES

5.1. General comments on GRFA policy in other countries

Models for GRFA policy differ between countries. The Netherlands operates a highly centralised system for managing GRFA, whereas the federal structure of Germany requires a far more decentralised approach. Both France and Germany have set up a dedicated agency for genetic resources. The Nordic countries have the Nordic Genebank (NGB), which acts as both a facility for conserving GRFA and an organisation for co-ordinating efforts between countries. NGB operates alongside national policies for GRFA.

The NGB is the product of an original plan to have three central genebanks covering the whole of non-communist Europe – NGB for the Nordic countries; the German genebank for mid-european countries; and a genebank in Bari, Italy for southern-european countries. NGB was the only multi-country genebank to become established under this plan.

5.2. Issues arising for consideration in Defra policy

5.2.1. Organisation of policy

In Norway and Germany, national programmes for plants, animals and (where applicable) forests, microbes and fish are dealt with separately. Norway and Germany both have an overarching expert panel overseeing general GRFA policies and issues. However, both countries chose not to have this panel directly involved with the individual national programmes, due to the very different technical issues between the programmes.

Issues for Defra policy:

- Is there a need for an overarching body to oversee GRFA policy?
- Animal, plant, microbial, forest and aquatic technical issues are very different, so programmes for each area should be developed separately.

5.2.2. Co-ordination of stakeholders

Germany, Norway and Sweden all have stakeholder groups overseeing GRFA policy and national programmes. Scientists are strongly involved.

Issues for Defra policy:

- Should stakeholders be involved in national programmes through formal committees?

5.2.3. National Inventory

The National Inventory is the key priority for the Swedish national programme. All collecting and evaluation work flows from the National Inventory. In Germany, the Federal Ministry of Research is developing a catalogue of all collections which will form the German node of BioCASE as well as serving as a National Inventory.

Issues for Defra policy:

- Need to prioritise the development of a national inventory and use as a basis for priority setting and further work.
- Consider making National Inventory available on the web
- Links between National Inventory and web-based projects

5.2.4. Ex situ GRFA

Plants In the Nordic countries, collecting has been done extensively by NGB for the major crops. The national programmes are therefore focussing upon native GR not covered by NGB, such as ornamentals, garden vegetables and medicinal plants and herbs. Ex situ collections are largely publicly funded.

Animals Germany is monitoring breed numbers, and plan to take semen samples from breeds when numbers drop below 200. These would then be used if numbers dropped below 50, to ensure diversity is maintained.

Issues for Defra policy:

- Consider need to co-ordinate animal genebanks in collaboration with NGOs and the European Regional Focal Point.

5.2.5. In situ GRFA

Plants In all three countries, there was relatively little in situ conservation of plant GRFA. However, they had appreciated the need to link biodiversity and GRFA more strongly.

Animals The Nordic countries are focussing efforts on breeds within national control. Holsteins and poultry breeds are not covered, since these genetic resources are imported and are not controlled by national animal breeding legislation. Native mainstream breeds, such as the red breed cattle, are covered. One focus of work is determining what sustainable breeding means.

Germany pays subsidies for rare breeds, but the problems encountered have led some states to end these schemes. The main difficulty is the inefficiency of making per-head payments to farmers.

Issues for Defra policy:

- Consider how far biodiversity and GRFA policies are complimentary.
- It may be necessary to focus on breeds indigenous to the UK. Imported genetic resources may be difficult to influence.
- Direct payments to farmers may not be the best way to support rare breeds.
- Keep in touch with developments on rules for payments for rare breeds under the Rural Development Regulation.

5.2.6. Promoting use of GRFA

Nordic Genebank for Farm Animals is funding research on using genetic information, for example a “genetic sustainability” mark, in product branding.

Issues for Defra policy:

- Is branding by breed or genetic history an area for the GRFA national programme?

5.2.7. Characterisation and evaluation

Germany has developed a model national evaluation programme, drawing together the private sector, the public sector genebank and research institutes, in order to benefit all parties. Current work is evaluating cereals, this will be used as a model for further evaluation work.

Issues for Defra policy:

- Use German evaluation programme as a model for encouraging stakeholders to work together on evaluation of GRFA.

5.2.8. Information systems

Germany and the Nordic countries have developed extensive web resources for GRFA, including databases of accessions, livestock databases, information on breeds and information on different funding mechanisms available. Germany has developed a portal that searches 4 different web based databases. Germany is also compiling a database of meta-information for in situ GRFA, which will include results of surveys, university research and other data.

Issues for Defra policy:

- Need to review the various database projects relevant to GRFA and biodiversity, and ensure activities are joined up.
- Should consider using German experience to develop own information systems for GRFA.
- Any national inventory should be designed to fit with and build upon existing information systems and database projects, within Defra and elsewhere.

5.2.9. Raising awareness

The Swedish national programme for plant GRFA has generated great interest, due to its emphasis upon collecting material from home gardens. Material is displayed for the public in open-air museums.

Issues for Defra policy:

- Consider involving public gardens and attractions such as the Eden project in awareness raising activities.

5.2.10. Plants

In Germany, stakeholders are organised into groups mirroring the ECP/GR groups. These report on progress and priorities to both the national programme and ECP/GR. Germany is anticipating the need to report back on progress towards meeting the Global Plan of Action.

Issues for Defra policy:

- Consider future need to report on Global Plan of Action.
- Involve ECP/GR group members in national programme, possibly organised into groups corresponding to ECP/GR networks.

5.2.11. Farm animals

In Germany, the same individual is responsible for animal GRFA and Zootechnic regulations. German colleagues thought it important for these two roles to be integrated. Germany has a monitoring system for farm animal breeds, based on effective population size. Action is triggered when effective population size falls below 200, and further when it falls below 50. This system has been jointly developed with stakeholders.

Issues for Defra policy:

- Is there a need for greater co-ordination between animal GRFA and Zootechnic policy in Defra?
- Is there a need for Defra to develop the national animal genetic resources database in collaboration with stakeholders to facilitate national monitoring of breeds at risk?

5.2.12. Microbes

There is little work on microbial GRFA in the countries visited. There are no national programmes in Norway and Sweden, and no joint Nordic work. Germany has started work, and has compiled a database of collections in research institutes. Germany is trying to co-ordinate with a large national collection used for medical purposes.

Issues for Defra policy:

- Need to work in partnership with other government departments that have an interest in microbes, i.e. DoH and DTI.

6. RESULTS OF CONSULTATION

6.1. Stakeholder views - priorities

Stakeholder views were gathered through one-to-one meetings and through a conference, “Harvesting Diversity”, drawing together the microbial, animal and plant sectors. Annex 8 contains summaries of responses gathered in the one-to-one interviews, and annex 9 contains a matrix of priorities drawn up by delegates at the conference. This section sets out the priority issues identified, both at the conference and in individual meetings.

6.1.1. Conference priorities

The key priorities and points arising from the conference were:

- importance of characterisation, evaluation and use of GRFA – it should not be merely “stamp collecting”
- support for broadening activity beyond the current focus on ex situ resources for plants and microbes
- emphasis upon raising public awareness
- importance of in situ microbe and plant genetic resources
- the need for networks (although ideas differed on how this should be done)
- potential for overlap with work of nature conservation agencies
- importance of genetic stocks
- concerns over co-ordination between Defra and devolved administrations
- difficulty of identifying microbial genetic resources specifically relevant to food and agriculture

6.1.2. Plant breeders’ priorities

The priorities for this group were to maintain ex situ collections, make germplasm accessible, encourage research in plant breeding and improve access to well characterised material in all countries. One stakeholder was concerned that germplasm collections were insecure and under-utilised, and felt collections should be funded by Defra, not BBSRC. There was a need for more information about UK collections, perhaps through a central information point. Another stakeholder felt that the existing system of plant breeders’ rights worked well and did not stifle biodiversity.

6.1.3. Other plant stakeholders’ priorities

This group included HDRA, NFU, BBSRC and the chair of UKPGR. The key priority was characterisation and further exploration of collections. Further collecting was not seen as a priority. Some stakeholders felt that government’s role was to concentrate upon GRFA that industry would not fund, and to focus on areas of wider public interest such as nutrition, long term conservation and crops of potential future industrial use. BBSRC fund a number of plant collections, however the view of the BBSRC and a number of other bodies is that this is not strictly within the organisation’s remit. This issue should be resolved.

6.1.4. Mainstream breed stakeholders’ priorities

A number of stakeholders felt it was important that commercial livestock was seen as part of GRFA, it should not only be about rare and traditional breeds. The emphasis was on use and development of genetic resources, rather than

conservation. The role for government was seen as co-ordination, e.g. acting as an information hub and co-ordinating the activities of genebanks. Defra also had a role in informing and educating. Defra research should focus on meeting Defra objectives through genetics, e.g. reduced emissions and improved health and welfare. It was also important to consider the impact of other Defra policies, e.g. animal transport regulations, upon the development and export of commercial livestock genetic resources.

6.1.5. Breeds at risk stakeholders' priorities

The prime concern for stakeholders was that government should take account of the impact of all policies upon breeds at risk. Effects of existing and future policies were seen as the greatest risk to rare breeds, with examples cited including the Over Thirty Months Scheme, the National Scrapie Plan and the threat to small and medium sized abattoirs. The general decline of the UK livestock industry was also of prime concern.

Stakeholders wanted the government to implement the section of the Rural Development Regulation concerned with payments to keepers of rare breeds. Other priorities were research on the particular adaptations of breeds at risk in order to identify uses; developing networks; and assistance with converting breed monitoring data into electronic format.

6.1.6. Microbial sector priorities

Stakeholders wanted a government policy to cover all genetic resources, not just those relevant to food and agriculture. It is not possible to define entire microbial collections as relevant or not relevant to agriculture.

Insecurity of collections was a major concern, with collections both inside and outside the UKNCC seen to be at risk due to insecure funding. The key priority was for government to determine who is responsible for funding collections. A number are currently funded by BBSRC, but it is debatable whether funding of collections is within their remit; BBSRC argue that it is not. In particular, there is a risk that substantial investment in genomic and post-genomic research will be lost if the resources generated are not conserved.

A co-ordinated policy was seen as important in order to improve collaboration between government funded research and institutes holding collections, and to determine what should and should not be conserved.

6.1.7. Other stakeholders' priorities

This group included DfID, the Intermediate Technology Development Group (ITDG) and JNCC. It was important to consider the impact of UK policies elsewhere, since our policy will influence other countries. A strongly conservation focussed policy would have negative impacts if emulated in other countries. It was also important to link GRFA with the sustainable development agenda. Genetic resources and microbes have been neglected in implementation of the CBD. A whole ecosystem approach is required, looking at interactions between agro-biodiversity and wider biodiversity. Agri-environment schemes, in situ conservation and utilisation of GRFA should be given greater emphasis. One stakeholder was concerned about the impact of

genetically modified organisms, in terms of both genetic pollution and patenting leading to restricted use of GRFA.

6.2. Stakeholder views – detailed comments

The following is a summary of the more detailed comments received from stakeholders, drawn from both the conference and individual interviews. Fuller details are at annexes 9 and 10.

6.2.1. Co-ordination of and communication with stakeholders

Conference output: There is a need for greater co-ordination of stakeholders, including between plant, animal and microbe sectors and between Defra and the devolved administrations. There was some support for the creation of a single national facilitator to promote collaboration and exchange of information between stakeholders in the different sectors. Defra should build on existing stakeholder networks – UKPGR and the National Consultative Committee on animal GR. Farm animal groups supported a permanent national farm animal GR steering committee, and felt a national facilitator for all GRFA could duplicate the work of this group. The conference supported the idea of having regular meetings between the sectors once or twice a year.

Other stakeholder views:

Suggestions for involving stakeholders in the new policy included establishment of an expert panel representing microbial, animal and plant GR interests. Stakeholders were positive about the National Consultative Committee, and thought it was a good model for including all interests. Farm animal stakeholders felt they could learn from the experiences of the plant community.

6.2.2. National Inventory

Conference output: There is a need to identify all ex situ collections in both private and public hands, and to identify important in situ sites, populations of animal breeds at risk, landraces and farmer varieties. This should include a more accurate methodology for surveying of livestock numbers by breed and a survey of in-garden and delisted plant varieties. Information should be made available via a web-based database.

6.2.3. Ex situ GRFA

Conference output: Identify and record status of all ex situ collections. Identify key collections, and ensure they can be adequately maintained. Increase international and national collaboration. Identify and prioritise gaps in collections (task for collection managers). Ensure ex situ and in situ are complementary. Develop a policy for threatened GRFA.

Other stakeholder views: Some felt that BBSRC should not be responsible for funding GRFA collections, as it is not within BBSRC's remit to do this. It was suggested that Defra should take responsibility for these collections.

6.2.4. In situ GRFA

Conference output: Determine status of important wild growing GRFA. Identify presence of important GRFA in protected areas, and manage these through protected area authorities. Monitor, characterise and record use of

landraces, farmer varieties, conservation varieties and breeds at risk. Develop programmes to retain viable populations.

Other Stakeholder views: There was potential for Defra and Nature Conservation Agencies to work together on wild growing GRFA.

6.2.5. Promoting use of GRFA

Conference output: Identify uses for GRFA, including uses in scientific research, breeding programmes and marketing opportunities. In particular, promote use of GRFA at risk. Promote GRFA suitable for sustainable agriculture.

Stakeholder views: A number of stakeholders emphasised the importance of evaluating and using GRFA, not merely conserving.

6.2.6. Characterisation and evaluation

Conference output: This area was given high priority. Characterisation and evaluation is needed to increase value of collections. A programmed approach is needed, taking into account needs of breeders and other users. Collections should be linked to evaluation and pre-breeding programmes. Need common framework for deciding priorities, and common methodology for characterisation. Passport data must be accessible to users. This area should be led by breeders, collection holders and research institutes. Co-ordination and joint funding of work on the characterisation of animal breeds in collaboration with conservation NGOs was requested.

6.2.7. Information systems

Conference output: The conference attached high importance to this issue. The actions identified were to establish a national information system and to develop collection databases. Paper based and historical information should be included, and passport data should be available for all collections.

Other stakeholder views: Defra should help breed societies transfer paper data into electronic format. User-friendly software could be developed to help societies manage genetic diversity within breeds.

6.2.8. Synergies and conflicts with other Defra policies

Conference output: Actions identified were to identify and exploit synergies with other Defra policies (e.g. in agri-environment schemes and biodiversity policy) and to identify and resolve conflicts. In particular, some delegates wanted Defra to make payments for rare breeds under the England Rural Development Programme. Monitor impact of breeding strategies, breeders' rights, national list and varietal release legislation, and ensure domestic legislation does not stifle UK competitiveness in research and trade in GRFA.

Other stakeholder views: All rare breed farm animal interests and some mainstream animal interests identified existing government policy as a major threat to GRFA. Biodiversity and conservation interests were keen to link GRFA with wider biodiversity policy, and for greater consideration of agriculture-environment interactions in biodiversity policy. JNCC and English Nature were interested in the possibility of collaborating with Defra on in situ GRFA.

6.2.9. Raising awareness

Conference output: High priority was given to this issue. Promote public awareness of the value of GRFA conservation and sustainable use, and raise awareness with politicians, scientific community, breeders, consumers and food industry.

7. ANALYSIS

7.1. General

The absence of an overarching strategic policy has led to the dispersal of policy responsibility between different Defra divisions and between a number of government departments. As a result, there is no clear statement or understanding of what our national objectives are. This has led to a lack of guidance from government to stakeholders on the implementation of our international obligations and national objectives. The result is an uncoordinated effort that lacks direction, leading to inefficiencies and lack of prioritisation of tasks. To meet our long-term needs for genetic resources for food and agriculture we need to address this situation through the development of a strategic framework for conservation and sustainable use of GRFA.

7.2. Aims of GRFA policy

The first step in developing policy on GRFA should be to establish an overarching framework. More detailed policy should now be developed for plants, animals and microbes, in the light of available resources and taking note of the findings of this review. The detailed policy should include a programme of costed activities, and should be regularly reviewed.

GRFA policy should not be focussed only upon conservation; to be of use, GRFA must be characterised, evaluated and developed. Relevant information must be made available to potential users both in the UK and abroad. The detailed policy should focus on GRFA that are of particular importance to Defra's objectives, covering sustainable agriculture, the environment, rural development and animal health and welfare. The policy should prioritise species and breeds not adequately covered by policies on biodiversity, fisheries and forestry.

Recommendations:

- 1. A framework for conservation and sustainable use of GRFA should be developed as a reference point for further work by Defra and other organisations. Its aim should be the conservation and sustainable use of plant, animal and microbial genetic resources to support sustainable agriculture and horticulture, environmental improvements, rural development, scientific research and conservation of heritage and biodiversity, now and in the future.**
- 2. The framework should be implemented through a detailed policy consisting of rolling programmes for plants, animals and microbes, developed in consultation with stakeholders and subject to available resources.**
- 3. GRFA policy should focus upon species, varieties and breeds that are not adequately covered by policies on biodiversity, fisheries and forestry.**

7.3. Defra's role in the framework

The framework for conservation and sustainable use of GRFA should act as a reference point for activities both by Defra and by other organisations. Defra would not be responsible for all elements of the framework. As a minimum, Defra should act to co-ordinate and give direction to the activities of the various stakeholders. If sufficient resources are available, Defra should take action to achieve objectives not covered by other stakeholders, e.g. development of an information system for GRFA. The stakeholder conference identified other stakeholders with responsibilities within the framework (see Annex 9).

7.4. Scope of policy

The scope of the policy should extend to all genetic resources for food and agriculture, including mainstream livestock breeds; breeds at risk; game animals; cultivated plants; wild relatives of cultivated plants; plants of potential use for food and industrial purposes; plant genetic stocks; and micro-organisms, including soil micro-organisms. The scope of the policy can only extend to species, varieties and breeds relevant to food and agriculture.

7.4.1. Non-regenerable collections

Non-regenerable collections of e.g. bloods, dried plant tissues and non-viable semen should also be included, as they contain genetic information that may be of use. However, priority should be to conserve regenerable GRFA, e.g. seeds and living organisms, as these have the greatest potential for use.

7.4.2. Micro-organisms

Micro-organisms present a problem, since their potential uses extend beyond food and agriculture. It is not possible to classify broad groups or collections of micro-organisms as relevant or not relevant to Defra's interests. Micro-organisms are clearly an important resource for science and industry, but it is unclear who is responsible for their conservation. It is vital that this issue is resolved.

Recommendation:

4. Defra should work with DTI, DoH and other relevant departments to determine who should be responsible for microbial and genetic stock resources, and to develop a suitable policy for their conservation and sustainable use.

7.4.3. Fish

Fish are an important part of GRFA. However, wild fish are affected by management of marine and freshwater habitats, rather than by intentional human selection. Fish resources are managed through existing policies and legislation, described in 3.1.5. It is therefore not necessary to deal with wild fish through GRFA policy. Farmed fish are exposed to selection pressures arguably similar to other farmed species. Farming of emerging species such as cod, haddock and halibut is strongly linked to wild genetic resources, as it is largely dependent on wild broodstock. Farmed fish may require particular

attention within GRFA policy in the future, but there is no perceived need for action on fish genetic resources at present.

7.4.4. Forests

Responsibility for forests lies with the Forestry Commission, which is already working on genetic resource issues, and intends to develop its own policy. The Forestry Commission has been kept in touch with this review. Defra should work with the Forestry Commission where there are overlaps on genetic resources – e.g. in situ conservation. Fruit trees, which do not fall within the responsibility of the Forestry Commission, should be included in GRFA policy.

Recommendation:

5. Defra should work with the Forestry Commission where forest and agricultural genetic resources overlap

7.5. Main objectives of a framework for GRFA

The elements listed below are the recommended key objectives of the policy, around which any work should be focussed. These take into account stakeholder priorities and obligations and priorities of relevant international agreements.

Recommendation:

6. The main objectives of a framework for GRFA should be to:

- **Co-ordinate activities and improve co-operation**
- **Facilitate sharing of information on GRFA**
- **Compile a National Inventory of GRFA**
- **Support conservation of ex situ GRFA**
- **Support conservation of in situ GRFA**
- **Support characterisation and evaluation of GRFA, with particular focus upon plant and animal health, environmental improvements, animal welfare and sustainable agriculture**
- **Raise awareness of the importance of GRFA with the public, scientific community, breeders, consumers and food industry**
- **Support GRFA through other Defra policies and programmes**

7.6. Implementation of the framework

The framework would be implemented through development of a detailed policy, consisting of rolling programmes of activities for plants, animals and microbes. The following recommendations highlight key areas for action within each objective, as identified by the policy review. Further work is needed to develop these points in consultation with stakeholders.

7.6.1. Co-ordinate activities and improve co-operation

Co-operation between stakeholders at both national and international level is important to maximise the efficiency and effectiveness of available resources. This is the principle behind the range of international agreements described in section 4. The priority for Defra should be to add value to the work of the

large number of existing organisations active in this area, by co-ordinating stakeholders and improving co-operation at national and international level. Defra should only become involved directly in activities where there is clear market failure and where actions fit within identified priorities.

The main co-operation instruments for UK stakeholders at the international level are ECP/GR and the European Focal Point on Farm Animal Genetic Resources. Defra is represented on the Steering Committees of these organisations, and through them should seek to maximise benefits for UK efforts to conserve and sustainably use GRFA. UK stakeholders should also seek to benefit from EU funding under the GENRES programme and Framework Programme 6 (section 4.3). Defra should, within the resources available, provide the necessary matching funds for these programmes.

Co-operation and co-ordination at the UK level should be achieved through stakeholder groups (UKPGR, the proposed National Steering Committee for farm animal genetic resources and the UKNCC). They should be used as a means to provide information to stakeholders and to receive feedback. Since UKNCC represents only public service collections, Defra should also work with the UK Federation of Culture Collections (UKFCC) which represents a wider group. In particular, there is a need to co-ordinate the activities of NGOs engaged in ex situ conservation of animal GRFA to avoid unnecessary duplication of effort. A proposal from one sector for the creation of a national facilitator for genetic resources, linking stakeholders from all sectors, should only be pursued if there is general support. This is not the case at present.

Recommendations:

7. Defra should work through existing stakeholder groups. Any initiative to appoint a national facilitator should come from stakeholders.

8. Defra should encourage regular meetings of representatives of the three communities to discuss issues of common interest and give feedback on GRFA policy.

9. UKPGR should continue to be the main interface between Defra and plant genetic resource stakeholders. Where relevant, Defra should consult other plant genetic resource interest groups not covered by UKPGR, e.g. nature conservation organisations.

10. A permanent National Steering Committee for Farm Animal Genetic Resources should be established.

11. Representatives of both mainstream and at risk farm animal breeds should be consulted.

12. The UK National Culture Collection and the UK Federation of Culture Collections should both be used to communicate with stakeholders in the microbial sector.

7.6.2. Facilitate sharing of information on GRFA

Information is essential in order to make GRFA useful. Availability of information is an important obligation under the CBD, Global Plan of Action and International Treaty. Stakeholders need to know what genetic resources are available within ex situ collections, and any characterisation and evaluation data that may exist. They also need information on in situ GRFA, e.g. concerning pedigree information or access to sites.

There is currently no single entry point for information on GRFA. During consultations, stakeholders considered this an area where Defra could make an important contribution. Defra should therefore consider how it might develop a national GRFA information system.

Defra maintains a database of rare farm animal breeds and a web-based CBD National Focal Point on Access and Benefit Sharing, containing links to various GRFA organisations. Numerous other database projects are being carried out with the aim of linking information systems at national and international level, including EFABIS, BioCASE and the National Biodiversity Network. A review of all existing database projects should be carried out to identify synergies and ensure that the GRFA information system complements existing data sources.

Recommendations:

13. Defra should develop a national information system for GRFA, in order to provide information on activities by Defra and other organisations and links to resources including collection databases. The site should link up existing information resources.

14. A review of database projects both within and outside Defra should be carried out, drawing together information on all the current initiatives, with the aim of developing links and synergies.

15. Consideration should be given to developing the CBD National Focal Point as the portal for such an information system.

7.6.3. Develop a National Inventory of GRFA

There is currently no national inventory. A review of ex situ plant collections was carried out in 1992. The national animal genetic resources database has basic information on breed populations, their origin and status, utilisation and existence of conservation programmes. Identifying and monitoring plant GRFA is a priority under a number of international agreements.

It would be difficult to construct a useful work plan or identify priorities without knowing what genetic resources exist. A national inventory of ex situ and in situ GRFA should therefore be compiled as one of the very first steps. This should be done in collaboration with the devolved administrations and with stakeholders. A national inventory could also be used as the basis for an information system.

Recommendations:

16. Compilation of a national inventory of GRFA collections and sites should be a key priority. This should be done in collaboration with the devolved administrations and stakeholders, and should be made publicly available where appropriate.

7.6.4. Support conservation of ex situ GRFA

Secure ex situ collections of plant and microbial GRFA are vital for future research and, in the case of plants, for breeding new varieties. For farm animals, ex situ storage of semen and embryos is an important way of conserving material for breeding and making it widely available. For breeds at risk, ex situ collections provide an important safety net.

It is not possible to conserve all GRFA. In determining future policy on support of ex situ collections, therefore, Defra should identify key collections. It should avoid commitment to core funding, which would be a major cost with long-term implications. Core funding should only be given in cases where there is clear market failure; where no alternative source of funding can be identified; and where a collection is judged to be of major importance (for research or industry, as an insurance policy or for heritage value). Where core funding is considered appropriate the most cost efficient methods should be identified. In general, Defra should look for other ways to support GRFA at risk, in particular, through synergies between GRFA and other policy areas. This might be through supporting research and evaluation work for specific plant genetic resources.

The Office of Science and Technology (OST) in the DTI is currently undertaking a wider review of policy for support of collections, beginning with those funded by research councils. This includes the National Cereal Collection, the National Pea Collection, the National Arabidopsis Stock Centre and a number of collections of the UKNCC. One aim of the review is to clarify responsibilities for funding collections over the longer term. Defra will need to work with OST to ensure key collections are secure.

Recommendations:

17. Key ex situ collections should be identified.

18. Defra should only commit to long term funding of collections where stringent conditions are met. In general, Defra should support key ex situ collections through other means, e.g. supporting research and co-ordinating activities of other organisations.

7.6.5. Support conservation of in situ GRFA

Defra is not currently involved in any in situ conservation of plant GRFA. It is widely recognised, however, that in situ and ex situ conservation should be complementary activities of a single policy. Defra should, therefore include appropriate in situ conservation activities for plants in its GRFA policy. This could include supporting conservation of landraces and integrating GRFA policy into wider biodiversity policy.

Wild biodiversity is protected through a range of measures, including through SSSIs and national parks. No account is currently taken of any important wild relatives of crop plants that might be present in such protected areas. Defra should work with the appropriate authorities of protected areas on in situ plant GRFA. The national inventory should be the first step in this work. Plant GRFA should be incorporated into the policies and programmes of nature conservation authorities where appropriate.

There is currently no direct government support for in situ conservation of farm animals. While in situ conservation of breeds at risk may be of low importance for commercial breeding and food security, many breeds have an important cultural value. The UK does not make payments to keepers of native rare breeds under the EU Rural Development Regulation (as permitted by article 13 of the implementation regulation); any such expenditure would reduce the funds available for spending on other ERDP schemes. Opportunities for supporting Britain's indigenous breeds at risk, including through the ERDP, should however be considered as part of the detailed policy on animal genetic resources, and as part of the consultation on the next round of rural development programming from 2007.

Mainstream breeds do not require support for in situ conservation. However, a number of Defra's research projects are concerned with identifying and improving certain genetic traits (see annex 5). This issue is dealt with below.

Recommendations:

19. The policy should cover in situ plant GRFA, including wild growing plants, landraces and conservation varieties. In situ plant genetic resources should be included in a national inventory, as a basis for determining what further work is necessary.

20. Defra should work with nature conservation organisations on in situ plant GRFA.

21. Defra should consider the desirability of supporting indigenous breeds at risk where they have a positive contribution to make to the environment and heritage value of the countryside, for example, through the England Rural Development Programme. The planned consultation on the future of rural development programmes could provide an opportunity for seeking stakeholder views on the relative merits of this as against other objectives.

7.6.6. Support characterisation and evaluation of GRFA, with particular focus upon plant and animal health, environmental improvements, animal welfare and sustainable agriculture.

Defra already funds the evaluation and development GRFA through a number of its research programmes, fuller details of which are at annex 5. However, there is no co-ordinated GRFA policy perspective over this research.

A programmed approach is needed, developed in concert with all stakeholders. In particular, Defra should support characterisation and

evaluation of GRFA where there are public benefits, for example, landscape conservation or development of energy crops.

In the context of plants, characterisation and evaluation is essential in order to identify material which may be useful in breeding programmes. Although this work is of clear importance to industry, industry relies upon public funded research to identify useful genetic traits in wild or novel material, and to carry out pre-breeding development of the material. Only at this stage is industry prepared to use novel material in breeding programmes, due to the cost, length of time taken and the uncertainties involved.

Work on developing plant genetic resources is funded by BBSRC and by Defra. Defra should learn from the German pilot national evaluation pilot scheme for plant GRFA, as a model for government and industry co-operating on GRFA evaluation for mutual benefit.

For breeds at risk, characterisation and evaluation are important for identifying particular adaptations that may make a breed more useful or justify its conservation on grounds of genetic distinctiveness. For example, Defra is to fund a project looking at the grazing habit of different sheep breeds. Such projects should be supported, as they offer twin benefits of conserving breeds at risk and improving understanding of conservation grazing. There is also a need to characterise breeds phenotypically and genetically so that their categorisation as breeds at risk can be more accurately defined for other areas of Government policy, e.g. exemptions for animal disease control measures.

For mainstream breeds, breeding for performance is adequately dealt with by industry and the MLC. Defra should therefore target research upon genetic traits which have a direct impact on other areas of Defra policy, such as health and welfare or environmental pollution.

Recommendations:

22. Defra should co-ordinate stakeholders to develop a programmed approach to characterisation and evaluation of GRFA.

23. For plants, public funded development of GRFA is required to develop new genetic material for use in crop plants. Defra should learn from the German National Evaluation Programme, as a model for industry and government working together.

24. Defra should support development of GRFA, including for mainstream farm animal breeds, in order to meet objectives other than direct performance, such as animal health and welfare, biodiversity, reduced environmental emissions and development of industrial crops to support environmental objectives.

7.6.7. Raise awareness of the importance of GRFA with the public, scientific community, breeders, consumers and food industry.

Raising awareness of the importance of GRFA with the public, scientific community, breeders, consumers and food industry was seen as a high

priority by stakeholders. It is also identified as an important objective in international agreements. Defra should examine possible actions, working with stakeholders, particularly NGOs that communicate with the public such as HDRA and botanical gardens. Activities to raise awareness of GRFA could involve public gardens and attractions such as the Eden project. Awareness raising should be linked to efforts to create markets to support GRFA, e.g. by promoting relevant assurance schemes or products from breeds at risk.

Recommendations:

25. Defra should work with stakeholders to raise awareness of the importance of GRFA. Awareness raising should be linked to creation of markets to support GRFA.

26. This report should be published in order to communicate the importance of GRFA and the activities undertaken by government and others to conserve and sustainably use GRFA.

7.6.8. Support GRFA through other Defra policies and programmes.

Defra should identify and build upon synergies that exist between policy on GRFA and those concerned with agriculture and biodiversity. Synergies should also be developed with agri-environment schemes and research projects. Prior to this review, there has been no link between policy on GRFA and policies on biodiversity and agri-environment.

Stakeholders have also identified a number of other policies that conflict with GRFA objectives. This is particularly the case for breeds at risk. Defra should examine these policies to see where such conflict might be removed. Mechanisms should be put in place so that future policy developments within Defra will, where possible, avoid conflict with GRFA policy.

Recommendations:

27. GRFA policy and biodiversity policy should be closely linked in order to identify possible synergies.

28. A key priority for future work should be a review of Defra policies impacting on GRFA, with the aim of building upon synergies and reducing or removing conflicts.

29. The review of policies should focus in particular upon the negative impacts identified by stakeholders of Defra policies upon breeds at risk.

TERMS AND ABBREVIATIONS USED

Ex situ conservation: Conservation of components of biological diversity outside their natural habitats (e.g. seed banks, cryopreservation)

Genetic erosion loss of genetic diversity.

Genetic resources for food and agriculture: Animal, plant or microbial genetic material of actual or potential value for use in food or agriculture.

In situ conservation: Maintenance of species in the surroundings where they have developed their distinctive properties – i.e. in the wild for plants, or in original farm or common grazing environments for livestock

On farm conservation: Conservation of species through their cultivation or husbandry by farmers – e.g. landraces of particular plant species or native animal breeds at risk.

Abbreviations:

BBSRC	Biotechnology and Biological Sciences Research Council. Directly or indirectly supports a number of GRFA ex situ collections.
BioCASE	Biological Collection Access Service for Europe – Framework 5 funded project to provide researchers with web based access to collections throughout Europe.
CABI	CAB International, formerly known as the Commonwealth Agricultural Bureau. Work includes bioscience research and maintenance of a collection of fungi, bacteria and nematodes.
CBD	Convention on Biological Diversity
ECP/GR	European Co-operative Programme for Crop Genetic Resources Networks
EFABIS	European Farm Animal Biodiversity Information System - Framework 5 funded project to link national animal genetic resources databases with the European Database in Hanover and DAD-IS in FAO Rome
GENRES	Council regulation EEC 1467/94, which established a 5-year programme of funding for the conservation, characterisation, collection and utilisation of genetic resources in agriculture.
GRFA	Genetic resources for food and agriculture
JNCC	Joint Nature Conservation Committee. UK wide body representing the nature conservation bodies of England, Wales, Scotland and Northern Ireland.
UKNCC	UK National Culture Collections. Organisation supporting the nine public service culture collections.
UKPGR	UK Plant Genetic Resources group. Represents plant genetic resources stakeholders.