

# UK National Action Plan on Farm Animal Genetic Resources

November 2006



Front Cover Photos:

Top Left: Holstein cattle grazing (Courtesy of Holstein UK).

Top Right: British Milk Sheep halfbred with triplets (Courtesy of Lawrence Alderson).

Bottom Left: Tamworth pig in bracken (Courtesy of Dunlossit Estate, Islay).

Bottom Right: Red Dorking male (Photograph by John Ballard, Courtesy of The Cobthorn Trust).

# UK National Action Plan on Farm Animal Genetic Resources

November 2006

Presented to Defra and the Devolved Administrations  
by the National Steering Committee for Farm  
Animal Genetic Resources



SCOTTISH EXECUTIVE



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The UK's Farm Animal Genetic Resources (FAnGR) are of great economic, social and cultural importance. For these reasons alone it is important that we care for them. Additionally, we have national and international obligations to do so.

We already have a strong tradition of caring for our FAnGR in the UK – thanks largely to the activities of individual breeders, breed societies, charities and non-governmental organisations. However, the threat to our FAnGR is growing, for a variety of reasons, including the spread of relatively few, specialised breeds and the growing economic pressures on primary producers. In a few cases Government policy in other areas, such as in disease control, has led to unintended risks to our FAnGR. So, more needs to be done.

In 2002 the Department for Environment, Food and Rural Affairs (Defra), with contributions from the Scottish Executive Environment and Rural Affairs Department (SEERAD), the Department of Agriculture and Rural Development Northern Ireland (DARDNI) and the Welsh Assembly Government (WAG), published the UK Country Report on Farm Animal Genetic Resources. This was the United Kingdom's official contribution to the FAO's "First Report on the State of the World's Animal Genetic Resources" to be published in 2007 as part of FAO's Global Strategy.

The Report identified some major gaps in our management of FAnGR, and concluded with strong recommendations that: (i) there should be a National Action Plan for Farm Animal Genetic Resources based on the recommendations in the Report, and (ii) a National Steering Committee on Farm Animal Genetic Resources should be constituted to formulate the Plan and drive it forward.

Both of these recommendations were accepted by the relevant Government Departments. The National Steering Committee on Farm Animal Genetic Resources was established as an *ad hoc* advisory committee, initially for a two-year period, and the committee met for the first time in January 2004. The membership of the committee is shown in Annex 1. The primary aim of the committee was to produce this National Action Plan (its full remit is shown in Annex 2).

The Plan is intended to build on our strong tradition of non-governmental commitment to protecting our FAnGR. But, there are clearly areas where Government input and resources are needed, both to improve outcomes of Government policies, and to help co-ordinate the activities of others.

We commend this National Action Plan to Ministers in the relevant Government Departments, and look forward to helping Government, industry and other stakeholders with its implementation.

**Professor Geoff Simm**  
**Chair**  
**National Steering Committee on Farm Animal Genetic Resources**  
**October 2006**

## 1 Executive Summary

### 1.1 Overview

The UK's Farm Animal Genetic Resources (FAnGR) – its farm animal breeds, strains and varieties, and the variability within them – are of great economic, social and cultural importance.

This National Action Plan has been produced at the request of UK Government rural affairs departments, in response to one of the major recommendations of the UK Country Report on Animal Genetic Resources, published in 2002.

The plan was produced by the National Steering Committee on Farm Animal Genetic Resources, the membership of which is shown in Annex 1.

The Plan considers:

- Why we need to protect our Farm Animal Genetic Resources (FAnGR), and how a National Action Plan can help.
- What, and where, are our Farm Animal Genetic Resources?
- How should we look after and use our FAnGR?
- What can Government do to help?

The plan identifies 38 Recommended Actions to help in the protection and sustainable use of our FAnGR, and these are summarised below.

The Plan also refers to web-links within the text (underlined phrases in blue) which are the source of further information or interest. An address list of these links is given in Annex 8, in order of appearance.

### 1.2 List of Recommended Actions

1. The National Steering Committee should be constituted as a **UK standing committee**, to provide a permanent forum for advising Government and other stakeholders on issues relating to FAnGR, and to oversee implementation of, and further develop, the National Action Plan.
2. Defra and the Devolved Administrations should commission a series of **Breeding Structure Reports** for each UK livestock sector, and update these every six years.
3. The existing UK National Breed Database should be upgraded into a web-based **UK National Breed Inventory** using the European Farm Animal Biodiversity Information System (EFABIS), as appropriate, to ensure compatibility with and links to European and UN Food and Agriculture Organisation (FAO) Domestic Animal

Diversity Information System (DAD-IS) databases. Clear links with the Livestock Register (and the National Equine Database) in Defra and equivalent databases in the Devolved Administrations should be established.

4. The UK National Co-ordinator, with guidance from the NSC (with additional expertise as necessary), should **populate and maintain the UK National Breed Inventory**, identifying which breeds should be classified as mainstream or at risk, native, exotic or feral etc. The use of the term breed within the inventory should be consistent with definitions of inter-governmental bodies such as the EU and FAO.

Further, the NSC should:

- provide guidance for UK Government on the appropriateness of any proposed EU definition of a breed, and the implications such a definition may have for UK policy, industry activity and FAnGR management; and
  - keep under review the scope of the inventory and its use of terms to ensure it is relevant to the management of FAnGR.
5. There is a need for greater, but cost-effective, **scientific characterisation** of those breeds to be incorporated into the UK National Breed Inventory – e.g. through EU initiatives and partnership with conservation programmes, but ensuring sound comparisons of resources in the same environment – with priorities on:
    - disease resistance;
    - quality of meat and/or other products;
    - behavioural or physiological differences leading to increased ‘fitness’ for specific environments or management regimes e.g. conservation grazing.

More research is needed on effective targeting of breed characterisation studies.

6. A short **review of molecular characterisation studies** on UK livestock should be commissioned, including their adequacy in relation to Molecular Domestic Animal Diversity (MoDAD) procedures and advising on priorities for any future studies. Studies should be commissioned to address the priorities identified.
7. The NSC should oversee the development of a suitable **Standardised Template** to monitor breeds for incorporation into the National Breed Inventory and ensure that information is collected to help assess the risk posed to our national FAnGR.
8. The NSC should ensure that the **GRFA Information Portal** being developed by Defra fulfils the needs of FAnGR stakeholders by:



- linking the web-based UK National Breed Inventory (in Recommendation 3) to the web portal;
  - ensuring the uploading and updating procedures can facilitate monitoring of FAnGR;
  - obtaining accurate and objective information on breeds, activities and issues in relation to FAnGR as described in the Standardised Template in Recommended Action 7.
9. The NSC should review and **update 'monitoring data'** in the UK National Breed Inventory in a 3 yearly cycle with sequential reviews of: (i) sheep and goats; (ii) cattle, pigs, and horses; and (iii) poultry.
  10. The **procedure for obtaining information** from breed societies and breeding companies and the content of the information should be reviewed by the NSC, in the light of the needs of the Standardised Template recommended above (Recommended Action 7) and the opportunities offered by the GRFA Information Portal.
  11. **Breed societies should be encouraged to make all herd and flock books** electronic to facilitate the uploading of monitoring information, as defined in the Standardised Template, to the National Breed Inventory via the GRFA Information Portal.
  12. **Procedures for quantifying resources not included within herd and flock books** should be formalised by the NSC.
  13. A project – to be steered by NSC – should be commissioned, to build on and define:
    - **robust qualifications for a breeding nucleus** essential to the survival of a breed, with or without cryopreserved genetic material as a backup, and particularly when the breed is geographically concentrated;
    - how best to quantify **degree of concentration** and thresholds for preservation action;
    - the **feasibility and practicality** of the necessary data collection, including the population size and location of holdings; and
    - **breeds at risk** as a result of geographical concentration, using the preferred measures defined above.
  14. Industry and Government stakeholders should work together: (i) to **improve the recording of livestock breed data** before finalising the requirements of the Livestock Register, and (ii) to speed the development of routine linking (through common formats for animals and holdings) of key databases containing information important for the sustainable management of the UK's FAnGR.

15. The prioritisation of **native breeds** for conservation should continue as at present, but **exotic breeds** in the UK which are extinct in their country of origin and severely endangered globally, or which make an important economic contribution to UK agriculture, may also need conservation action. More work is needed to identify exotic FAnGR that fall into these categories.
16. Defra and the Devolved Administrations should commission a **cost-benefit analysis of FAnGR** to the rural economy. The study should be steered by NSC, link to that in Recommended Action 19, and include the roles of FAnGR of all farmed species in agribusiness, leisure and tourism. The results should be used as a guide to prioritisation for conservation action.
17. The NSC should establish and keep under review the thresholds and **priority levels for conservation action** of breeds using scientifically robust criteria, further developing these as necessary. Thresholds for geographical concentration, local adaptation and breed distinctiveness, including use of other breeds or strains, need to be more clearly defined.
18. We recommend that the NSC should **advise on strategies for genetic conservation actions** as part of risk management in **mainstream breeds**, and **highlight corrective actions** that may be needed in mainstream breeds or strains where selection strategies appear to be producing unfavourable consequences for health, welfare or 'fitness' of animals.
19. A project – to be steered by the NSC – should be commissioned to develop a **co-ordinated *in situ* and *ex situ* National FAnGR Conservation Strategy** for breeds at risk, and mainstream breeds that qualify for priority action, taking into account the conservation work already being carried out by NGOs and breed societies. The project should include an evaluation of the costs and benefits of alternative approaches, and link with Recommended Action 16.
20. Defra and the Devolved Administrations should identify opportunities within existing and developing national and EU legislation, such as European Agricultural Fund for Rural Development (EAFRD), to **encourage the use of FAnGR** that are fit for purpose in delivering complementary policy objectives. "Stand alone" genetic resource measures to support owners of at-risk FAnGR who do not qualify for any other complementary scheme should also be considered (see Recommended Action 29).
21. The NSC, with other partners and external communications expertise, should develop a **Communication Plan** to:
  - create wide awareness of the information resources available on FAnGR; and
  - develop future FAnGR information provision in a way that is most helpful to decision-makers.

22. The NSC should identify and **publicise ‘success stories’** where commercial activities (e.g. speciality food marketing) or environmental management programmes have been developed around the use of non-mainstream FAnGR.
23. The NSC should seek resources to develop and repackage material on the GRFA Information Portal to facilitate its **use in schools, colleges and universities**, as part of taught courses, or via distance learning. The material should be updated regularly. The availability of this material should then be publicised widely.
24. The NSC should work with industry stakeholders to identify a programme of relevant **training courses relating to FAnGR**, to identify possible funding opportunities to develop such courses, and to identify appropriate groups to deliver them.
25. The NSC should help to **identify research and development needs** and priorities to support the protection and sustainable use of FAnGR, help to identify relevant funding routes, and to disseminate R&D results.
26. The **National Action Plan should act as the linking framework** on which to identify and collate resource sharing from a wide range of stakeholders, some of whom may have conflicting priorities.
27. The NSC should engage policy makers implementing **post CAP Reform livestock strategy**, at central and regional level, on the importance of **mainstreaming FAnGR policy into all sustainable food and farming strategies**. Sustainable use of FAnGR is the starting point for all sustainable livestock production chains. The NSC should monitor the impact of CAP reform on FAnGR and alert the relevant policy makers to any corrective action needed.
28. The NSC should continue to actively **monitor the impact of the National Scrapie Plan (NSP) and the Northern Ireland Scrapie Plan (NISP) on genetic diversity in sheep breeds**. The findings of research on the impact of the NSP should be fed into policy development of the NSP and future breeding scheme design.
29. The UK National Co-ordinator for FAnGR should:
  - **Monitor closely the progress of the new EAFRD proposals**, intervening where necessary in the negotiations and liaising with policymakers on the inclusion of ‘stand alone’ genetic resource measures (other than headage payments) into national rural development plans in support of flexible actions to conserve and utilise FAnGR.

- Liaise with policy makers to ensure that **payments supporting endangered native breeds** provided for under agri-environmental measures in the new EAFRD regulation are incorporated into new rural development plans.
30. The UK National Co-ordinator for FAnGR should **monitor legal action taken under Countryside Rights of Way (CROW)** in England and Wales and any negative impact on the willingness of livestock keepers to conserve FAnGR on their land.
  31. The UK National Co-ordinator for FAnGR should commission publicly co-funded R&D to model/characterise breeds for their lifecycle nutrient efficiency and to investigate **the incorporation of lifecycle nutrient efficiency traits into breeding programmes** in all livestock species.
  32. In respect of the **Foot and Mouth Disease (FMD) Directive**, the NSC should advise Government on a scientifically and legally **robust definition of a nucleus unit** essential to the survival of the breed, with or without cryopreserved genetic material as a backup, particularly where that breed is not numerically rare but is geographically concentrated.
  33. When the new EU **Avian Influenza Directive** is implemented in the UK, the special provisions to protect rare poultry breeds should be transposed into UK legislation. This will require an improved data set on UK poultry breeding holdings. The NSC, in consultation with relevant species associations, should have a key role in advising policymakers on applying these special measures and be involved in the subsequent implementation process.
  34. The UK National Co-ordinator should monitor and contribute to the development of **livestock disease control policies that may impact on FAnGR** and be involved in any changes to parent legislation where appropriate.
  35. In response to the **2004 Farm Animal Welfare Council (FAWC) Report on the Welfare Implications of Animal Breeding and Breeding Technologies in Commercial Agriculture**, Defra should trigger regular, formal exchanges of views between the NSC and FAWC on livestock breeding technologies and programmes and their impact on animal welfare.
  36. The NSC, through the UK National Co-ordinator for FAnGR, should carefully **monitor developments in zootechnical legislation**, encourage deeper integration between zootechnics and FAnGR policy and develop better communication with other stakeholders such as breed societies.

37. NGOs and research providers should be encouraged to participate in **trans-national FAnGR projects** under the new **European Genetic Resources Regulation 870/2004**. Defra and the Devolved Administrations should, wherever possible, make match funding available for suitable projects.
38. The UK National Co-ordinator for FAnGR, should continue to **play an active part at global and European regional level**, through existing FAO structures such as the **European Regional Focal Point for FAnGR (ERFP)**, in the development of a sustainable policy on farm animal genetic diversity.

## 2 Introduction

### 2.1 Why we need to protect our Farm Animal Genetic Resources

#### 2.1.1 Economic, social and cultural importance of the UK's FAnGR

The UK's Farm Animal Genetic Resources (FAnGR) – its farm animal breeds, strains and varieties, and the variability within them – are of great economic, social and cultural importance.

The food and drink industry is the UK's largest manufacturing sector worth almost £70 billion *per annum* and accounting for over 15% of all manufacturing turnover. The production, processing, and preservation of meat and meat products alone is responsible for almost 19% of food and drink manufacturing turnover. On its own, dairy farming represents the largest agricultural sector worth £2.7 billion, accounting for around 20% of agricultural production. The success of the livestock sector depends heavily on the performance and capabilities of our livestock breeds and strains that deliver the industry's raw materials. Hence, our FAnGR have a crucial role at the very start of the food chain, and there are strong economic arguments for ensuring that we manage these resources in a sustainable way.

Livestock farming, and the food industries based on it, also have an important social role over and above their direct contribution to the UK economy. Livestock farming occupies over one third of land area in the UK. Hence, it has an important role in shaping the countryside enjoyed by so many. The presence of livestock themselves, and their regional diversity, is a very positive feature for many who live in, work in, or visit the countryside. Furthermore, in many of the most socially and economically fragile areas of the UK, livestock farming is a core, underpinning economic activity, on which whole communities depend. For all of these reasons, we need to be aware of and care for our FAnGR.

The UK has a very rich diversity of livestock breeds – over 130 native breeds of poultry, cattle, sheep, goats, pigs, horses and ponies in total, of which approximately 100 are at risk (see Appendix 3 of the [UK Country Report on Farm Animal Genetic Resources 2002](#)). Many of these breeds have strong regional roots, and have played an important role in the development of regional rural economies. Some have played an important role in the economic and social development of the nation, and in the development of many other nations besides. Each has an interesting history, which deserves to be told. Hence, careful stewardship of our FAnGR is important for aesthetic, cultural and historical reasons too.



### Box 1: Robert Bakewell, pioneer of selective breeding of farm livestock

Robert Bakewell (1725-1795) is recognised worldwide as the father of selective breeding of farm livestock. He pioneered the recording of, and selection for, economically-important characteristics in farm livestock, and the recording of pedigrees (ancestry). Bakewell was particularly effective in improving the performance of sheep in his native Leicestershire – his Dishley or New English Leicester breed growing much faster and reaching market sooner than its forebears. Several other British and overseas sheep breeds are direct descendants of Bakewell's Dishley Leicester. Bakewell's methods were emulated by many followers and this led to the creation of many improved livestock breeds in the late 18th and early 19th century<sup>1,2</sup>. This important development within the UK served as a model worldwide. Hence, there are strong 'heritage' reasons for conserving our traditional breeds.



'Robert Bakewell at Dishley Grange' by John Boulton  
(Courtesy of the Royal Agricultural Society of England).

## 2.1.2 International obligation to protect our FAnGR

As one of 150 signatories to the [Convention on Biological Diversity](#) (CBD) at Rio de Janeiro in 1992, the UK has an international obligation to look after its FAnGR. There has been concern for many years over the loss of indigenous, locally-adapted breeds in developing countries. While this remains a major concern, the United Nation's Food and Agriculture Organisation (FAO) is also concerned about the unprecedented threat to FAnGR in developed countries, as a result of the global spread of relatively few specialised breeds, and the growing economic pressures on primary producers<sup>3</sup>. The [FAO Global Strategy for the Management of Farm Animal Genetic Resources](#), which the UK is party to, is the international mechanism through which action recommended by the CBD is taken. More recently the CBD, in their 7th Conference of the Parties in February 2004, passed a decision on mainstreaming agricultural biodiversity into core Government policy.

### Box 2: The Convention on Biological Diversity

The Convention on Biological Diversity is the major international agreement on protection and sustainable use of biodiversity and it covers all ecosystems, species and genetic resources – including Farm Animal Genetic Resources. The Convention was ratified by most of its signatories, which included the UK, and its provisions are legally binding. Therefore, participants are obliged to implement its provisions, which have three main goals:

- to conserve biodiversity;
- to promote the sustainable use of biodiversity; and
- to promote the sharing of benefits arising from the use of genetic resources in a fair and equitable way.

A recent Decision (COP VII/III on [Agricultural Biodiversity](#)) signed up to by the UK:

*“Invites the Parties and other Governments to consider and promote, as appropriate and subject to national legislation and international law, the mainstreaming of agricultural biodiversity in their plans, programmes and strategies with the active participation of local and indigenous communities and the inclusion in the communities’ plans, programmes and strategies on conservation, development and use of agricultural biodiversity, and to recognise and support the efforts of local and indigenous communities in conserving agricultural biodiversity;...”*

It is therefore entirely appropriate, and in line with international policy obligations, that we should incorporate into mainstream livestock policy those actions that properly manage, conserve and make use of our farm animal genetic diversity in sustainable livestock systems.

### 2.1.3 Impact of national policies on the UK's FAnGR

Until recently, farm animal genetic resources (FAnGR) *per se* have not featured strongly in UK Government policy. Managing FAnGR was left in the capable hands of industry and non-governmental organisations. However a combination of the international obligations, as described above, and changes in the strategic direction of domestic policy affecting the livestock sector, has led to a growing realisation that a co-ordinated national policy on FAnGR is needed across the UK.

All four UK Government Rural Affairs Departments have published strategic documents defining policy for sustainable farming and food production within a wider framework of economic, environmental and social sustainability. These policy documents are:

[The Strategy for Sustainable Farming and Food](#) – Defra, England

[A Forward Strategy for Scottish Agriculture: Next Steps](#) – SEERAD, Scotland

[Farming for the Future](#) – Welsh Assembly Government, Wales

[Strategic Plan 2006-2011](#) – DARDNI, Northern Ireland

These documents describe the policy framework through which Government will seek to work effectively alongside the farming industry, to facilitate and support its future development – which lies principally in the hands of the industry itself. Whilst there is no specific policy relating to FAnGR or animal breeding in these documents, the sustainable use and conservation of FAnGR is critical to their success, because they provide the very first link in any sustainable livestock product chain. In this context, livestock products not only include meat, milk, eggs, wool, hides and skins and other useful by-products, but also the rural landscape, tourist attractions and environments that enhance wild biodiversity.

The use of appropriate breeds and breeding strategies can also help to minimise the impact of greenhouse gas emissions, ammonia, nitrates and phosphates on the environment by ensuring that essential nutrients such as carbon, nitrogen and phosphorus are converted as efficiently as biologically possible into useful livestock products, rather than being lost to the environment.

In each of the areas mentioned above there are opportunities for some of our FAnGR. However, Government actions or policies can have an unintended detrimental effect on FAnGR too. For instance, the culling policy employed during the 2001 Foot and Mouth Disease epidemic resulted in dramatic reductions in the population size of a number of rare and traditional breeds of livestock. Many elite herds and flocks of mainstream breeds were lost during the crisis too. Similarly, the National Scrapie Plan (NSP), and Northern Ireland Scrapie Plan (NISPP), which is intended to accelerate breeding for scrapie resistance in the UK sheep flock – a highly desirable aim – is leading to rapid

changes in the genetic makeup of many breeds. Despite the laudable objectives of the NSP and NISP, there is a risk of unforeseen consequences in the long term. Hence, we applaud the creation of a semen archive to provide a fallback position.

There is a growing need to identify areas of Government policy – including animal health and welfare, landscape management and biodiversity, sustainable food and farming and rural development – that may have impacts on our FAnGR, to ensure that policy is ‘joined up’, that the benefits for FAnGR are maximised and the risks minimised. The actions of non-governmental organisations have been very effective in breed conservation in the recent past. For instance, none of the breeds listed by the Rare Breeds Survival Trust has become extinct in the UK over the past 30 years. However, the challenge that faces both industry and Government is to avoid the unnecessary permanent loss of genetic diversity within our farm animal breeds, so that we are better prepared to meet the environmental, economic and social challenges to the future of livestock production in the UK. This applies whether the breeds are commercially mainstream or at risk of extinction.

## 2.2 Why we need a National Action Plan

In 2002 Defra, with contributions from SEERAD, DARDNI and the Welsh Assembly Government, published the UK Country Report on Animal Genetic Resources. This was the United Kingdom’s official contribution to the FAO’s “First Report on the State of the World’s Animal Genetic Resources”, to be published in 2007 as part of FAO’s Global Strategy.

The UK Report describes the state of the UK’s livestock industry and the key role that the country’s rich diversity of livestock breeds and commercial strains play in maintaining the economic and genetic sustainability of its farm animal production systems, as well as being part of the country’s rural culture. It also analyses the changing demands on national livestock production and future breeding programmes driven by the globalisation of livestock product marketing, and by evolving Government policies on the environment, animal welfare and food safety. The Report reviews what needs to be done to assist the industry to meet those demands by improving co-ordination among the relevant stakeholders, and by building capacity in the animal breeding and conservation sectors. National priorities for action are given as well as a number of recommendations relevant to both Government and the private sector on how the conservation and utilisation of the country’s animal genetic resources can be improved.

The Report identified some major gaps in our management of FAnGR in the new rural context, and concluded with strong recommendations that:

- (i) there should be a National Action Plan for Farm Animal Genetic Resources based on the recommendations in the Report, and

- (ii) a National Steering Committee on Farm Animal Genetic Resources should be constituted to formulate the Plan and drive it forward.

Both of these recommendations were accepted and supported by the relevant Government Departments. The National Steering Committee on Farm Animal Genetic Resources was established as an *ad hoc* advisory committee, initially for a two-year period, meeting for the first time in January 2004. The membership of the committee is shown in Annex 1. The primary aim of the committee was to produce this National Action Plan; its full remit is shown in Annex 2.

We have a strong tradition of not only producing but also caring for our FAnGR in the UK – thanks largely to the activities of many individual breeders, charities and non-governmental organisations. However, the threat to our FAnGR is growing, for the reasons outlined above. The Plan is intended to build on our strong tradition in the UK of non-governmental commitment to protecting our FAnGR. But there are clearly areas where Government input and resources are needed, both to improve outcomes of its own policies, and to help co-ordinate the activities of others. The National Action Plan identifies these, and will help Government, industry and other stakeholders work together in a co-ordinated way.

## 2.3 Structure of the Plan

The Plan is divided into three main sections, dealing respectively with:

- **What, and where, are our Farm Animal Genetic Resources?**
- **How should we look after and use our FAnGR?**
- **What can Government do to help?**

We identify a total of 38 Recommended Actions throughout the report, and these are also listed in the Executive Summary. The first of these is given below. In framing the rest of the Recommended Actions we have assumed that this first one will be accepted.

**Recommended Action 1:** The National Steering Committee should be constituted as a UK standing committee, to provide a permanent forum for advising Government and other stakeholders on issues relating to FAnGR, and to oversee implementation of, and further develop, the National Action Plan.

We have consulted widely with stakeholders in drawing up the National Action Plan, and believe that there is strong support for the Recommended Actions within it. There is also wide support for an ongoing forum to advise on, and help co-ordinate, activities relating to FAnGR, as the NSC has done during its initial period of operation.



### 3 What, and where, are our Farm Animal Genetic Resources?

#### 3.1 Introduction

Clearly, if we are going to protect our FAnGR, we first need to know what resources we have, and where they are.

The CBD recognises the **identification** and **monitoring** of genetic resources as the foundation for all management activities, from conservation to sustainable utilisation. The activity of identifying FAnGR includes developing an inventory and characterising FAnGR. This will help to identify priorities and increase awareness of opportunities. The outcome answers the questions *'What resources do we have?'*, *'What does each resource have to offer?'* and *'How is the population changing?'*. To be most effective, the question *'What does each resource have to offer?'* needs to address strategic and long-term needs. Monitoring provides assurance on the management of FAnGR and identifies the needs and opportunity for policy development and actions by stakeholders.

The CBD obliges governments to address these fundamental issues, and the actions will need to be led by Government, although they can only be effectively achieved with the support and assistance of all stakeholders in FAnGR.

#### 3.2 Identification of the UK's Farm Animal Genetic Resources

First, we must answer the question *'What is a genetic resource?'* before we can begin to compile an inventory. Genetic resources are widely defined as genetic material of current or potential use. In technical terms "genetic material" refers to any material of plant, microbial or animal origin, including reproductive and vegetative propagating material, containing functional units of heredity. More simply, a 'genetic resource' can be fully mature plants, animals and microbes or seeds, cuttings, frozen embryos, eggs, and semen. In this section, we look at how we can consider this term to usefully apply to the UK's farmed livestock.

##### 3.2.1 Describing Breeding Population structures

The UK has a rich reservoir of purebred farm animal breeds that are of international significance. However, defining a national genetic resource is unusually complicated in the UK by the structures of the most important livestock sectors, in which many of the productive livestock are crossbred, resulting from the systematic and recurrent mating of two, three or four breeds to capture hybrid vigour or to exploit complementary characteristics of several breeds. This often involves two generations of breeding to produce these crosses, and involves specially selected lines within the breeds used for crossing. The poultry and pig sectors are highly developed examples of such crossbreeding systems. In response to this situation we recommend that a 'Breeding Structure Report' is compiled for each sector which details the reliance of the sector on



crossbreds, the structure of the crossbreeding system, the pure breeds that are the primary source of parents for such systems, and the stakeholders managing the system. Regular surveys of the sheep sector already exist, and we recommend that this approach be extended to all sectors.

**Recommended Action 2:** Defra and the Devolved Administrations should commission a series of Breeding Structure Reports for each UK livestock sector, and update these every six years.

### Box 3: Changing breed popularity

The recent Defra-commissioned survey of the sheep breeding sector provides valuable insight into the changing popularity of breeds and crosses. For example, the Lleyn breed of sheep was rare 40 years ago, but is estimated to number over 230,000 ewes today. Its resurgence is probably due to its 'easy care' attributes, of increasing importance post CAP Reform, and because of its overall efficiency – it produces a relatively high output of lambs, while having relatively low maintenance costs due to intermediate ewe weight. Similarly, there is renewed interest among some sheep producers in the Wiltshire Horn breed, because of its characteristic of shedding wool – a potentially useful easy-care attribute for some sheep producers.

These examples illustrate both the importance of having accurate information on population sizes, and the commercial value of conserving FAnGR to help meet changing market demands.



Lleyn Sheep with triplets (Courtesy of Coleg Flock Institute of Rural Sciences, University of Wales, Aberystwyth).

Wiltshire Horn sheep are able to shed their own fleeces (Courtesy of The Wiltshire Horn Sheep Society).



### 3.2.2 Creating a UK National Breed Inventory

To complement the Breeding Structure Reports, giving an overall picture of the various livestock species sectors, we need to maintain a UK web-based inventory of pure breeds, upgraded from the existing UK National Breed Database kept by Defra (See Appendix 3 of the [2002 UK Country Report on FAnGR](#)). It will be important to co-ordinate the development of the Inventory in parallel with the regional European Farm Animal Biodiversity Information System (EFAB-IS) which itself will have links to the global FAO Domestic Animal Diversity Information System (DAD-IS). In this way, it will be possible to monitor not only national trends, but also European and global trends, in native and exotic breed populations.

Defra's Livestock Data Division, Horse Passport Branch and the equivalent Devolved Administration Divisions should also be kept informed of progress on the development of the National Breed Inventory and appropriate working links should be set up so that the scope for interchange of information between the National Equine Database, the Livestock Register and the Inventory is optimised and duplication avoided.

**Recommended Action 3:** The existing UK National Breed Database should be upgraded into a web-based UK National Breed Inventory using the European Farm Animal Biodiversity Information System (EFABIS), as appropriate, to ensure compatibility with and links to European and UN Food and Agriculture Organisation (FAO) Domestic Animal Diversity Information System (DAD-IS) databases. Clear links with the Livestock Register (and the National Equine Database) in Defra and equivalent databases in the Devolved Administrations should be established.

### 3.2.3 Definition of a breed

One problem in compiling such an Inventory is that there is no scientifically robust or universally accepted definition of a breed. The FAO recognise the term breed as a cultural one, and will simply recognise a breed if a member Government says that the breed exists.

In Europe, [zootechnical legislation](#) provides a standard that can be applied to breed societies, pedigree certificates, herdbooks and genetic evaluation. The legislation aims to promote free trade in pedigree breeding animals and their genetic material through standardisation, and makes a valiant attempt to harmonise the breeding practices of its Member States. However, the legislation is not always sufficiently flexible, nor is it uniformly applied in each Member State. Because of the potential effect on FAnGR, the NSC should be consulted on any issues or policies developing from discussions in Europe on definitions of what constitutes a breed. Clearly, the NSC will need to revise the inventory in the light of any adopted changes to existing Europe-wide policies or other developments, to ensure compliance and cohesion, and will need to determine which breeds qualify as a genetic resource.

**Recommended Action 4:** The UK National Co-ordinator, with guidance from the NSC (with additional expertise as necessary), should populate and maintain the UK National Breed Inventory, identifying which breeds should be classified as mainstream or at risk, native, exotic or feral etc. The use of the term breed within the inventory should be consistent with definitions of inter-governmental bodies such as the EU and FAO.

Further, the NSC should:

- provide guidance for UK Government on the appropriateness of any proposed EU definition of a breed, and the implications such a definition may have for UK policy, industry activity and FAnGR management; and
- keep under review the scope of the inventory and its use of terms to ensure it is relevant to the management of FAnGR.

Broad attributes, which may be used to characterise breeds, should be included in the Inventory. It is likely that NSC priorities will be determined, at least in part, by whether or not the resource is native, since the UK Government has the greatest obligation towards these breeds under the CBD. This will be determined by the period of time the breed has been recognised within the UK and the distinctiveness of the gene pool. We have followed the FAO nomenclature in this report of categorising breeds as native or exotic. However, we understand native to include both indigenous breeds, and those that have been present in the UK for a very long time.

It is difficult to be precise in defining which breeds should be considered native. Similarly, defining feral is difficult, and this may be necessary as the application of future regulations concerning welfare and management of FAnGR may depend on whether or not a resource is feral. We show in Annex 3 our current working guidelines on these definitions, but propose that these are kept under review by the NSC, and that 'borderline' cases are considered in more detail by the NSC on their merits.

### 3.2.4 Characterisation

Characterisation – identifying the major biological/agricultural characteristics of breeds and strains – is the key task to help us identify what each resource has to offer. A review<sup>4</sup> commissioned by Government, gives a comprehensive and relatively recent indication of the degree and nature of characterisation carried out for UK native breeds at risk. The review highlighted the need for better quality information, in particular from well-designed research. Much of the anecdotal information presented about how native breeds at risk perform, in general or in specific environments, has yet to be sufficiently verified. This lack of characterisation severely limits opportunities for breeds that are currently rare to increase in numbers. The challenge will be to exploit

opportunities to conduct such studies in a cost-effective way, since objective characterisation experiments are expensive to run. Developing a more objective approach to targeting characterisation studies is a subject that needs more research.

**Recommended Action 5:** There is a need for greater, but cost-effective, scientific characterisation of those breeds to be incorporated into the UK National Breed Inventory – e.g. through EU initiatives and partnership with conservation programmes, but ensuring sound comparisons of resources in the same environment – with priorities on:

- disease resistance;
- quality of meat and/or other products;
- behavioural or physiological differences leading to increased ‘fitness’ for specific environments or management regimes e.g. conservation grazing.

More research is needed on effective targeting of breed characterisation studies.

### 3.2.5 Molecular Characterisation

Molecular characterisation, leading to generalised measures of genetic similarity and distance among breeds and strains, has been carried out for most species (pigs, sheep, cattle, and horses) including many native breeds. These characterisation studies are not exhaustive – inevitably many breeds of sheep and poultry have received little attention. There is benefit in commissioning a review of such studies in relation to UK FAnGR, to identify gaps and prioritise breeds for inclusion in any future study. The outcomes of studies may have an influence on the priorities for conservation actions and may lead to new insights into breed histories and relationships. Molecular characterisation should also help to ensure more effective targeting of phenotypic characterisation studies.

**Recommended Action 6:** A short review of molecular characterisation studies on UK livestock should be commissioned, including their adequacy in relation to Molecular Domestic Animal Diversity (MoDAD) procedures and advising on priorities for any future studies. Studies should be commissioned to address the priorities identified.

## 3.3 Monitoring

The objective of monitoring is to answer questions such as *‘To what extent, and how quickly, are populations changing in size or structure?’* and *‘To what degree is this breed ‘at risk’?’*.

### 3.3.1 Monitoring breeds

A monitoring process is required to provide the necessary information for assessing the extent and source of risk to our native breeds. Monitoring of population sizes and trends (both numerical and geographical criteria) for each breed, including both the national, bio-geographical (Northern Ireland and the Irish Republic) and global status are an integral part of this procedure

There is also a need to ensure that monitoring of mainstream breeds is adequate to assess the loss of genetic variation within them and to assess the broad direction of genetic change in relation to sustainability. Whilst directions of change in commercial productivity will be monitored closely by industry, areas of concern to Defra and the Devolved Administrations such as 'fitness' and environmental impact may remain unmonitored, or may require Government input to achieve adequate monitoring.

A Standardised Template should be used to collect all information to assess the risk posed to both breeds at risk and mainstream FAnGR so that these resources can be more effectively monitored. This template should provide the basis for collection and storage of data to be included in the National Breed Inventory. We show in Annex 4 a provisional list of data that would be of value in monitoring FAnGR.

**Recommended Action 7:** The NSC should oversee the development of a suitable Standardised Template to monitor breeds for incorporation into the National Breed Inventory and ensure that information is collected to help assess the risk posed to our national FAnGR.

### 3.3.2 Information Portal

Defra is constructing a UK Information Portal for Genetic Resources for Food and Agriculture (GRFA), providing information on resources in the animal, plant and microbial kingdoms, similar to that found in the [German](#) and [French](#) GRFA portals. This is an opportunity to provide an improved evidence base for policymakers, and to publicise both resources and activities pertaining to FAnGR. The portal also has considerable value in facilitating the monitoring of FAnGR and the NSC has an important role in ensuring that the development of the portal fulfils the needs of the FAnGR stakeholders. In particular, the NSC should ensure that the updating and uploading systems for the inventory contained within the information portal meet stakeholder requirements.

**Recommended Action 8:** The NSC should ensure that the GRFA Information Portal being developed by Defra fulfils the needs of FAnGR stakeholders by:

- linking the web-based UK National Breed Inventory (in Recommendation 3) to the web portal;
- ensuring the uploading and updating procedures can facilitate monitoring of FAnGR;
- obtaining accurate and objective information on breeds, activities and issues in relation to FAnGR as described in the Standardised Template in Recommended Action 7.

### 3.3.3 Frequency of monitoring and review

Whilst the National Breed Inventory linked to the GRFA Portal should provide opportunities for regular updating, the information collated under the Standardised Template should be examined routinely by the NSC to review trends and re-assess priorities. This information should be sought by Defra from stakeholders, including breed societies, through regular surveys.

**Recommended Action 9:** The NSC should review and update 'monitoring data' in the UK National Breed Inventory in a 3 yearly cycle with sequential reviews of: (i) sheep and goats; (ii) cattle, pigs, and horses; and (iii) poultry.

### 3.3.4 Breed societies

Breed societies will be one of the major sources of information used for monitoring aspects of the Standardised Template described in Recommended Action 7, and may be the sole source of information for some aspects, e.g. society profiles, conservation activities. There is a need to review the procedure for obtaining information from the breed societies and the adequacy of the information obtained, and to seek their co-operation in operating the procedure. This review should take account of the development of the GRFA information portal.

**Recommended Action 10:** The procedure for obtaining information from breed societies and breeding companies and the content of the information should be reviewed by the NSC, in the light of the needs of the Standardised Template recommended above (Recommended Action 7) and the opportunities offered by the GRFA Information Portal.



The monitoring and analysis of data obtained will be greatly facilitated if societies have cost-effective means of maintaining herd-book information electronically, e.g. in the uploading of information into the National Breed Inventory via the GRFA portal.

**Recommended Action 11:** Breed societies should be encouraged to make all herd and flock books electronic to facilitate the uploading of monitoring information, as defined in the Standardised Template, to the National Breed Inventory via the GRFA Information Portal.

### 3.3.5 Filling the gaps in quantifying available resources

Whilst the UK National Breed Inventory will be developed within Defra, building on the database associated with the UK Country Report, more work is still required to formalise the means of extrapolating beyond herd/flock-book information, or quantifying resources in the absence of herd or flock books. The latter situation is the rule in poultry breeds and also in some hill sheep breeds, such as the Scottish Blackface, and at least one breed of cattle. The annual census forms could provide some useful information about breeds without herd books.

**Recommended Action 12:** Procedures for quantifying resources not included within herd and flock books should be formalised by the NSC.

### 3.3.6 Monitoring geographical distribution

The Foot and Mouth Disease epidemic in 2001 highlighted the endangerment to breeds, such as the Herdwick sheep breed, that are relatively numerous, but are geographically localised. Whilst geographical distribution is identified within the template referred to in Recommended Action 7, there is currently no standard measure of this. This needs to be developed for use in assessing priorities for conservation actions.

**Recommended Action 13:** A project – to be steered by the NSC – should be commissioned, to build on and define:

- robust qualifications for a breeding nucleus essential to the survival of a breed, with or without cryopreserved genetic material as a backup, and particularly when the breed is geographically concentrated;
- how best to quantify degree of concentration and thresholds for preservation action;
- the feasibility and practicality of the necessary data collection, including the population size and location of holdings; and
- breeds at risk as a result of geographical concentration, using the preferred measures defined above.

### 3.3.7 Mainstream breed monitoring

There are a number of policy drivers for UK Government and Devolved Administrations to collect and monitor population data on livestock, such as the need for recording census data, managing traceability, monitoring animal health, measuring environmental impact, conserving genetic resources and so on. It is intended that the Livestock Register project will consolidate many of the various national livestock databases into one, or at least to ensure that they are linked and compatible. However, at present, the National Equine Database is not within the scope of the Livestock Register so this information source will need to be considered separately.

As the scope of the Livestock Register has been examined, Defra has recognised the potential benefits of improving breed and species information but, so far, no mechanism has been identified to deliver this improvement. However, a vast amount of important information is currently being, and will be, collected to populate the Register and linked databases. This should be made available for analysis to facilitate the monitoring of all breeds. The NSC should have access to these data to ensure the sustainable management of the nation's mainstream FAnGR

**Recommended Action 14:** Industry and Government stakeholders should work together:

- to improve the recording of livestock breed data before finalising the requirements of the Livestock Register, and
- to speed the development of routine linking (through common formats for animals and holdings) of key databases containing information important for the sustainable management of the UK's FAnGR.

## 4 How should we look after and use our FAnGR?

### 4.1 Introduction

The previous section concentrated on how we establish what and where the nation's FAnGR are and what their attributes are. In this section we consider two main issues: how we protect the FAnGR that we have identified and characterised, and how we encourage sustainable use of these FAnGR.

We believe that a strong demand for breeding stock, and their continued commercial use, offers the best protection for FAnGR. So, in section 4.5 we consider what actions might be taken to identify and stimulate demand for more of our genetic resources. However, we recognise that for many breeds that are no longer in common use, this market demand may never return, or may not return soon enough to offer protection. Hence, in the first part of the section we consider the measures needed to protect FAnGR at risk in the event of a lack of market demand.

This Plan is concerned both with breeds at risk, and with mainstream breeds, for the reasons outlined earlier. However, a vital component of the sustainable use of our FAnGR, whether mainstream or at risk, is the management of genetic variation **within** breeds.

### 4.2 How should we look after our FAnGR?

The preservation of a wide spectrum of FAnGR is a crucial component of any programme to maintain genetic diversity in our farmed livestock – not only to meet our obligations under the CBD, but also to assist the development of sustainable systems of livestock breeding and production in agriculture post CAP reform. Access to a wide variety of species and breeds of livestock is the starting point for effective matching of FAnGR to the existing diverse range of semi-natural and cultivated environments found in the UK today. Importantly, it also increases the chances of meeting novel challenges to livestock production, such as those expected as a result of climate change in the future, and for reducing environmental impact.

The preservation of mainstream breeds is likely to be ensured by their widespread use, but changes in their status and employment should still be monitored. Less obvious risks to these mainstream breeds include the potential loss of genetic variation in some cases, caused by the global use of relatively few sires, and the potential loss of functional fitness, as a result of too much emphasis on production-related traits in selection. This may directly or indirectly lead to welfare problems such as leg weakness in broilers, or to impairment of other characteristics, such as fertility in dairy cattle.

The qualities possessed by minority breeds and breeds at risk have not provided security for their survival historically, as market demands have favoured higher-yielding breeds. There is a justification for preserving them in case they possess qualities, such as robustness, 'easy care' attributes, disease resistance, high fertility etc. that are valued more highly in future. There is a counter argument that such attributes could be

improved more rapidly by selection within larger, mainstream breeds. However, the best option will depend on the relative merits of the 'candidate' rare and mainstream breeds in all traits of interest, the amount of genetic variation in the desired trait and the mode of inheritance e.g. whether single or many genes are involved. Our view is that a targeted preservation and characterisation programme for breeds at risk is worthwhile.

The development of policies and actions for preservation depend on access to accurate and current information on the FAnGR of the UK. The data generated by the identification and monitoring of FAnGR (see Section 3) will provide the information necessary to define and prioritise actions for conservation as part of an ongoing process.

### 4.3 Which FAnGR should we preserve?

A number of national non-Governmental organisations have been involved actively for several decades in conserving our national FAnGR. Attention has often focussed on which FAnGR to preserve when there has been a particular threat as a result of a disease outbreak, such as Foot and Mouth Disease. Rising threats from diseases such as TB and avian influenza highlight the importance of greater co-operation and co-ordination at national level to make the best use of conservation action.

The first step in this process is to *standardise national thresholds* so that conservation action can be prioritised. There are a number of thresholds that should be considered:

#### 4.3.1 Is the breed native or exotic?

In the UK Country Report breeds of livestock were classified according to whether they were native or exotic (i.e. not native to the UK) (see [UK Country Report](#) on FAnGR Appendix 3). More than 220 breeds of large livestock are listed of which 55% are native, but this varies between species (sheep – 70%; pigs – 67%; cattle – 50%; equines – 39%; and goats – 25%). There are also more than 230 breeds of poultry (which includes turkeys, true bantams, geese and duck), but less than 15% are native. Support for all listed breeds would create enormous financial demands, and indicates the need for prioritisation. Each country is particularly responsible under the CBD for the genetic resources in its native breeds, so the first threshold is whether or not the breed is classified as native in the National Breed Inventory (see Recommended Action 5).

However, there are strong arguments for preserving *exotic* FAnGR either when:

- the UK population makes up a substantial part of the global population; or
- the breed concerned makes an important economic contribution to UK agriculture, and has been selected to be significantly different from the population in the country of origin.

More work is needed to identify exotic FAnGR that fall into these categories. Breeds in the latter category are likely to have the financial resources to support any conservation action needed, but may welcome advice on the conservation actions that could be taken.

**Recommended Action 15:** The prioritisation of native breeds for conservation should continue as at present, but exotic breeds in the UK which are extinct in their country of origin and severely endangered globally, or which make an important economic contribution to UK agriculture, may also need conservation action. More work is needed to identify exotic FAnGR that fall into these categories.

#### 4.3.2 Is the breed mainstream or at risk?

Breeds are categorised in the UK Country Report as ‘mainstream breeds’ or ‘breeds at risk’. Both contribute to FAnGR and need to be accommodated within the National Action Plan, but breeds at risk should have priority for conservation.

**Breeds may be considered to be at risk** because they are numerically scarce (“rare”), because of low genetic variability, because of a narrow geographical concentration (e.g. many of the ‘heritage’ sheep breeds listed by [The Sheep Trust](#); Chillingham cattle) or because of adaptation to a very specific environment.

**Recommended Action 16:** Defra and the Devolved Administrations should commission a cost-benefit analysis of FAnGR to the rural economy. The study should be steered by NSC, link to that in Recommended Action 19, and include the roles of FAnGR of all farmed species in agribusiness, leisure and tourism. The results should be used as a guide to prioritisation for conservation action.

Thresholds for numerical scarcity and consequent priority for conservation action for **rare breeds** usually have been based in the UK on the [RBST](#) Endangerment List, which is itself based on FAO and other published guidelines. This list was further developed in the UK Country Report on FAnGR 2002. The list presented in the UK Country Report will be the foundation for future discussions by NSC on priorities for conservation action. The list will be reviewed regularly to ensure that it is relevant to stakeholder needs and priorities. It is important to recognise however that the criteria and thresholds for **breeds at risk through geographical concentration and/or local adaptation** are ill defined, as are the measures for **genetic or phenotypic distinctiveness**. These factors need to be addressed in order to prioritise breeds, which are not necessarily numerically scarce, for conservation action. The extent to which breeds are introducing breeding stock of other breeds or strains is another criterion to be considered, over and above numerical when prioritising breeds for conservation action

**Recommended Action 17:** The NSC should establish and keep under review the thresholds and priority levels for conservation action of breeds using scientifically robust criteria, further developing these as necessary. Thresholds for geographical concentration, local adaptation and breed distinctiveness, including use of other breeds or strains, need to be more clearly defined.

In mainstream breeds there are three main cases which may require conservation action, or corrective action, to preserve the integrity of the genetic resource.

#### **(i) Loss of valuable herds/flocks**

The **first** is illustrated by the recent Foot and Mouth Disease epidemic, during which many valuable mainstream breeding herds and flocks were lost. Pig, poultry and dairy breeding companies usually have biosecurity policies that include contingencies for recovery from losses such as these. However, it would be useful for mainstream breeds outwith the breeding company sector (e.g. many beef and sheep breeds) to consider similar measures to protect their genetic resources in the event of a future disease epidemic, or other natural disaster.

#### **(ii) Side effects of breeding policy**

The **second** case is where the consequences of the current or past breeding policy may require corrective or conservation action. There is now substantial evidence that selection narrowly focused on production traits often leads to unfavourable correlated responses in health, welfare or fitness-related traits. A review in 1998 reported over 100 examples of unfavourable correlated responses, mainly in poultry, pigs and dairy cattle<sup>5</sup>. Unfavourable responses are particularly common in reproductive performance, metabolic disease and functional fitness (e.g. an increase in leg weakness/gait disorders in broiler chickens associated with selection for rapid growth; decreasing fertility in dairy cattle selected for high milk yield). As well as posing an animal welfare and economic risk, these unfavourable responses also pose a threat to the long-term viability of the populations concerned, and hence to our FAnGR. It is important to note that reduced welfare is not a necessary consequence of selective breeding *per se* – rather these responses tend to arise from a *narrowly-focused* breeding goal. Also, many of the unfavourable consequences of selection identified have been, or are now being, addressed by breeders and breeding companies modifying their breeding programmes. This area is one of mutual interest to the NSC and the Farm Animal Welfare Council (FAWC), and interaction between them on any future advice would be useful.

#### **(iii) Loss of genetic variation**

The **third** case where action may be needed in mainstream breeds (and almost certainly in all rare breeds) is in managing genetic variation. The more sustainable use of genetic variation offers opportunities to enhance long term responses to selection in mainstream breeds (and is critical to the survival of numerically-small breeds). It has become apparent over the last couple of decades that techniques which can increase the accuracy and/or intensity of selection, such as the use of 'best linear unbiased prediction' (BLUP) for



genetic evaluation, artificial insemination and embryo transfer, and genetic markers, potentially accelerate inbreeding and loss of genetic variation. During the last few years there have been important developments for simultaneously managing rates of genetic gain and inbreeding, which should enhance responses to selection in mainstream breeds, and help manage conservation of rare breeds<sup>6,7</sup>.

#### Box 4: Changes in the genetic makeup of the UK dairy herd

Over the last half a century there have been major changes in the genetic makeup of the UK dairy herd. Around fifty years ago the native Shorthorn, Ayrshire and Channel Island breeds were the most common. Over the following few decades the populations of these breeds declined in favour of the Friesian breed, a breed of Dutch origin, which was the most numerous dairy breed 25 years ago.

Today this breed itself has been largely replaced by the Holstein. The Holstein shares its Dutch ancestry with the British Friesian, but underwent many generations of selection for milk production in North America, before being exported to become the predominant breed in most temperate dairying countries today. The importation of North American Holsteins to the UK resulted in a substantial increase in milk yield and associated economic returns compared to that of other breeds.

Despite being the predominant temperate dairy breed, with hundreds of millions of cows worldwide, most Holstein cows around the world have many ancestors in common only a few generations back, and the extent of inbreeding is increasing quite rapidly in many countries. This illustrates the need for careful stewardship of these genetic resources, despite the very large population size.



The Holstein is the predominant breed of cattle in temperate dairying countries today (Courtesy of Holstein UK).

**Recommended Action 18:** We recommend that the NSC should advise on strategies for genetic conservation actions as part of risk management in mainstream breeds, and highlight corrective actions that may be needed in mainstream breeds or strains where selection strategies appear to be producing unfavourable consequences for health, welfare or ‘fitness’ of animals.

## 4.4 What are the conservation options?

Conservation may take place both *in situ* and *ex situ*.

- ***In situ*** conservation in the farm animal sector generally involves maintaining breeds at risk on commercial farms or smallholdings and is the preferred option in the Convention on Biological Diversity. This approach has several advantages:
  - (i) the animals can still be seen and enjoyed,
  - (ii) the breed can continue to be characterised, and
  - (iii) the breeds have the opportunity to ‘evolve’ e.g. to develop resistance to new disease challenges, or changes in husbandry. However, *in situ* conservation exposes breeds to possible undesirable genetic changes (e.g. loss of valuable attributes through selection or genetic drift). *In situ* populations are also at risk of disease epidemics or other natural disasters. Also, without financial support, commercial pressures that made rare breeds rare in the first place will continue to encourage substitution by other breeds.
- ***Ex situ*** conservation involves collections of animals in museums or farm parks, or the creation of banks of genetic material (e.g. frozen semen, frozen embryos or DNA). Museums or farm-parks share many of the advantages and disadvantages of commercial farms, though they may allow more control over breeding decisions. Cryogenic stores offer protection from disease epidemics affecting live animals, though the stores themselves may be at risk from these or other disasters. The cost of *ex situ* conservation is usually a major obstacle to its wider use. Therefore, a combination of *in situ* and *ex situ* conservation is likely to be the most effective route for conservation<sup>8</sup>.

Characterisation (e.g. morphological, molecular, performance) of both *in situ* and *ex situ* material is essential if the conservation programmes are to be meaningful for future use. In particular, uncharacterised cryogenic material is of limited value.

There is a need for a nationally co-ordinated Conservation Strategy whereby breeds which are considered a priority for action, according to the national thresholds agreed in Recommended Actions 16 to 18 above are identified and given priority in practical national or European-level *in situ* and *ex situ* conservation activities. This action should be based on the FAO guidelines on management of populations at risk, further developing these where necessary<sup>7, 9, 10</sup>.

**Recommended Action 19:** A project – to be steered by NSC – should be commissioned to develop a co-ordinated *in situ* and *ex situ* National FAnGR Conservation Strategy for breeds at risk, and mainstream breeds that qualify for priority action, taking into account the conservation work already being carried out by NGOs and breed societies. The project should include an evaluation of the costs and benefits of alternative approaches, and link with Recommended Action 16.

## 4.5 Identifying sustainable uses and stimulating demand for our FAnGR

### 4.5.1 Changing Government policies on food and farming

Government policies on food and farming, across the UK, are changing rapidly (see Section 5 for more details). Modification of the EU Common Agricultural Policy (CAP) is a key driver. Common themes in policies in England, Scotland, Wales and Northern Ireland are:

- **Encouraging livestock producers to operate more effectively in an increasingly competitive food chain.** An important part of this is the production of high quality, consistent produce that the market wants.
- **Encouraging more livestock production systems that deliver environmental benefits, or other 'public goods', including access.** There is wide recognition of the inextricable link between agriculture and the environment. Livestock farmers are responsible for the management of much of the UK's landscape and biodiversity and have the potential to make a significant contribution to tackling water and air pollution and climate change.

These developments may lead to both threats and opportunities for FAnGR. On the one hand, a focus on global competitiveness and costs of production may well accelerate the trend towards the expansion of a few, very specialised breeds, and threaten some FAnGR. On the other hand, an emphasis on quality, region of origin, unique attributes, diversification and environmental benefits may create new opportunities for other FAnGR.

Encouragingly, there appears to be a growing recognition of the importance of FAnGR in Government policy (see Section 5). The developing European Agricultural Fund for Rural Development Regulation (EAFRD), due in 2007 to replace the existing Rural Development Regulation, provides an ideal opportunity to ensure appropriate measures for the support of FAnGR, particularly when the new Regulation is transferred into country-specific national development plans. The status of owners of limited acreage who cannot benefit from Agri-Environment Schemes but who, nevertheless, keep valuable groups of FAnGR, especially rare breeds needs to be considered. In this context

the implementation into national plans of “stand alone” genetic resource measures, independent of environmental benefits (possible under Axis II, Article 39 (paragraph 5) in the EAFRD Regulation as described in Recommended Action 29) is very important.

**Recommended Action 20:** Defra and the Devolved Administrations should identify opportunities within existing and developing national and EU legislation, such as the European Agricultural Fund for Rural Development (EAFRD), to encourage the use of FAnGR that are fit for purpose in delivering complementary policy objectives. “Stand alone” genetic resource measures to support owners of at-risk FAnGR who do not qualify for any other complementary scheme should also be considered (See Recommended Action 29).

The importance of FAnGR is also increasingly recognised in research planning. For instance, the first report of the Sustainable Farming and Food Research Priorities Group (RPG) recognises that characterisation and development of FAnGR has something to offer in a number of policy areas such as whole farm nutrient balancing and environmental protection.

#### 4.5.2 Impact of changes in farming systems on the nation’s FAnGR

Partly stimulated by the policy changes outlined above, there is a trend for UK livestock farming to gravitate towards one of three types of system:

- **High input systems with a focus on technical efficiency.** Livestock sectors that have historically had little or no subsidy support tend to fall into this category already. With the removal of subsidies linked to production, more enterprises in the previously subsidised sectors are expected to move in this direction. Management decisions will be based strongly on the direct impact on profitability. Enterprises will have to be managed to meet the minimum standards of environmental care and animal welfare required in law or, if this is higher, by customers (in most cases the major supermarket chains). These systems are likely to depend largely on today’s mainstream breeds. The main FAnGR concerns here are likely to be sustainable use of genetic variation within these mainstream breeds, matching appropriate genotypes to these systems, and potential concerns over loss of functional fitness in the long term, because of short term focus on production.
- **Low and medium input systems, often maximising use of home-grown feeds, including grazing.** Many more of these enterprises are likely to be able to benefit from schemes to deliver public goods, such as enhanced environmental benefits. FAnGR concerns will include those mentioned above. However, intuitively, there ought to be opportunities for FAnGR currently outside mainstream production to find a role, for example in organic systems, especially if the use of traditional breeds is supported directly.

- **Systems producing niche products for (usually) small, specialised markets.** These include high value meat, dairy, hide and skin and other livestock products for specialist independent retail outlets, farmers markets, and other direct marketing initiatives. Consumers are likely to expect especially high environmental and animal care in these systems. Again, these systems ought to be particularly attractive to those interested in locally-adapted and rare native breeds with a strong regional image. The lower volumes of product required also make these systems attractive to rare breeds, as their rarity sometimes precludes contracts with major retailers. Finding the appropriate FAnGR for a given system will be a major challenge here. Better characterisation of FAnGR would help identify new market opportunities.

A key challenge for those concerned about sustainable use of our FAnGR, will be to encourage the flow to decision makers of accurate, appropriate information on our FAnGR, and its suitability for particular livestock systems. Many of the actions identified so far, and some to follow (see Recommended Actions 28 and 29 in particular), should help in this regard.

## 4.6 Actions to encourage sustainable use of our FAnGR

Given the Government policy and industry context outlined above, we see four main areas in which this National Action Plan can help to encourage sustainable use of our FAnGR:

- **Communication of information on FAnGR**
- **Highlighting and demonstrating best practice**
- **Training and capacity building**
- **Research and development**

We expand below on the actions needed in each of these areas, and in a final section discuss resource needs. Activities in each of the areas mentioned depend heavily on, or interact with, other Recommended Actions on identifying, monitoring and preserving FAnGR.

### 4.6.1 Communication of information on FAnGR

Effective collation and communication of information on our FAnGR is central to encouraging the use of the most appropriate FAnGR. Much of the information needed (if it exists already) is being collected for identification, monitoring or preserving purposes. However, it is important that we engage with those taking decisions on what FAnGR to use in commercial systems, to ensure that the right sort of information is available in the right way.

The Grazing Animals Project has had equivalent aims for several years, in disseminating information on the suitability of breeds for grazing conservation projects (see Box 5).



### Box 5: [The Grazing Animals Project \(GAP\)](#) and PONT

GAP was formed in 1997 to help develop conservation grazing throughout the UK. The project was founded through the merger of two initiatives: 'The Forum for the Application of Conservation Techniques' (FACT) and 'The Use of Rare Breeds in Conservation' forum at Liverpool John Moores University.

Its purpose is to help grazing managers and advisors to deliver biodiversity targets through integrated and sustainable land management systems. Many conservation sites have been traditionally managed by grazing for centuries but some have been reported to be less suited to imported breeds. Re-establishing grazing on such sites using native breeds has the potential to deliver the combined benefit of encouraging desirable plant communities and conserving our native genetic resources through utilisation.

GAP and its Welsh counterpart PONT have two main activities:

- Providing publications to help managers choose stock, deliver high animal welfare standards and develop novel and improved marketing approaches for produce derived from conservation grazing systems
- Organising networking and servicing events to promote the use of grazing animals in conservation areas

A wide range of organisations support the activities of GAP and PONT, including conservation agencies, NGOs, agricultural organisations, breed societies and land owning or managing organisations such as the National Trust and National Parks.



Exmoor Ponies have been grazing on what are now conservation sites for centuries (Courtesy of Margaret Paxton)



Traditional breeds such as Highland cattle can play a key role in land management (Courtesy of Robert Goodison)



**Recommended Action 21:** The NSC, with other partners and external communications expertise, should develop a Communication Plan to:

- create wide awareness of the information resources available on FAnGR; and
- develop future FAnGR information provision in a way that is most helpful to decision-makers.

Key partners that should be invited to take part in formulating and acting on the plan include:

- Breed societies and associated umbrella organisations (e.g. NBA, NSA, BPA, NPA, RABDF)
- Breeding companies
- Livestock levy boards and associated devolved organisations (MLC, MDC, Eblex, QMS, HCC)
- Recording companies
- Agri-environmental organisations (e.g. LEAF, FWAG, Soil Association, Grazing Animals Project etc).
- Advisory and Consultancy organisations, including Agri-Food Partnership Wales
- Marketing and branding experts
- Food Chain Centre
- Red Meat Industry Forum
- Dairy Chain Forum
- Retailers (including the Institute of Grocery Distribution)
- Agricultural societies and international export traders
- Relevant Government agencies.

In constructing and implementing the Communication Plan the NSC should:

- Draw up a list of existing traditional breed marketing schemes (based on RBST and other NGO expertise) and identify relevant contacts.
- Approach organisations with an interest in developing livestock product marketing initiatives to publicise the FAnGR message and encourage their greater use.

- Engage with all organisations and breeding companies that have a role in developing breeding objectives and indices or run genetic improvement programmes to increase awareness of FAnGR policy and utilisation objectives

#### 4.6.2 Highlighting and demonstrating best practice

The NSC has neither the remit nor the expertise to become directly involved in strategies for marketing or branding of FAnGR. However, we recognise that this offers important opportunities for some FAnGR, especially rare and traditional breeds that have a strong regional or quality image. Two important roles for the NSC are to ensure that appropriate factual information is available to promote responsible marketing (as outlined above), and that FAnGR stakeholders are aware of what can be done, by highlighting success stories.

The promotion of quality brands for local or regional products can also be facilitated by Government through supporting applications to the EU Commission for Protected Geographical Indication (PGI) or Protected Designation of Origin (PDO). A Certificate of Specific Character (CSC) – otherwise known as Traditional Speciality Guaranteed (TSG) status – for products derived from native breeds is particularly relevant under PGI. The Regional Development Agencies may also have a role to play in encouraging the growth of regional branding initiatives related to their local FAnGR.

**Recommended Action 22:** The NSC should identify and publicise ‘success stories’ where commercial activities (e.g. speciality food marketing) or environmental management programmes have been developed around the use of non-mainstream FAnGR.

### Box 6: Promotion of native breeds by the National Trust in England and Wales, by Natural England and others.

In England and Wales, the National Trust uses rare native breeds on many of its historic properties. For example, Wimpole Home Farm near Cambridge, has large breeding units of several native breeds at risk (cattle, sheep, pigs and poultry) and is an Approved Conservation Centre for the RBST. Also, Dinefwr Castle in South Wales has a herd of White Park cattle first mentioned on that site in 856AD.

White Park are one of the UK's oldest and most genetically distinct cattle breeds (Courtesy of Lawrence Alderson).



The National Trust also encourages the use of native breeds by its tenant farmers. For example, in Cumbria, National Trust tenants are encouraged to use the Herdwick sheep breed, and the Trust supports its tenants by organising promotional and marketing material and events.

Natural England also promotes the use of native breeds in grazing conservation projects (e.g. the [Limestone Country Project](#)). This assists directly in conservation of these breeds, and provides an important opportunity to publicise FAnGR conservation issues.



Blue Grey crossbred cattle are capable of surviving in the harsh climate and rough grasslands of the limestone country (Courtesy of Robert Goodison).

The [Wiltshire Interactive Grazing Initiative](#) (WIGI), a partnership project between English Nature, RSPB and Wiltshire Wildlife, is using White Park cattle for conservation grazing across a range of habitats, for example in the woodland glading of Savernake Forest, upland grazing sites of special scientific interest (SSSIs) on Salisbury Plain, and on the wetlands of the Somerset Levels.

### Box 7: The RBST Traditional Breeds Meat Marketing Company Ltd

The [Traditional Breeds Meat Marketing Scheme](#) was started by the RBST in 1994 as a national project to assist the conservation of endangered native FAnGR. A main objective is to secure outlets for meat of high quality to make minority breeds financially viable. In 2003 the scheme was put in the hands of the Traditional Breeds Meat Marketing Company Ltd. The scheme involves local production, processing and marketing, through a network of producers, finishers, abattoirs and butchers.



The Gloucestershire Old Spot has been one of the successes of the Traditional Breeds Meat Marketing Co Ltd (Courtesy of Richard Lutwyche)



Traditional Breeds' meat products being marketed locally (Courtesy of Richard Lutwyche)

### Box 8: The British Pig Association's Pedigree Pork initiative

The British Pig Association is the official breed society of, and maintains the herd books for, the Berkshire, British Landrace, British Saddleback, Duroc, Gloucestershire Old Spot, Hampshire, Large Black, Large White, Middle White, Oxford Sandy and Black, Pietrain and Tamworth breeds.



The Large White has been one of the UK's most successfully exported breeds since the 1880s (Courtesy of the British Pig Association).

The BPA's [Pedigree Pork Initiative](#) promotes the sale of pig products from small herds of pedigree pigs, produced by local farmers. Pedigree Pork is available from selected local butchers, farmers markets, farm shops and by mail order.

Similarly, best practice with respect to the protection of breeds at risk and sustainable management of FAnGR<sup>10</sup> as a whole should be publicised e.g. see Box 9.

### Box 9: Breeding companies contributing to the protection of FAnGR

Several international breeding companies hold populations of rare or traditional breeds and strains, as an insurance policy against changing market demand, and to help protect important FAnGR.

For example PIC International, the world's largest pig breeding company maintains more than 15 populations internationally as part of its genetic programme. This includes traditional breeds such as the Berkshire (from the UK) and the Meishan (from China).



Breeding companies have a pivotal role to play in the protection of FAnGR (Courtesy of Aviagen).

Aviagen, the multinational poultry breeding company, maintains two distinct sets of pure lines that are not being subjected to genetic selection for production traits. The first of these groups was established in 1972 (approximately 40 generations ago) and the latter group in 1996 (approximately 10 generations ago). Aviagen also maintains populations of rare turkey lines with unique characteristics such as colour sexing ability.

As well as protecting rare breeds and strains, breeding companies often restrict rates of inbreeding in selected lines to protect genetic variability within these.

### 4.6.3 Training and capacity building

The UK Country Report identified a strong need for training and capacity building in the area of FAnGR in the UK. The creation of the National Breed Inventory and the GRFA Information Portal will themselves provide useful training material. Likewise, the DVD produced to accompany this Plan should be of wider value in training. Other actions that we consider necessary include:

**Recommended Action 23:** The NSC should seek resources to develop and repackage material on the GRFA Information Portal to facilitate its use in schools, colleges and universities, as part of taught courses, or via distance learning. The material should be updated regularly. The availability of this material should then be publicised widely.

Defra and the Devolved Administrations may have a useful role to play, in collaboration with the NSC, in sponsoring **training** on conservation genetics and programmes for action for FAnGR stakeholders at appropriate fora.

**Recommended Action 24:** The NSC should work with industry stakeholders to identify a programme of relevant training courses relating to FAnGR, to identify possible funding opportunities to develop such courses, and to identify appropriate groups to deliver them.

Other training actions should include the preparation of appropriate teaching support material for use in basic agriculture or countryside management courses. Also, other initiatives, such as The Science, Engineering, Technology and Mathematics Network ([SETNET](#)), could be used to reach school children, again through the production and availability of support material.

### 4.6.4 Research and Development

The NSC should have a continuing role in helping to identify and prioritise research and development needs to support the protection and sustainable use of FAnGR. Several research and development needs have been identified in this Plan already (see Recommended Actions 5, 6, 13, 16, 31).

Briefly, these include R&D to:

- Review past molecular characterisation studies and identify future priorities.
- Provide more objective breed characterisation, and develop methods for more effective targeting of characterisation studies.



- Produce robust guidelines on breeding nucleus flock/herd sizes to ensure the survival of a breed
- Develop methods to quantify the degree of geographical concentration of breeds, and identify breeds at risk as a result of geographical concentration.
- Investigate the costs and benefits of FAnGR to the rural economy
- Investigate lifecycle nutrient efficiency of different breeds, and developing strategies to include this in within-breed selection
- Develop a co-ordinated *in situ* and *ex situ* National FAnGR conservation strategy, including an evaluation of the costs and benefits of alternative approaches.

R&D is also needed to:

- Identify potential new opportunities for FAnGR, e.g. by identifying breeds/breed characteristics of value for different types of conservation grazing.
- Identify new opportunities for development of mainstream breeds in directions that support Government policy, such as reducing the environmental impact of livestock production, or helping to deliver animal health and welfare benefits.
- Develop user-friendly tools to assist in maintaining the 'genetic health' of mainstream FAnGR or FAnGR 'at risk'.

Where there is clear public interest in, or policy relevance of, a particular FAnGR research topic, then these should be of interest to the NSC's sponsoring Government Departments.

Where the likely benefits are entirely or partly to industry, then industry funding or co-funding (e.g. through existing schemes such as LINK) would be appropriate.

The NSC should also assist in ensuring effective dissemination of results to relevant stakeholders. Traditional dissemination routes have an important role to play (breed societies, levy boards, RBST, The Sheep Trust etc). Demonstration farms, perhaps linking with LEAF/FWAG and others, land-based colleges with farming enterprises, Natural England, Farming Connect in Wales and other devolved bodies will all have a role to play in encouraging the uptake of R&D which demonstrates the value of the strategic use of particular breeds at risk in farming or environmental management systems.

**Recommended Action 25:** The NSC should help to identify research and development needs and priorities to support the protection and sustainable use of FAnGR, help to identify relevant funding routes, and to disseminate R&D results



#### 4.6.5 Resource needs

The importance and relevance of the conservation of FAnGR in the UK has become increasingly understood recently. The resources necessary to carry out conservation actions are varied, and require the concerted input of the industry and Government. They include financial, human, genetic (animals) and infrastructure resources.

Potential sources of funding are through existing EU and Government programmes, NGOs, livestock industry (e.g. levy boards), and individuals. Human and infrastructure resources should be sought mainly from NGOs, while the genetic resources themselves could be provided by individuals (mainly farmers) or private companies. In regard to the allocation of resources the NSC should seek to influence the priorities of **levy bodies** by demonstrating the role and value of FAnGR, and establishing the principle of provision of resources for FAnGR activity as a foundational building block for a sustainable livestock industry. Stakeholders should be encouraged to seek EU funding for collaborative projects involving European partners.

**Recommended Action 26:** The National Action Plan should act as the linking framework on which to identify and collate resource sharing from a wide range of stakeholders, some of whom may have conflicting priorities.

## 5 What can Government do to help?

### 5.1 General policy

Much of Government agricultural policy is concerned with regulation of the livestock sector and this naturally has an impact on the economic viability of livestock production and breeding. The vast majority of such legislation is developed under the **EU Common Agricultural Policy** and adopted in the UK by Defra and the Devolved Administrations, covering food quality and safety, rural development, environmental protection, biodiversity and animal health and welfare. There are over eighty current EU Regulations that affect livestock production and breeding.

Very little legislation covers animal breeding and FAnGR directly. However, there are some key regulations involving FAnGR and the number is growing as Genetic Resource policy becomes more integrated into wider policy areas affecting livestock, both within the EU and nationally. Specific legislative areas will be dealt with later.

The following sections look at specific areas of Government policy affecting livestock production and breeding and highlight areas where action is needed to protect genetic diversity in the UK's farm animal breeds and manage their conservation and use. The policy areas covered are those identified in the template in Appendix 7 of the [UK Country Report](#) on Farm Animal Genetic Resources 2002.

### 5.2 Food production and security policy

#### 5.2.1 Quantity and quality of production affecting genetic resources

The Common Agricultural Policy (CAP), originally introduced in 1962, was driven by a strategic need for food security in Europe, which led to a deliberate increase in domestic food production and reduced dependence on imports. Throughout the last half-century, production-related subsidies have remained a central feature of UK food and farming policy. However, the 2003 CAP reform agreement heralded the decoupling of subsidy from production, notably for the beef and sheep sectors, removal of the market-distorting effects of subsidy regimes and encouragement of greater environmental responsibility.

The implementation of CAP reform is central to farming and food strategies in England, Scotland, Wales and Northern Ireland. These reforms will arguably lead to the most significant changes in the livestock industry in decades, including a much greater incentive to produce what the market requires, rather than farming for headage payments. Animal breeders will need to focus on new objectives to reduce costs of production, including environmental ones, meet cross compliance requirements and produce specific products for specified markets. Producers will face stiffer competition from imports produced at lower cost and will need to define unique selling points for their products if their businesses are to survive. Farmers may look to quality/specialist markets that attract a premium as well as to improving performance in their animals to ensure economic viability and reduce output of environmental pollutants.

FAnGR have an important role to play in providing the genetic basis for new or evolving production systems and markets, and therefore the sustainability of UK livestock production. As more is understood about the genetic control of quality traits in farmed species, such as carcass and meat eating quality and fatty acid profiles, there is a need to characterise UK breeds for these attributes, and to use modern selection techniques to enhance performance accordingly.

The availability of cheap, high-throughput genotyping and the growing amount of information on the location of genes affecting traits of economic importance should make it possible for breeders to make an even greater impact in future, especially in traits that have been neglected in the past because of the difficulty of measurement. These include meat quality, some reproductive traits and disease resistance. This will considerably raise the profile of host genetics in the management and monitoring of risks for many diseases, especially zoonotic diseases (those of risk to humans), diseases of economic importance to farmers, or those requiring the use of treatments that may risk human health (e.g. an increasing risk of antibiotic resistance) or pose risks to the environment.

Government and their devolved bodies oversee the surveillance of disease risks and the routine sampling of animals in a range of disease control measures. By (i) integrating genetic information into relevant databases and (ii) allowing the re-use of surveillance samples (e.g. for access to DNA) for defined and approved science projects will speed the achievement of both Government and farmers' objectives in this area, reduce the costs of achieving them, and improve the health and welfare of livestock.

In view of the need for a genetically diverse pool of breeding stock from which to select a widening array of desirable traits, it is surprising that none of the national strategies involving livestock production recognise the foundational importance of a coherent FAnGR policy to deliver strategic objectives. This omission needs to be addressed.

**Recommended Action 27:** The NSC should engage policy makers implementing post CAP Reform livestock strategy, at central and regional level, on the importance of mainstreaming FAnGR policy into all sustainable food and farming strategies. Sustainable use of FAnGR is the starting point for all sustainable livestock production chains. The NSC should monitor the impact of CAP reform on FAnGR and alert the relevant policy makers to any corrective action needed.

### 5.3 Food safety and genetic diversity

A good deal of EU legislation related to Food Safety is aimed at improving animal identification and traceability. Improved traceability offers benefits to consumers and to animal health interests alike and diseases such as TB, BSE and Salmonella have added to the importance of legislation in this area. Improved identification has positive benefits for the monitoring of FAnGR and is to be welcomed, particularly for breeding

stock. There needs to be improved integration between the various Government livestock databases so that breeding population monitoring can be enhanced. It is hoped that the Defra Livestock Register Project will deliver this in due course (see Recommended Action 3).

However, the impact of food safety legislation on genetic diversity is limited, with one notable exception. That is where, to protect human health, precautionary measures are taken to reduce risk by selective breeding in an animal population. There is a theoretical risk of BSE occurring in sheep, which would pose a human health risk. This risk would be greater if the presence of BSE was masked by the occurrence of scrapie in sheep (although tests are now available to distinguish these diseases). Hence, the eradication of scrapie was seen as a potential benefit in protecting human health, as well as an animal welfare and economic benefit. As a result of these drivers, the National Scrapie Plan (NSP) in Great Britain, and the Northern Ireland Scrapie Plan (NISIP) were established a few years ago to reduce and eventually eradicate scrapie from the national sheep flocks.

The progressive elimination of genotypes most susceptible to scrapie was a central feature of the NSP and NISIP when they were first introduced. However, the potential impact on a number of mainstream breeds and breeds at risk was recognised to be serious, if not managed appropriately. (The emphasis of these scrapie plans has been modified over time, to removing only those genotypes at highest risk, partly because of these concerns over the impact in some breeds, and to await the results of research on optimal approaches to breeding for resistance in populations of different size and resistance status. Also, there are concerns that creating sheep populations that are most resistant to currently common strains of scrapie may not be the most effective way to guard against future strains of the disease agent.) There is commendable action to conserve lines within breeds that are at risk as a result of breeding policies developed to meet original NSP/NISIP guidelines, through the work of the Semen Archive Management Board. But it is imperative that the NSP/NISIP are closely monitored to ensure that valuable traits are not inadvertently lost from the UK sheep population.

**Recommended Action 28:** The NSC should continue to actively monitor the impact of the National Scrapie Plan (NSP) and the Northern Ireland Scrapie Plan (NISIP) on genetic diversity in sheep breeds. The findings of research on the impact of the NSP should be fed into policy development of the NSP and future breeding scheme design.

**Box 10: Government and industry collaboration to protect FAnGR potentially at risk because of the National Scrapie Plan.**

A wide range of sheep industry stakeholders recognised that implementing the National Scrapie Plan and the Northern Ireland Scrapie Plan posed a risk to some FAnGR. Relevant Government administrations have responded by supporting genotyping programmes to establish the frequency of genotypes conferring different levels of resistance to scrapie in rare breeds and by establishing a semen archive, overseen by The UK Semen Archive Management Board (which includes a sub-group covering Northern Ireland). This board has wide representation, and is a good example of effective collaboration between Government and industry to protect FAnGR.



Filling of semen straws (Courtesy of Innovis).

Freezing of semen straws for storage (Courtesy of Innovis).



## 5.4 Rural socio-economic policy

### 5.4.1 Rural Development Plans and genetic resources

European Rural development policy is defined by Council Regulation 1257/1999 and is implemented by Commission Regulation No. 2603/1999 (see below). Each nation within the UK has produced its own rural development plan under the auspices of the Regulation. As an example the [England Rural Development Programme \(ERDP\)](#) contributes to the delivery of the Government's Strategy for Sustainable Farming and Food by helping farmers to respond better to consumer requirements and become more competitive, diverse, flexible and environmentally responsible. It also provides help to rural businesses and communities, which need to adapt and develop. Whilst there is provision in the Council Regulation for the support of rare breeds in danger of extinction, the UK had not implemented this measure in any of the original rural development plans unlike every other EU Member State except Denmark (which has introduced national measures).

However, the introduction of specific measures in England to support native FAnGR under the Higher Level Environmental Stewardship options for secondary agri-environmental measures during the 2004 mid-term review of the RDR was eventually approved by the Commission in the autumn of 2005. Measures in support of native cattle grazing and native breeds at risk are now being implemented, so setting a precedent for future rural development plans in England.

In Scotland a management option, the 'Retention or Introduction of Cattle of Scottish Native or Traditional Breed(s)' on small units, was introduced when the Rural Stewardship Scheme was launched in 2001. This measure was introduced given the decline in cattle numbers in the crofting areas of Scotland, recognising the positive benefits that keeping a herd of cattle can deliver, both directly and indirectly, to biodiversity and knowing that native or traditional cattle breeds, and first crosses from these, are naturally adapted to producing a marketable calf when managed extensively.

A proposal for a new Council Regulation to be introduced in 2007 in support of rural development planning by the European Agricultural Fund for Rural Development (EAFRD, the general rules for which are outlined in Commission Regulation [1698/2005](#)) is now being discussed at Commission and Member State level and it is imperative that appropriate implementing rules for the optional "stand alone" measure in support of the conservation and sustainable use of FAnGR in Axis II (Article 39 – Agri-environmental measures) are incorporated into the implementing Regulation, and that the UK incorporates suitable genetic resource measures into the various national rural development plans in 2007.



### Box 11: Native pigs in sustainable Scottish woodland management

A new rôle for traditional pig breeds is emerging in Scotland. Pigs have been considered important for successful woodland management for centuries, and have contributed significantly to shaping the historic woodlands in Britain – something which has been lacking since the right of pannage (the right to feed pigs or other animals in woodland) dropped out of common usage. In the last decade, however, the power of hardy pigs has been harnessed for the management of large tracts of bracken on moorland as a serious alternative to the use of herbicides.

Pigs do not provide an overnight solution, but there is a growing body of evidence to demonstrate that regular rooting by pigs has the ability to transform moorland areas dominated by bracken cover. Pigs have the ability to destroy the bracken canopy, break open the mat of decaying debris, and expose the ground to dormant seeds of other plants and the current season's dispersal. The overall impact is to create a mosaic of far greater biodiversity than can be achieved where bracken has achieved dominance – and is in the longer term more effective than an application of chemicals. Traditional breeds of pigs are thought to be better suited to this type of activity, being hardier and able to subsist in relatively rugged terrain. A further economic benefit is that there is a strong niche market for the meat produced from these breeds managed in this way.



Pigs can contribute significantly to re-establishing historic woodlands (Courtesy of Dunlossit Estate, Islay).

Breeds such as the Tamworth may provide a serious alternative to the use of herbicides in moorland area (Courtesy of Dunlossit Estate, Islay).





**Recommended Action 29:** The UK National Co-ordinator for FAnGR should:

- Monitor closely the progress of the new EAFRD proposals, intervening where necessary in the negotiations and liaising with policymakers on the inclusion of 'stand alone' genetic resource measures (other than headage payments) into national rural development plans in support of flexible actions to conserve and utilise FAnGR.
- Liaise with policy makers to ensure that payments supporting endangered native breeds provided for under agri-environmental measures in the new EAFRD regulation are incorporated into new rural development plans.

#### 5.4.2 Countryside access

[The Countryside and Rights of Way Act 2000](#) (also known as CROW) applies in England and Wales and extends the public's ability to enjoy the countryside, whilst providing safeguards for landowners and occupiers. It creates a new statutory right of access to open country and registered common land, modernises the rights of way system, gives greater protection to Sites of Special Scientific Interest (SSSIs), provides better management arrangements for Areas of Outstanding Natural Beauty (AONBs), and strengthens wildlife enforcement legislation. However, whilst there is some protection in the Act (Article 74) for wild biodiversity, in accordance with the CBD, there is no mention of agricultural biodiversity. Whilst there is no restriction on the keeping of breeds that may endanger public safety e.g. horned cattle, farmed wild boar, native ponies etc., extension of rights of access may create a disincentive to keep certain types of FAnGR. The (Environment) Northern Ireland Order 2002 offers additional protection for designated sites. Neither this order, nor the Scottish Executive's Land Reform Act, appears to have implications for keeping FAnGR.

**Recommended Action 30:** The UK National Co-ordinator for FAnGR should monitor legal action taken under Countryside Rights of Way (CROW) in England and Wales and any negative impact on the willingness of livestock keepers to conserve FAnGR on their land.

## 5.5 Environmental policy

There are two strands to environmental policy which impact on livestock production generally. The first is in terms of maintenance of the semi-natural landscapes that owe their attractiveness and biodiversity to extensive grazing by husbanded animals. The legislative impact on FAnGR here is limited except in defining the particular suitability of certain listed native breeds for use in agri-environmental schemes in the English Rural Development Plan (see Rural Socio-economic Policy section above).

The second is the management of waste products from livestock which impacts on the environment through natural resources, principally air and water. There is a raft of EU and domestic legislation (e.g. the new [Groundwater Directive](#) and the [Integrated Pollution Prevention and Control \(IPPC\) Regulations](#)) that seeks to control the impact of livestock production to deliver Government environmental sustainability objectives and EU Biodiversity Targets.

Whilst there is little specific impact of environmental policy on the management of farm animal genetic resources *per se*, there may be some breeds, ruminant and monogastric, which more efficiently convert feed and forage into livestock products and thereby reduce the environmental burden caused by waste products such as nitrates, ammonia and greenhouse gases. More work is needed to characterise breeds for such traits and to incorporate lifecycle nutrient efficiency targets into animal breeding programmes.

In this area there are also clear and demonstrable ways in which Government databases and monitoring can provide information to allow farmers and breeders to select mainstream breeds to reduce environmental impact and to better match genotype to the local environmental conditions. To achieve this substantial environmental benefit, the procedures for environmental monitoring and reporting, and the design and linking of the associated databases need to be considered.

**Recommended Action 31:** The UK National Co-ordinator for FAnGR should commission publicly co-funded R&D to model/characterise breeds for their lifecycle nutrient efficiency and to investigate the incorporation of lifecycle nutrient efficiency traits into breeding programmes in all livestock species.

## 5.6 Animal health and welfare policy

### 5.6.1 Animal Disease regulations and their impact on FAnGR

Disease control is a big issue for FAnGR, not only in the UK but also across Europe and globally. The EU has an interest in protecting and raising the health status and condition of farm animals in the Community, whilst permitting intra-Community trade and imports of animals and animal products in accordance with appropriate health standards and international obligations such as those prescribed by the OIE (Office International des Épizooties).

#### Box 12: Loss of Genetic Diversity through FMD

During the FMD epidemic of 2001, several breeds suffered huge losses. Important breeding units of many breeds of all affected species (cattle, sheep, pigs) were lost, but the greatest effects were experienced among sheep breeds.

Four breeds lost more than one-third of their total population: the Cheviot, Herdwick and Rough Fell, all locally adapted hill breeds, and the British Milkshoop, a more recently derived breed selected for high milk production. About 30,000 Herdwicks died during the FMD outbreak, including almost the entire generation of hogs wintering away from the home farms.

The Herdwick, in particular, illustrates the value of 'heritage' breeds. The local adaptation of its flocks to the Cumbrian fells offers environmental and marketing benefits. The breed is intimately linked with the Lake District, providing a strong marketing base through this heritage.



Locally adapted breeds such as the Herdwick suffered severe losses during the FMD outbreak of 2001 (Courtesy of Robert Goodison).

History has shown that outbreaks of disease, and control measures themselves, can have a profound effect on breeding programmes and the viability of the breeds, unless there are specific exemptions for threatened FAnGR. For example, the recently adopted FMD Directive (2003/85/EC) provides for special measures for the protection of breeds

at risk and the application of these provisions will need to be reviewed on a regular basis if they are to be used effectively in our dynamic livestock population. The NSC has a role to play in defining which breeds should be protected and formulating a legally robust definition of a nucleus population essential to the survival of the breed.

**Recommended Action 32:** In respect of the Foot and Mouth Disease (FMD) Directive, the NSC should advise Government on a scientifically and legally robust definition of a nucleus unit essential to the survival of the breed, with or without cryopreserved genetic material as a backup, particularly where that breed is not numerically rare but is geographically concentrated.

The new EU [Avian Influenza Directive](#) contains similar provisions for poultry, but a parallel FAnGR policy on poultry should be developed to include an improved data set on UK poultry breeding holdings to be linked to the National Breed Inventory.

**Recommended Action 33:** When the new EU Avian Influenza Directive is implemented in the UK, the special provisions to protect rare poultry breeds should be transposed into UK legislation. This will require an improved data set on UK poultry breeding holdings. The NSC, in consultation with relevant species associations, should have a key in advising policymakers on applying these special measures and be involved in the subsequent implementation process.

The EU has a range of preventative measures in place to counter the risk of (exotic) disease incursion and to limit the spread of diseases (including those already endemic, such as scrapie) within the Community. Such measures include [detailed rules](#) on the movement of live animals, genetic material and animal products between Member States and third countries.

These policy areas, and the domestic transposition of EU law, can have a significant effect on the economic viability of FAnGR populations, and therefore warrant close monitoring of future developments. A good example of this is the application of the new Bovine Semen (England) Regulations and the associated Bovine Semen Fees (England) Regulations (2004), which had the potential to add cost to on-farm semen collections from native breeds and so incentivise the use of imported semen. Close consultation between Government and animal breeding stakeholders has succeeded in reducing the likely impact on the UK's genetic resources.

In addition to the EU strategy on animal health and welfare, GB has its own Animal Health and Welfare Strategy, which sits in parallel with the EU model. The [Animal Health and Welfare Strategy for Great Britain](#) applies (but is not exclusive) to all farmed livestock and is aimed at improving animal health and welfare through greater co-operation between stakeholders and Government. Relevant areas of work that may have secondary impacts on genetic diversity could include contingency planning for

disease outbreaks, veterinary surveillance and promotion of health and welfare per se, improving the infrastructure of disease monitoring and surveillance to facilitate genetic improvement of host resistance and the identification of more resistant breeds and strains.

We commented earlier on the role of monitoring and surveillance in the improvement of host resistance and the better understanding of epidemiology.

**Recommended Action 34:** The UK National Co-ordinator should monitor and contribute to the development of livestock disease control policies that may impact on FAnGR, and be involved in any changes to parent legislation where appropriate.

### 5.6.2 Animal welfare policy and links with FAnGR policy

The Government takes advice on farm animal welfare issues from the Farm Animal Welfare Council (FAWC), which produced a report on [Welfare Implications of Animal Breeding and Breeding Technologies in Commercial Agriculture](#) in 2004. A framework for considering welfare in farm animal breeding has been needed for some time and one of the recommendations made in the FAWC report is a call for the creation of a new committee to advise on farm animal breeding and the ethical and welfare implications of new and existing breeding technologies and programmes. A response to the report has not yet been published but there is significant overlap with FAnGR policy within the recommendations.

**Recommended Action 35:** In response to the 2004 Farm Animal Welfare Council (FAWC) Report on the Welfare Implications of Animal Breeding and Breeding Technologies in Commercial Agriculture, Defra should trigger regular, formal exchanges of views between the NSC and FAWC on livestock breeding technologies and programmes and their impact on animal welfare.

## 5.7 Animal breeding, Zootechnics and Genetic Resources for Food and Agriculture

### 5.7.1 Animal Breeding and Zootechnics

The EU 'zootechnical' legislation listed at Annex 6, covers herd book controls, breed society recognition, pedigree certification, genetic evaluation and performance testing, passports and the importation of genetic material.

The overarching aim of this legislation is to promote free trade in breeding animals and their genetic material, monitor the sustainability of breeding programs and preserve the genetic resources of Member States. This is, in part, being delivered through harmonisation and international recognition of breed societies, herd books, performance testing, genetic evaluation and pedigree certificates.

All EU zootechnical legislation has the potential to impact directly on FAnGR and any future developments should be closely monitored and disseminated. The NSC is in an excellent position not only to inform policy in these areas, but also to facilitate the communication and understanding of policies from the centre. This is vital if policies are to be correctly implemented and the NSC is already demonstrating its value here through positive dialogue with policy makers and concerned stakeholders.

**Recommended Action 36:** The NSC, through the UK National Co-ordinator for FAnGR, should carefully monitor developments in zootechnical legislation, encourage deeper integration between zootechnics and FAnGR policy and develop better communication with other stakeholders such as breed societies.

### 5.7.2 Genetic Resources for Food and Agriculture

In 2004 the EU Commission introduced a new Genetic Resources Regulation ([870/2004](#)) on establishing a Community programme on the conservation, characterisation, collection and utilisation of genetic resources in agriculture. The Regulation provides Commission co-funding for various trans-national projects, which encourage co-operation and collaborative-targeted action between member states on practical *in situ* and *ex situ* conservation projects for plants, animal and microbial genetic resources used for food and agriculture. There are real cost benefits to be gained in European collaboration on characterisation and conservation projects and it is important that UK NGOs, research institutes and Government are fully aware of the value that can be added to national programmes by participating in initiatives at European level.

**Recommended Action 37:** NGOs and research providers should be encouraged to participate in trans-national FAnGR projects under the new European Genetic Resources Regulation 870/2004. Defra and the Devolved Administrations should, wherever possible, make match funding available for suitable projects.

The important contribution that Defra makes to the development of European collaboration on FAnGR and development of Commission legislation supporting genetic diversity in livestock breeds is recognised by both FAO and the EU Commission. It is important that this contribution continues especially through active participation in the [European Regional Focal Point](#) (ERFP) for FAnGR which has an annual workshop alongside the European Association of Animal Production (EAAP) annual meetings.



The ERF is a network of National Co-ordinators officially appointed by the 37 member nations of the UN in Europe, under the auspices of the FAO Commission on Genetic Resources for Food and Agriculture. It forms the hub of collaboration and exchange of information on FAnGR in Europe. The ERF is now recognised (with technical support from the EAAP) by the EU Commission as the centre of expertise on FAnGR in Europe and has an influential voice in Brussels in the development of policy in areas impacting on the management of genetic diversity in EU Member States.

**Recommended Action 38:** The UK National Co-ordinator for FAnGR should continue to play an active part at global and European regional level, through existing FAO structures such as the European Regional Focal Point for FAnGR (ERFP), in the development of a sustainable policy on farm animal genetic diversity.

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## Annex 1: Membership of NSC

### Chair:

Professor Geoff Simm  
Scottish Agricultural College

### Universities and Research Institutes:

Professor Stephen Hall  
University of Lincoln

Professor John Woolliams  
Roslin Institute

### NGOs and Species Associations:

Mr Lawrence Alderson, CBE  
The Rare Breeds Survival Trust

Professor Dianna Bowles / Mr Sam Jones  
The Sheep Trust

Mr Marcus Bates  
British Pig Association

Mr Tim Brigstocke  
Royal Association of British Dairy Farmers

Mr Peter Dean  
The British Horse Society

Ms Kim-Marie Haywood  
National Beef Association

Mr Andrew Sheppy  
Cobthorn Trust

Mr John Thorley / Mr Peter Morris  
National Sheep Association

### Devolved Administrations:

Dr Maurice McCoy  
DARDNI

Mr Roy Paterson  
SEERAD

Mr Chris Lea  
WAG

### Defra Secretariat:

Mr Mike Roper  
UK National Co-ordinator for FAnGR

Mr Philip Hambling  
Technical and Policy Adviser

Miss Emma Boyd  
Executive Support

Mr Matthew Mahony  
Executive Support and Publishing

## Terms of Reference

1. The scope of the Committee shall be to encourage the conservation and sustainable use of farm animal genetic resources, including cattle, sheep, goats, pigs, poultry and equines but excluding wild animals, pets and other minor domestic species.
2. The Committee shall report to Defra, and the Devolved Administrations in SEERAD, WAG and DARDNI as appropriate, through the UK National Co-ordinator for FAnGR (located in Defra) who will act as Secretariat to the Committee.
3. The Committee's principal task will be to set priorities for and advise on the implementation of the UK National Action Plan on FAnGR as recommended in the UK Country Report on FAnGR 2002.
4. The Committee will also provide technical advice on all policy matters relating to the conservation and sustainable use of FAnGR to policy makers in Defra and the devolved administrations, and disseminate that advice through relevant non-governmental organisations (NGOs) and the livestock industry.
5. The Committee will act as a forum for stakeholders concerned with issues associated with the conservation and sustainable use of FAnGR.
6. The Committee will set R&D priorities in the area of FAnGR and advise relevant Defra and devolved administration policy Divisions of those priorities.
7. The Committee will advise on co-ordinated UK *in situ* and *ex situ* conservation programmes for FAnGR and evaluate their implementation.
8. The Committee will liaise closely with comparative national committees concerned with genetic resources in food and agriculture in the plant and microbial kingdoms.

## Working definition of native

The following tests have been used to determine whether or not a breed is to be considered native:

The breed satisfies the criteria for inclusion in the UK National Breed Inventory described in Recommended Action 4; and

- breed history documents the breed origin within the UK (including from amalgamation of native breeds), and the UK has formed the primary environment for the development of the breed; **and**
- breed history documents its presence in the UK for 40 years plus 6 generations; **and**
- not more than 20% of the genetic contributions come from animals born outside the UK (other than those imported for an approved conservation project) in any generation for the last 40 years plus 6 generations.

## Working definition of feral

The following series of tests have been used to define feral FAnGR in the UK National Breed Inventory:

- The breed itself satisfies the criteria for inclusion in the UK inventory; **and**
- the breed is not subject to routine handling of any kind; **and**
- more than 90% of the population have been born to feral parents, over two generations\*.

\*Why two generations? This ensures that the population, which at any given time will consist of animals at different stages of life, will go through at least one complete life cycle of birth, growth, reproduction, and death as a feral animal. Ideally this would encompass 100% of the population but to allow an occasional and rare unintended introduction to be assimilated, a margin of error has been allowed for so that only 90% need satisfy these requirements without compromising the status.

We intend the definition to apply to existing populations because 'rewilding' has potential welfare implications.

## Annex 4: Proposed list of data for collection in the Standardised Template

- Herd-book breeding population (male and female) including:
  - Adequacy of assessment through the herd-book.
  - Effective population size.
  - Cross referencing data from other organisations e.g. BCMS, NGOs, levy boards, commercial databases etc.
  - Breed Society prediction of population trends.
  - Use of technologies that may accelerate inbreeding, especially in small populations.
- Geographical concentration, using new measures to describe it (see Recommended Action 13).
- Degree of crossbreeding.
- Genetic diversity between and within breeds.
- Any evidence of environmental adaptation and genotype-environment interaction.
- Economic relevance:
  - Evaluated with regard to conventional farming practice.
  - Evaluated taking into account the full range of diversification (including all aspects of tourism) available to farmers.
- Human resources and demography of ownership of the breed.
- International populations.
- Foreseen external changes that will influence future endangerment (e.g. NSP for sheep).
- Initiatives that may influence future endangerment (e.g. participation in conservation schemes).
- Cryo-conserved gametes (semen, oocytes, embryos).



## Annex 5: Prioritised list of legislation for action related to FAnGR

The following table outlines the EU legislation that is expected to affect farm animal breeding the most and those that will represent key areas of work for the NSC in the foreseeable future.

Where-

★★★ = significant input expected or required

★★ = monitoring with some input

★ = some monitoring needed

Subject	Details	Importance
Genetic Resource Regulations	<b>Council Regulation (EC) No 870/2004 of 24 April 2004</b> – establishing a Community programme on the conservation, characterisation, collection and utilisation of genetic resources in agriculture and repealing Regulation (EC) No 1467/94 ( <i>Text with EEA relevance</i> )	★★★
AI Directive-disease control	<b>Council Directive 2005/94/EC</b> – on Community measures for the control of avian influenza  Previous Directive:-  <b>Council Directive 92/40/EEC of 19 May 1992</b> – Introducing Community measures for the control of avian influenza  <b>Amended by</b> 194NN01/05/E ( <i>Norway, Austria, Finland, Sweden</i> ), 103TN02/06/B1 ( <i>Czech Republic, Estonia, Cyprus, Latvia, Lithuania, Hungary, Malta, Poland, Slovenia, Slovakia</i> ), 303R0806 ( <i>procedural; not relevant</i> )  <b>Consolidated Version</b>	★★★

Subject	Details	Importance
Newcastle Disease Directive- disease control	<p><b>Council Directive 92/66/EEC of 14 July 1992</b> – Introducing Community measures for the control of Newcastle disease</p> <p><b>Amended by</b> 194NN01/05/E (<i>Norway, Austria, Finland, Sweden</i>), 103TN02/06/B1 (<i>Czech Republic, Estonia, Cyprus, Latvia, Lithuania, Hungary, Malta, Poland, Slovenia, Slovakia</i>), 303R0806 (<i>procedural; not relevant</i>)</p> <p><b>Consolidated Version</b></p>	★★★
TSE Regulations	<p><b>Regulation (EC) No 999/2001</b> – Of the European Parliament and of the Council of 22 May 2001 laying down rules for the prevention, control and eradication of certain transmissible spongiform encephalopathies</p> <p><b>As amended</b></p>	★★★
National Scrapie Plan	<p><b>2003/100/EC: Commission Decision of 13 February 2003</b> – laying down minimum requirements for the establishment of breeding programmes for resistance to transmissible spongiform encephalopathies in sheep (<i>Text with EEA relevance</i>)</p>	★★★
National Scrapie Plan –survey requirements	<p><b>2002/1003/EC: Commission Decision of 18 December 2002</b> – laying down minimum requirements for a survey of prion protein genotypes of sheep breeds (<i>Text with EEA relevance</i>) (notified under document number C(2002) 5102)</p>	★★★
New FMD Directive	<p><b>Council Directive 2003/85/EC of 29 September 2003</b> – on Community measures for the control of foot-and-mouth disease repealing Directive 85/511/EEC and Decisions 89/531/EEC and 91/665/EEC and amending Directive 92/46/EEC (<i>Text with EEA relevance</i>)</p>	★★★

Subject	Details	Importance
Animal Welfare	<p><b>Council Directive 98/58/EC of 20 July 1998</b> – Concerning the protection of animals kept for farming purposes</p> <p><b>Amended by</b> 303R0806 (<i>not relevant</i>).</p> <p><b>Consolidated Version</b></p>	★★
Animal Welfare	<p><b>21978A1117(01)</b> – European Convention for the protection of animals kept for farming purposes</p> <p><b>21992A1231(01)</b> – Protocol of amendment to the European Convention for the protection of animal kept for Farming Purposes</p>	★★
Live animal transport	<p><b>Council Directive 2004/68/EC of 26 April 2004</b> – laying down animal health rules for the importation into and transit through the Community of certain live ungulate animals, amending Directives 90/426/EEC and 92/65/EEC and repealing Directive 72/462/EEC (<i>Text with EEA relevance</i>)</p>	★★
Rural Development Regulation	<p>Council Regulation (EC) No 1698/2005 of 20 September 2005 on support for rural development by the European Agricultural Fund for Rural Development(EAFRD)</p> <p>Commission Regulation (EC) No. 2603/1999 of 9 December 1999 – <b>Laying down rules for the transition to the rural development support provided by Council Regulation (EC) No 1257/1999</b></p> <p>Amended by 300R1929 (<b><i>transformation of agri-environmental commitments</i></b>), 301R2055 (<b><i>application deadline extension</i></b>), 303R0568 (<b><i>minor language correction</i></b>)</p> <p>Council Regulation (EC) No <b>1257/1999</b> of 17 May 1999 on support for rural development from the European Agricultural Guidance and Guarantee Fund (EAGGF) and amending and repealing certain Regulations Official Journal L 160 , 26/06/1999 p. 0080 – 0101</p>	★★

Subject	Details	Importance
Trade in Bovine semen	<p><b>2004/639/EC: Commission Decision of 6 September 2004</b> – laying down the importation conditions of semen of domestic animals of the bovine species (Text with EEA relevance)</p>	★★
CBD	<p><b>93/626/EEC: Council Decision of 25 October 1993</b> – concerning the conclusion of the Convention on Biological Diversity</p> <p><i>(applies to domesticated species also, including genetic material)</i></p>	★
Trans-Atlantic Trade	<p><b>21998A0421(01)</b></p> <p>Agreement between the European Community and the United States of America on sanitary measures to protect public and animal health in trade in live animals and animal products</p> <p><b>Amended by</b> 203A1129(01)</p>	★

**Annex 6: Zootechnics Legislation****Bovine animals (cattle, buffaloes)**

Basic Directive		Council Directive 77/504/EEC
Recognition of breeding organisations		Commission Decision 84/247/EEC
Entering in herd books		Commission Decision 84/419/EEC
Pedigree certificates	Animals Semen, embryos Ova	Commission Decision 86/404/EEC Commission Decision 88/124/EEC Commission Decision 96/80/EC
Performance testing and genetic evaluation		Commission Decision 90/256/EEC Commission Decision 94/515/EC
INTERBULL		Council Decision 96/463/EC
Acceptance for breeding		Council Directive 87/328/EEC

**Porcine animals (pigs)**

Basic Directive		Council Directive 88/661/EEC
Recognition of breeding organisations	Pure-bred Hybrid	Commission Decision 89/501/EEC Commission Decision 89/504/EEC
Entering in herd books	Pure-bred Hybrid	Commission Decision 89/502/EEC Commission Decision 89/505/EEC
Pedigree certificates	Pure-bred Hybrid	Commission Decision 89/503/EEC Commission Decision 89/506/EEC
Performance testing and genetic evaluation		Commission Decision 89/507/EEC
Acceptance for breeding	Pure-bred Hybrid	Council Directive 90/118/EEC Council Directive 90/119/EEC

**Ovine and caprine animals (sheep and goats)**

Basic Directive		Council Directive 89/361/EEC
Recognition of breeding organisations		Commission Decision 90/254/EEC
Entering in herd books		Commission Decision 90/255/EEC

Pedigree certificates	Commission Decision 90/258/EEC
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Performance testing and genetic evaluation	Commission Decision 90/256/EEC
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Acceptance for breeding	Commission Decision 90/257/EEC
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### **Equine animals (horses, donkeys)**

Basic Directive	Council Directive 90/427/EEC
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Recognition of breeding organisations	Commission Decision 92/353/EEC
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Co-ordination between breeding organisations	Commission Decision 92/354/EEC
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Entering in herd books	Commission Decision 96/78/EC
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Identification document (passport)	Commission Decision 93/623/EEC
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Pedigree certificate for semen, ova, embryos	Commission Decision 96/79/EC
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### **Horse competitions**

Basic Directive	Council Directive 90/428/EEC
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Collection of data	Commission Decision 92/216/EEC
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Co-ordinating Authorities of Equine Competitions	
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### **Other breeding animals**

Basic Directive	Council Directive 91/174/EEC
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### **Import from third countries**

Basic Directive	Council Directive 94/28/EC
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Pedigree certificates	Commission Decision 96/509/EC Commission Decision 96/510/EC
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## Annex 7: Abbreviations and Acronyms

AI	Artificial Insemination
BCMS	British Cattle Movement Service
BLUP	Best linear unbiased prediction
BPA	British Pig Association
CAP	Common Agricultural Policy
CBD	Convention on Biological Diversity (also the 'Rio Convention')
CROW	Countryside Rights of Way Act (England and Wales)
DAD-IS	Domestic Animal Diversity Information System (run by the FAO)
DARD (NI)	Department of Agriculture and Rural Development Northern Ireland
Defra	UK Government Department for Environment, Food and Rural Affairs
EAFRD	European Agricultural Fund for Rural Development
EBLEX	English Beef and Lamb Executive
EFAB-IS	European Farm Animal Biodiversity Information System
ERFP	European Regional Focal Point (for FAnGR)
EU	European Union
FAO	Food and Agriculture Organisation of the United Nations
FAnGR	Farm Animal Genetic Resources
FAWC	Farm Animal Welfare Council
FMD	Foot and Mouth Disease
FWAG	Farming and Wildlife Advisory Group
GRFA	Genetic Resources for Food and Agriculture
HCC	Hybu Cig Cymru (Meat Production Wales)
IGD	Institute of Grocery Distribution
IPR	Intellectual Property Rights
LEAF	Linking Environment and Farming
MDC	Milk Development Council
MLC	Meat and Livestock Commission
MoDAD	Molecular Domestic Animal Diversity
NAP	National Action Plan on Farm Animal Genetic Resources
NAWAD	National Assembly for Wales Agriculture Department

NBA	National Beef Association
NISP	Northern Ireland Scrapie Plan
NPA	National Pig Association
NSA	National Sheep Association
NSP	National Scrapie Plan (GB)
NGO	Non-Governmental Organisation
NSC	National Steering Committee for Farm Animal Genetic Resources
QMS	Quality Meat Scotland
RBST	Rare Breed Survival Trust
RABDF	Royal Association of British Dairy Farmers
RDAs	Regional Development Associations
RPG	(Sustainable Farming and Food) Research Priorities Group
SAC	Scottish Agricultural College
SEERAD	Scottish Executive Environment and Rural Affairs Department
SSSI	Site of Special Scientific Interest
WAG	Welsh Assembly Government
WIGI	Wiltshire Interactive Grazing Initiative

### **Section 2.1.1**

UK Country Report

[www.defra.gov.uk/farm/policy/geneticresources/animalgenetics.pdf](http://www.defra.gov.uk/farm/policy/geneticresources/animalgenetics.pdf)

### **Section 2.1.2**

Convention on Biological Diversity (Rio Convention)

[www.biodiv.org](http://www.biodiv.org)

FAO's Strategy for the Management of FAnGR

<http://www.fao.org/dad-is>

COP VII/III of the CBD

[www.biodiv.org/decisions/default.aspx?m=COP-07&id=7740&lg=0](http://www.biodiv.org/decisions/default.aspx?m=COP-07&id=7740&lg=0)

### **Section 2.1.3**

Defra's Strategy for Sustainable Farming and Food in England

<http://www.defra.gov.uk/farm/policy/sustain/pdf/sffs.pdf>

SEERAD's Forward Strategy for Scottish Agriculture: Next Steps

<http://www.scotland.gov.uk/Resource/Doc/94965/0022832.pdf>

Welsh Assembly's Farming for the Future

[www.countryside.wales.gov.uk/fe/master.asp?n1=4&n2=52](http://www.countryside.wales.gov.uk/fe/master.asp?n1=4&n2=52)

DARD, Northern Ireland Strategic Plan 2006-2011

[www.dardni.gov.uk/dard-strategic-plan-2006-2011.pdf](http://www.dardni.gov.uk/dard-strategic-plan-2006-2011.pdf)

### **Section 3.2.2**

UK Country Report 2002, containing the UK's breed database

[www.defra.gov.uk/farm/policy/geneticresources/animalgenetics.pdf](http://www.defra.gov.uk/farm/policy/geneticresources/animalgenetics.pdf)

### **Section 3.2.3**

European Zootechnical Legislation

[www.europa.eu.int/comm/food/animal/zootechnics/legislation\\_en.htm](http://www.europa.eu.int/comm/food/animal/zootechnics/legislation_en.htm)

### **Section 3.3.2**

German GRFA web portal  
[www.genres.de/genres-e.htm](http://www.genres.de/genres-e.htm)

French GRFA web portal  
[www.brg.prd.fr/brg/ecrans/accueil\\_An.htm](http://www.brg.prd.fr/brg/ecrans/accueil_An.htm)

### **Section 4.3**

UK Country Report 2002, Appendix 3  
[www.defra.gov.uk/farm/policy/geneticresources/animalgenetics.pdf](http://www.defra.gov.uk/farm/policy/geneticresources/animalgenetics.pdf)

The Sheep Trust  
[www.thesheeptrust.org](http://www.thesheeptrust.org)

RBST  
<http://www.rbst.org.uk/>

### **Section 4.6.1**

The Grazing Animals Project/FACT  
[www.fact-group.org](http://www.fact-group.org)

### **Section 4.6.2**

The Limestone County Project  
[www.limestone-country.org.uk](http://www.limestone-country.org.uk)

The Wiltshire Interactive Grazing Initiative  
[www.rspb.org.uk/england/southwest/conservation/wigi.asp](http://www.rspb.org.uk/england/southwest/conservation/wigi.asp)

The RBST Traditional Breeds Meat Marketing Scheme  
<http://www.rbst.org.uk/rare-breeds-meat/main.php>

The British Pig Association's Pedigree Pork initiative  
[www.britishpigs.org.uk/pork.htm](http://www.britishpigs.org.uk/pork.htm)

### **Section 4.6.3**

The Science, Engineering, Technology and Mathematics Network  
<http://www.setnet.org.uk/>

## Section 5.2

UK Country Report

[www.defra.gov.uk/farm/policy/geneticresources/animalgenetics.pdf](http://www.defra.gov.uk/farm/policy/geneticresources/animalgenetics.pdf)

## Section 5.4.1

Information on the England Rural Development Programme (ERDP)

[www.defra.gov.uk/erdp/docs/default.htm](http://www.defra.gov.uk/erdp/docs/default.htm)

Commission Regulation 1698/2005

[http://www.europa.eu.int/eur-lex/lex/LexUriServ/site/en/oj/2005/l\\_277/l\\_27720051021en00010040.pdf](http://www.europa.eu.int/eur-lex/lex/LexUriServ/site/en/oj/2005/l_277/l_27720051021en00010040.pdf)

## Section 5.4.2

Countryside Rights of Way Act

[www.opsi.gov.uk/acts/acts2000/20000037.htm](http://www.opsi.gov.uk/acts/acts2000/20000037.htm)

## Section 5.5

Groundwater Directive

[www.environment-agency.gov.uk/business/444217/444663/955191/?version=1&lang=e](http://www.environment-agency.gov.uk/business/444217/444663/955191/?version=1&lang=e)

The Integrated Pollution Prevention and Control (IPPC) Regulations

[www.environment-agency.gov.uk/business/444217/444663/298441/?lang=e](http://www.environment-agency.gov.uk/business/444217/444663/298441/?lang=e)

## Section 5.6.1

Avian Influenza Directive – EU Official Journal

[www.eur-lex.europa.eu/LexUriServ/site/en/oj/2006/l\\_010/l\\_01020060114en00160065.pdf](http://www.eur-lex.europa.eu/LexUriServ/site/en/oj/2006/l_010/l_01020060114en00160065.pdf)

Rules on the movement of live animals, genetic material and animal products between Member States

[www.defra.gov.uk/animalh/int-trde/default.htm](http://www.defra.gov.uk/animalh/int-trde/default.htm)

The Animal Health and Welfare Strategy for Great Britain

[www.defra.gov.uk/animalh/ahws/default.htm](http://www.defra.gov.uk/animalh/ahws/default.htm)

## **Section 5.6.2**

2004 FAWC Report

[www.fawc.org.uk/reports.htm](http://www.fawc.org.uk/reports.htm)

## **Section 5.7.2**

Genetic Resources Regulation 870/2004

[www.europa.eu.int/eur-lex/pri/en/oj/dat/2004/l\\_162/l\\_16220040430en00180028.pdf](http://www.europa.eu.int/eur-lex/pri/en/oj/dat/2004/l_162/l_16220040430en00180028.pdf)

European Regional Focal Point (ERFP)

<http://www.rfp-europe.org/template02.php?lang=en&id=7>



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