Conserving farm animal genetic resources in the UK: a discussion on post-Brexit policies

B. Vosough Ahmadi[1]; G. Peart[2]

1: SRUC, Land Economy, Environment and Society Research Group, United Kingdom, 2: ABE Europe, , United Kingdom

Corresponding author email: bouda.v.ahmadi@sruc.ac.uk

Abstract:

The global challenges for conservation of farm animal genetic resources (FAnGR) are mainly tackled using in situ, ex situ or both breed conservation methods aiming at reducing the extinction risks and providing options for future usage. The United Kingdom government has confirmed their commitment to this plan by adopting and endorsing the Interlaken Declaration in 2007. Over a decade later, the Brexit vote has provided a unique opportunity for the UK to re-evaluate its agricultural policies which regulate farm animal genetic resource conservation, specifically the pillars of common agricultural policy (CAP) and how they affect the conservation of the UK's farm animal population diversity. This paper describes the current activities and policies regarding FAnGR conservation in the UK and discusses the effects that Brexit may have on UK FAnGR and how the UK government could best alter policy post-Brexit to give renewed drive towards safeguarding FAnGR. It was concluded that conservation of FAnGR should be re-prioritised as an important environmental service. To do this, specific budget and payment support needs to be allocated to FAnGR conservation activities, giving emphasis on public funding for public good to renew drive towards fulfilling the targets of the Global Plan in the UK.

Acknowledegment: Dr B Vosough Ahmadi's contribution to this research was funded by the Scottish Government Rural Affairs and the Environment Portfolio Strategic Research Programme 2016–2021, Work Package 2.3 Agricultural Systems and Land Management.

JEL Codes: Q18, Q28

#289

Conserving farm animal genetic resources in the UK: a discussion on post-Brexit policies

Abstract

The global challenges for conservation of farm animal genetic resources (FAnGR) are mainly tackled using *in situ*, *ex situ* or both breed conservation methods aiming at reducing the extinction risks and providing options for future usage. The United Kingdom government has confirmed their commitment to this plan by adopting and endorsing the Interlaken Declaration in 2007. Over a decade later, the Brexit vote has provided a unique opportunity for the UK to re-evaluate its agricultural policies which regulate farm animal genetic resource conservation, specifically the pillars of common agricultural policy (CAP) and how they affect the conservation of the UK's farm animal population diversity. This paper describes the current activities and policies regarding FAnGR conservation in the UK and discusses the effects that Brexit may have on UK FAnGR and how the UK government could best alter policy post-Brexit to give renewed drive towards safeguarding FAnGR. It was concluded that conservation of FAnGR should be re-prioritised as an important environmental service. To do this, specific budget and payment support needs to be allocated to FAnGR conservation activities, giving emphasis on public funding for public good to renew drive towards fulfilling the targets of the Global Plan in the UK.

Introduction

The global challenges for conservation of farm animal genetic resources (FAnGR) are mainly tackled using *in situ*, *ex situ* or both breed conservation methods aiming at reducing the extinction risks and providing options for future usage. The Global Plan for Action for Animal Genetic Resources was produced as a blue print for "combating the erosion of animal genetic diversity and using animal genetic resources sustainably" (FAO, 2007). This conservation is vitally important because genetic diversity is a key tool to help future generations guarantee food security for growing populations, deal with the effects of climate change, and safeguard against emerging diseases. The United Kingdom government confirmed their commitment to this plan and to the Interlaken Declaration on Animal Genetic Resources, when they adopted it alongside 109 other states at the 2007 International Technical Conference. Now, over a decade later, Brexit has provided a unique opportunity for the UK to re-evaluate the agricultural policies which regulate animal genetic resources conservation, specifically the common agricultural policy (CAP) and how it affects the conservation of the UK's farm animal population diversity. This paper describes the current activities and policies regarding FAnGR conservation in the UK and discusses the effects that Brexit will have on UK FAnGR and how the government could best alter policy post-Brexit to give renewed drive towards safeguarding farm animal genetics for future generations.

Current FAnGR data collection in the UK

Both *in situ* and *ex situ* FAnGR conservation is overseen by the FAnGR committee which is comprised of many technical experts from different roles in the UK agriculture. This committee is devolved from any government organisation however gives guidance to the Department for Environment, Food and Rural Affairs (DEFRA) on FAnGR policy (Rfp-europe.org, 2017). Whilst giving expertise and promoting sustainable use of genetics, the committee did not actively record rare and native breed populations until 2012 (Gov.uk, 2017). Prior to this, the only UK FAnGR database has been managed by the Rare Breeds Survival Trust (RBST) that is a UK charity responsible for maintaining farm animal genetic diversity and promoting rare and native breed use. RBST's "watchlist" is still the main database that is used to categorise risk status of the UK farm animal populations, despite the commission of the UK FAnGR committee to produce the first UK national inventory of breeds as part of their 2012 report on UK FAnGR. This inventory was the first government record of the UK national breeds in a decade and shows an increasing awareness of the UK government to the importance of conserving genetics in the UK, as well as an active response to the FAO's Global Plan for Action for FAnGR. Prior to this report and inventory there was no governmental recording of rare breeds to be used to guide *in situ* and *ex situ* FAnGR conservation activity in the UK.

The 2001 foot and mouth disease epidemic triggered the RBST to set up the National Breeds at Risk (NBAR) database. The NBAR database serves two main functions. Firstly, to guide government declaration: Article 15 of Regulation 2003/85/EC in the UK, allowing the EU member states the option to give exclusions to culling due to foot and mouth disease if the population in question is a rare and/or native breed (Eur-lex.europe.eu, 2004). Subject to disease spread risk assessment, this is a useful tool to sustain *in situ* genetic resource populations if foot and mouth disease or any other similar contagious diseases were to return to the UK. Secondly, to guide the conservation activity of RBST's UK national livestock gene bank.

Current FAnGR conservation in the UK

FAnGR conservation activities in the UK are carried out on two different axes: the breeding of *in situ* rare and native breed populations and the *ex situ* gene banking of FAnGR material to be used by future generations. Ligda and Zjalic (2011) highlighted the UK FAnGR gene banking as being led by non-government organisations, specifically the RBST with the support of private breeders, breed societies and charities. The RBST's UK national livestock gene bank expanded from a bovine embryo and semen cryobank into what is now, a multi-species, multi-breed national gene bank that was created mainly in response to the 2001 foot and mouth disease epidemic. Its goal is to collect 25 unrelated semen and embryo samples from each of the UK breed as a safeguard against diseases (Rbst.org.uk, 2017). Similar to global trends, the UK is making rapid technical advancements in gene bank technology, which are being utilised by the RBST to further the development of its gene bank inventory. For example, originally due to technical limitations, only semen was collected and cryogenically preserved. This has now expanded to include embryos from multiple different species. It is also now possible to freeze and store oocytes however this technique is much more complex and costly compared to semen and embryo cryopreservation so therefore it is not currently being used by the RBST. It is important to note that currently, RBST's national livestock gene bank is not directly funded by the government and relies upon public donations to maintain its services.

As well as the national livestock gene bank's activity to preserve representative genetic samples from various native breeds, *in situ* conservation of genetics is carried out in the UK by private livestock breeders and farmers. The UK rare and native breed *in situ* population numbers are recorded in both the RBST Watchlist and the FAnGR committee's UK national inventory of breeds (Gov.uk, 2017). Having *in situ* populations of native breeds is vital for multiple reasons. Firstly, it increases public awareness of the need for FAnGR conservation, i.e. seeing living animals gives a relatable message and so a clear lesson regarding the importance of FAnGR conservation. Secondly, *in situ* populations are also vital genepools through which we can select varying genetics from and collect semen, embryo, oocyte and stem cell samples.

Current government funding for *in situ* FAnGR conservation

Unlike many other states in the EU, the UK government has chosen not to directly support livestock breeders and farmers who are trying to keep and maintain FAnGR around the country. For example, in England the funding available is through the Higher Level Scheme (HLS) of the current environmental stewardship of the agri-environment scheme. One area this scheme puts emphasis on is support for cattle grazing of upland areas where this activity will increase and promote "wild" biodiversity. However, the scheme does not explicitly insist on the use of rare or native livestock breeds (Natural England, 2012). Similar to all other UK FAnGR-related funding, it is paid per hectare of grazing and therefore does not directly support farming activities and practices related to many rare and native breed herds. This English agri-environmental scheme and similar schemes in Wales, Scotland and Northern Ireland are all considered as part of the second pillar of the European Commissions' CAP which aims to increase rural development and protect the environment. As such conservation of FAnGR and rare and endangered breeds are implicitly covered under broader environmental goals of the second pillar of the CAP. Therefore only by having a positive effect on "wild" conservation and conservation grazing do domestic rare and native breed populations receive any governmental funding.

This is juxtaposed against, to the opposing views of many other EU states and the European Commission who have provided specific regulations to allow member states to further support FAnGR conservation. One example of this is Council Regulation (EC) no 1698/2005 which aims to provide a European agricultural fund for rural development aimed at compensating farmers in return for the environmental services they provide. Article 39:5 of this regulation highlights the "conservation of genetic resources" as a valid environmental service (Ligda and Zjalic, 2011). The UK does not reflect this attitude however and has chosen not to utilize any such FAnGR regulation as part of their rural development policy.

The UK FAnGR conservation post-Brexit

With Brexit upon the horizon, the country has been afforded a unique opportunity to re-evaluate its agricultural and environmental priorities and redefine policy so as to conserve it rich heritage of rare and native breed genetic traits. This paper does not seek to define how the UK agriculture should be governed post-Brexit but it seeks to reaffirm the importance of FAnGR conservation in the UK and to provide a discussion on encouraging the UK government to support FAnGR conservation activities that ensure the UK upholds the Global Plan for Action for FAnGR.

As of 2020, the UK agriculture will no longer be subject to the CAP (Gov.uk, 2017) and it will be afforded more freedom to redefine government funding directions. Whilst Brexit negotiations continue, one can predict it is likely that importing goods from the EU states will be costlier after the split, which could mean more pressure on the UK food producers to increase country's food self-sufficiency. This added pressure is likely to change trends in livestock in the years following, towards a few, high production commercial breeds of livestock thus potentially decreasing domestic animal biodiversity. Given this predicted effect of Brexit, it is important to conserve as many of the FAnGR of the country's rare and native breeds as is possible, both as an insurance against extinction (i.e. due to diseases or other factors) and of specific phenotypes in case future generations of breeders want to re-introduce them into *in situ* populations.

Not only are rare breeds potentially vital to the production of viable protein sources in the future, they also hold economic value as part of the UK's natural history. The countryside in the UK, as we see it today has been shaped by the grazing management of these animals and their loss due to disease or lack of breeding will have knock-on effects on the UK landscape. Subsequently, farming systems, biodiversity (i.e. both domestic and wild) and tourism industry would be affected. It is arguable that much of the UK's countryside has been shaped by the grazing and management of rare and native breeds therefore maintaining these populations *in situ*, specifically in their areas of origin, would result in the direct conservation of wildlife and maintain the landscape which attracts many international tourists and visitors. Therefore, the conservation of FAnGR should be considered an asset both for the private sector and a force for public good and so be given raised priority in the new framework which will replace pillar 2 of the current CAP. This could be implemented in a "public monies for public good" (Helm, D. 2017) framework of a post-Brexit rural development policy in which FAnGR conservation is in the public interest and therefore breeders and gene banks will be given direct funding.

Post-Brexit funding of FAnGR conservation

As mentioned above, many EU states already place FAnGR highly in their national environmental policy alongside wildlife conservation plus make use of European Commission's regulation designed to promote FAnGR conservation in member states. Despite devolution, this attitude should be mirrored in the UK's post-Brexit policy, specifically in new policies which directly fund the production of rare breeds around the country.

One method of encouraging farmers to increase rare breed gene pools could be to provide direct payments to holdings where fertile rare breed animals are being produced and added to society herdbooks on a yearly basis. What is classed as "rare" by the government would need to be overseen and edited regularly to reflect changing populations. This could be done using both the RBST Watchlist and the national inventory as guidelines. It is important to note, however, that if funds are allocated "per head" then there is a risk of farmers being encouraged to overgraze land. Contingencies to deal with this risk should be included in new policy. It is also likely that if direct payment for rare breed production is not balanced with incentives for the UK protein production, there is a risk of commercial livestock farmers decreasing meat production and changing their priorities to adding as many rare breed animals to herdbooks per annum and so threatening food security. A compromise could be made by putting a premium on meat and animal products which have been produced using certified rare breed herds.

Having discussed the financial encouragement of *in situ* FAnGR conservation by livestock breeders, it is vital to consider *ex situ* gene bank conservation post-Brexit. There is general agreement that *ex situ* collections offer option value for suture utilization of the preserved genetic materials, but the efficacy of *ex situ* collections compared to in situ conservation is largely anecdotal. What is clear is that the UK FAnGR committee, RBST and other related organisations and stakeholders have already created the foundations for widespread FAnGR gene banking in the UK through the RBST Watchlist, the National Inventory and the UK National Livestock Gene Bank. However, as NGO charity institutes, they do not have the sufficient funding to effectively create a continual gene banking and population recording framework for all rare and native breeds throughout the UK. Government funding and increased government involvement is therefore crucially needed to enable the FAnGR committee and RBST to start widespread *ex situ* collections using up-to-date artificial reproduction and cryopreservation techniques. So far in these *ex situ* collections, an emphasis has been mainly put on show animals' genetics being conserved (Ligda and Zjalic, 2011), likely due to the organisations funding the cryopreservation having a vested interest in saving the genetics of high performing animals of each breed. Therefore, it should be the government's responsibility to ensure along with conserving genetic materials of commercially viable breeds, a representative sample of each generation of rare and native breeds are also conserved. The existing global research into selecting animals for gene bank projects to ensure the collection of genetically varied samples of each generation, should be further developed and funded at the UK level and within the context of the UK *ex situ* gene banking.

Conclusions

Since the establishment of the FAO's *Global Plan For the Action for AnGR* in 2007, the UK's response in terms of explicit policies encouraging and financially supporting the conservation of FAnGR has been lacking. Brexit, specifically the UK's devolvement from the common agricultural policy, gives

the UK government and whole agricultural industry the opportunity to redefine agricultural policy and encourage both food production and environmental services by farmers. FAnGR conservation should therefore be re-prioritised as an important environmental service. To do this, specific budget and payment support needs to be allocated to *in situ* and *ex situ* FAnGR conservation activities, giving emphasis on public funding for public good to renew drive towards fulfilling the targets of the Global Plan in the UK.

References

Blackburn, H. and Boettcher, P. (2010). Options and legal requirements for national and regional animal genetic resource collections. *Animal Genetic Resources/Ressources génétiques animales/Recursos genéticos animales*, 47, pp.91-100.

Boettcher, P., Stella, A., Pizzi, F. and Gandini, G. (2005). The combined use of embryos and semen for cryogenic conservation of mammalian livestock genetic resources. *Genetics Selection Evolution*, 37(7), p.657.

Eur-lex.europa.eu. (2017). *Council Regulation (EC) No 870/2004*. [online] Available at: http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1509221848586&uri=CELEX:32004R0870 [Accessed 29 Oct. 2017].

Fao.org. (2017). *THE STATE OF THE WORLD ś ANIMAL GENETIC RESOURCES FOR FOOD AND AGRICULTURE*. [online] Available at: http://www.fao.org/docrep/010/a1250e/a1250e00.htm [Accessed 29 Oct. 2017].

Gandini, G., Pizzi, F., Stella, A. and Boettcher, P. (2007). The costs of breed reconstruction from cryopreserved material in mammalian livestock species. *Genetics Selection Evolution*, 39(4), pp.465-479.

Gov.scot. (2017). *Grazing Management of Cattle*. [online] Available at: http://www.gov.scot/Topics/farmingrural/SRDP/RuralPriorities/Options/Nativeortraditionalcattle [Accessed 29 Oct. 2017].

Gov.uk. (2017). *FAnGR resources for farmers and livestock breeders - GOV.UK*. [online] Available at: https://www.gov.uk/government/collections/fangr-resources-for-farmers-and-livestock-breeders [Accessed 29 Oct. 2017].

Helm, D. (2017). Agriculture after Brexit. *Oxford Review of Economic Policy*, 33(suppl_1), pp.S124-S133.

Hiemstra, S. (2016). Complementary Strategies for Conservation of Animal Genetic Resources and Global Innovation Challenges. *Indian Journal of Plant Genetic Resources*, 29(3), p.314.

Hiemstra, S., Drucker, A., Tvedt, M., Louwaars, N., Oldenbroek, J., Awgichew, K., Abegaz Kebede, S., Bhat, P. and da Silva Mariante, A. (2006). What's on the menu? Options for strengthening the policy and regulatory framework for the exchange, use and conservation of animal genetic resources. [online] Available at: http://www.fao.org/ag/againfo/subjects/en/genetics/documents/ITWG-AnGR4/AnGR_policy_and_regul.pdf.

Ligda, C. and Zjalic, M. (2011). Conservation of animal genetic resources in Europe: overview of the policies, activities, funding and expected benefits of conservation activities. *Animal Genetic Resources/Ressources génétiques animales/Recursos genéticos animales*, 49, pp.75-86.

Paiva, S., McManus, C. and Blackburn, H. (2016). Conservation of animal genetic resources – A new tact. *Livestock Science*, 193, pp.32-38.

Rbst.org.uk. (2017). *UK National Livestock Gene Bank - RBST*. [online] Available at: https://www.rbst.org.uk/Our-Work/UK-National-Livestock-Gene-Bank [Accessed 29 Oct. 2017].

Rfp-europe.org. (2017). *About ERFP - European Regional Focal Point*. [online] Available at: https://www.rfp-europe.org/about-erfp/ [Accessed 29 Oct. 2017].

Simianer, H. (2005). Decision making in livestock conservation. *Ecological Economics*, 53(4), pp.559-572.