

Inclusion Of The Spatial Dimension Of Population Data In Developing Policies For The Management Of AnGR –The Case Of The Heritage Sheep Breeds

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Introduction

The sustainable use of farm animal genetic resources is connected with the recognition of their contribution to the society and the environment and the assessment of the threats they are facing. The category of the heritage breeds, which are genetically distinct, geographically concentrated, adapted to their environment, commercially farmed to contribute to the local economy were considered in the frame of the HERITAGESHEEP project funded under the EU Regulation 870/04 (www.heritagesheep.eu). The aim of this project was to deliver the potential of the heritage sheep breeds for a sustainable future for medium to low input production systems, which support local rural communities throughout Europe. This was achieved by addressing the conservation of these breeds, defining the current and future threats and developing new uses and markets for products.

Through a European Regional Focal Point (ERFP) scoping study, it has become clear that all Member States across the European Union (EU) can identify Heritage Sheep Breeds, confined to specific regions in the Member States, and through their adaptation to local environmental conditions, are used successfully in extensive, medium to low-input farming systems. Despite the value of these breeds and their genetic resources for both environmental and economic sustainability of local communities throughout the EU, they are only beginning to be recognised as "breeds at risk" within National Action Plans of Farm Animal Genetic Resources. Historically most breeds were localised and many local breeds, which are closely adapted to their area of origin, have remained concentrated in a small geographical range. These breeds are at risk if their native areas are in the path of a disease epidemic, but also these breeds can be expected to have a higher rate of inbreeding (Alderson, 2009). Several studies addressed the issue of the classification systems and indicators to evaluate breed endangerment status. In this frame there are criteria that can be measured accurately or have methods to provide objective data, as the population numbers and inbreeding, the geographical concentration, and the genetic variation. However other factors related with the

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self sustainability of the breeds, their special adaptation or cultural value, require an element of subjective judgement (Alderson (2003); Gandini, et al. (2004); Ruane (2000)).

The Geographical Information System is a valuable tool that can be used to link the breed data, population numbers, associated risks and values with the geographical location of the breeds. The spatial dimension of the breed related data, including the social, political and environmental aspects provide the opportunity to an in depth analysis of AnGR utilisation and of their future perspectives, which can be very informative in defining the policies and measures towards the sustainable use and development of AnGR.

Material and methods

Data collection In order to undertake the survey and the assessment of the heritage sheep breeds, a detailed questionnaire was developed that aimed to determine the factors which, according to breeders associations' perceptions, caused the greatest threat to the future of the breeds. The data collected included information on the origin of the breed, population trends, the traits of importance, disease risks, and several political, social, environmental issues. All the information collected within the project is stored in a database in order to assess the threats to each breed and visualize the results through relevant reports. The database developed aims to serve as a tool to promote the sustainable use of the Heritage sheep breeds, integrating information on the characteristics of the breeds, their use, the threats they are exposed to and the values attached to the breeds and their products. The above database was uploaded on the web site and by using dynamic content technology the potential users can view and have read access to respective information.

Geographical representation The current database was updated with geographic data for the breeds in order to be converted to a geo-database. For GIS implementation two main applications were used, with respect to the geographical analysis, Desktop GIS ArcView and ArcGIS Server by ESRI Company in order to visualize the information and distribute the maps. For the geographical representation it was decided to use the Nomenclature of Territorial Units for Statistics (NUTS) and present all information at NUTS3 level.

Two types of geographical representation were developed. The first type refers to the static maps that were generated according to the selected geo-database information by combining one or more database fields. Different maps were created using color differentiation or charts visualizations. The second type refers to the use of dynamic maps. The basic concept was to use dynamic geographic representation, so that the user could select and locate the position of breeds in the map or view the distribution of a specific query in the European map, which would generate the results according to a specific threat factor (social, political, environmental, disease), or according to the population trends, or the specific values and characteristics of the breeds (Figure 1). Under the current heritage sheep URL, the user can run in a friendly interface specific queries and information spread out from the database are presented in the relevant geographical locations (Mizeli et al. (2009)).

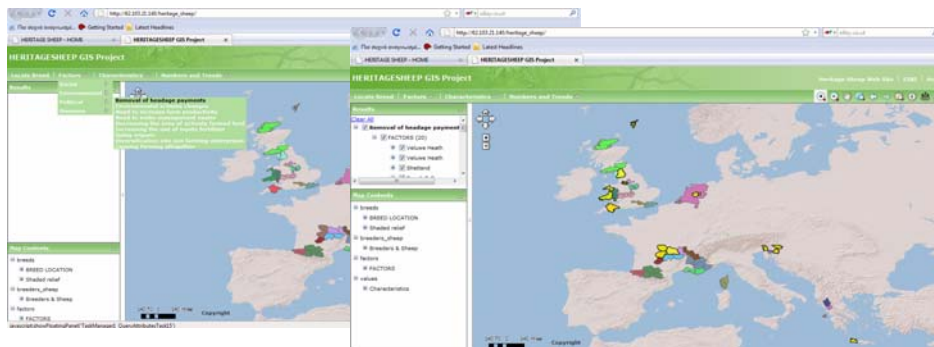


Figure 1. An example of the dynamic representation of the results

Results and discussion

The work highlighted the general concerns and the potential threats to the heritage sheep breeds including social, political, disease and environmental pressures and the determination of the value of the breed to the region that is raised through its contribution to the environment, adaptation and grazing practices. The main factors according to the breeders' societies to reducing sheep numbers were: the decrease in public funding, the lack of political will to support rural communities, policies and legislation, diseases, predators, urbanisation, poor return on product, ageing of farmer, lack of marketing support, inbreeding and loss of skills (Carson et al. (2009)).



Figure 2. Population trends and age of farmers in the sheep breeds studied

An important conclusion from this survey was that the breed societies lack quantitative data relating to their members and it was pointed out the urgent need for standardisation across the breed societies both nationally and internationally, in collecting, maintaining data about the population parameters (Carson (2009)). However the information collected provided interesting comparisons between the countries on the impact of the various threats and on the strategies followed towards the sustainability of the breeds. All breeds studied are raised in

challenging areas from an environmental perspective, to which they are very well adapted. In most cases their positive impact on landscape management is considered important.

The above results were represented geographically, using static and dynamic maps, revealing some clear issues related with the conservation and management of the breeds. The geographical visualisation of the results provided a comprehensible view on the ways the different breeders' societies evaluate their breed and their future perspectives. Important topics related with the prioritisation of the breeds can be more easily interpreted using the geographical representation. The database provided direct view of the breeds that their numbers are reducing, or of the breeds that are being threat by urbanisation, or lack of successors (Ligda et al. (2009)). In Figure 2, one of the outputs is presented showing the population trends in combination with the age of farmers (percentage over 60 or less than 35 years). This information analysed in combination with additional data of the region that are included in relevant databases, related with economical, political and social issues could result in an efficient tool for decision making and policy development.

Conclusion

The use of geographic information contributed to extract useful conclusions related with the current status of the breeds, the importance of the different threats and the impact of the policies to their future trends. The further exploitation of the collected information in connection with the population figures through the years can provide a very useful tool to the development of policies related with the conservation and management of AnGR and can be used in setting up an early warning system and response mechanism in national, regional and global level.

In the frame of the HERITAGESHEEP project new information was collected and guidelines and strategies for the conservation of heritage sheep breeds were developed. The aim was to provide an efficient support to the actual and future users of these genetic resources for the diversification of production in livestock agriculture and for their central importance in the long-term sustainability of medium to low input farming systems. The outcomes of this programme have positive impact: (1) to the environment, reducing the negative impact of intensive agricultural practices; (2) to the regional communities by using natural resources in a sustainable way to manufacture products; (3) to the rural economies developing strategies to enhance the profitability of local breeds.

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