



Exploring the risk factors to the heritage sheep breeds using multivariate analysis

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The **HERITAGESHEEP** project addressed the conservation of a specific category of genetic resources, the heritage sheep breeds, aiming to illustrate their contribution to the diversification of the production in livestock agriculture and to the long-term sustainability of medium to low input farming systems. The current and future threats to their breeds, their values and their further exploitation were addressed.

The outcomes of the project, confirmed the positive contribution of the breeds :

(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.

Collection of data

The Data were collected using a specific questionnaire addressed to Breeders' Societies, dealing with the different threats to the Heritage Sheep breeds, the values of the breeds, the current situation of in situ and ex situ conservation activities and their future trends. The breeders' societies were asked to rank the different threats to the breeds, from 5 to 1, according to their importance.

Partners:

United Kingdom: University of York / the Sheep Trust, **France:** Institut de l'Elevage, **Netherlands:** Centre for Genetic Resources, **Greece:** Aristotle University / National Agricultural Research Foundation, **Slovenia:** University of Ljubljana

The main factors

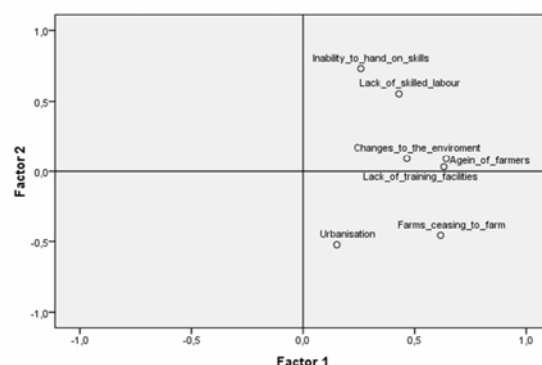
according to the breeders that reduce sheep numbers were: ageing of the farmers, farms ceasing to farm, loss of skills and urbanisation, the removal of headage payments, environmental schemes and environmental factors which were grouped as internal (management) and external (climatic factors).

The use of **multivariate analysis** contributed to extract useful conclusions on the importance of the different threats. The further exploitation of the collected information by **weighting the threat factors to an index** can provide a very useful tool for classifying the breeds according to their risk status and can be used in setting up an **early warning system** and response mechanism in national, regional and global level.

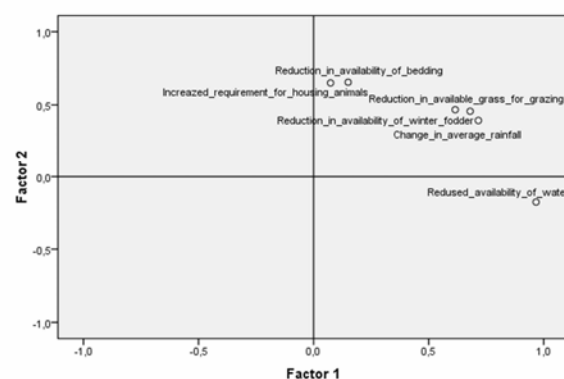
Factor Plot in Rotated Factor Space



Factor Plot in Rotated Factor Space



Factor Plot in Rotated Factor Space



The data were analysed using **Principal Components Analysis** (SPSS 17.0). After preliminary analysis of the data 18 variables were included in the PCA divided into the following categories: social, environmental and political factors. Two principal components were extracted in each category, explaining the 58% to 74% of the total variance of the category.

In the next step, using **hierarchical clustering** two clusters of breeds were formed according to the six new variables. The results show significant differences between the participated countries on the impact of the different threat factors to the heritage sheep breeds. The majority of the breeds of Netherlands and UK were clustered together, while the breeds of Slovenia, Greece and France formed a separate group. However, there are differentiations to the general grouping, as the breeds Bizet, Causses du Lot, Limousine (FR), Orino and Sfakia (GR) were clustered in cluster 2 (Netherlands and UK), while the breeds Black Blazed, Flevolander, Mergelland (NL), Dalesbreed and Southdown (UK) were grouped in cluster 1 (France, Slovenia and Greece).

