European Regional Focal Point for Animal Genetic Resources

Socio-economic and environmental parameters and their applicability into a tool to evaluate risks and trends

Final Project Report

Edited by Christina Ligda and Enrico Sturaro

Project members

Eleonore Charvolin- Lemaire	France	eleonore.charvolin-lemaire@inra.fr
Etienne Verrier	France	etienne.verrier@agroparistech.fr
Sebastian Winkel	Germany	Sebastian.Winkel@ble.de
Christina Ligda	Greece	chligda@otenet.gr
Gustavo Gandini	Italy	gustavo.gandini@unimi.it
Enrico Sturaro	Italy	enrico.sturaro@unipd.it
Filomena Afonso	Portugal	fafonso@dgadr.pt
Montserat Castellanos	Spain	mcastell@magrama.es
Monica Martin Cornejo	Spain	mmcornejo@magrama.es

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Content

Foreword

The European Regional Focal Point for Animal Genetic Resources (ERFP) is the regional platform to support the in situ and ex situ conservation and sustainable use of animal genetic resources (AnGR) and to facilitate the implementation of FAO's Global Plan of Action for AnGR. The activities of ERFP are carried out based upon a Multi-Year Programme of Work (MYPOW). In this framework, ad hoc actions are usually developed in the form of projects, workshops, meetings or consultancies to solve specific short-term problems at ad hoc basis, funded by the ERFP budget under the condition that the goals and activities of the proposed Ad hoc action contribute to the goals of ERFP.

With reference to monitoring breed status, in the last years ERFP has funded :

- an ad hoc action with the title “Development of models assessing the breeds risk status by utilization of population and relevant georeferenced data" aiming to find a common basis on the information that should be collected including the spatial dimension of the data, propose ways that such information can be utilized and investigate the feasibility of an index that will combine the different threatening factors to classify the breeds according to their degree of endangerment;

- a TF on risk status and indicators aiming to review what exists in terms of numerical and genetic indicators and test these, and also work on the definition of native breeds, considering that an harmonisation of such concepts is needed in order that the risk status is to be comparable at country, regional and global level.

The work that has been done in this respect has shown that the assessment of breeds’ risk status should be based on the simultaneous analysis of several criteria that may have an impact on the long-term sustainable breeding conditions, such as genetic and demographic characteristics. Geographical concentration is a primary indicator as it is objectively measured and can be used to identify breeds’ risk status.

Additional parameters may be used to further refine the assessment of the breed’s development potential or the risk status. Such parameters include environmental and socio-economic factors and can be provided from different information sources. Addressing socio-economic and environmental parameters requires a multidisciplinary approach.

Following these results, ERFP has funded in 2015 the current ad hoc action that aims to elucidate the additional factors that shape the general environment (physical and socio-economic environment), where a breed is raised and may affect the dynamics of the breed.

1. Introduction

One of the key points in the conservation of AnGR diversity, recognized in the Global Plan for Action (GPA) (FAO, 2007), is the need to enhance monitoring of trends and risks that threaten the diversity, and establish early warning systems according to their risk status gives us the information that indicates whether action is necessary.

The degree of risk of a breed can be defined as a measure of the likelihood that, under current circumstances and expectations, the breed will become extinct in a specified period, and/or that it will lose through time its genetic variation at a non-sustainable rate (Gandini et al., 2004).

Usually, the risk status of a breed has been evaluated by numerical and population data criteria (population size and rate of change of population size), while genetic data and demographic parameters, as level of crossbreeding, geographical concentration can be also considered, as it has been presented in the *In vivo conservation of Animal Genetic Resources guidelines* (FAO, 2013). In relation to this, also different socio-economic and cultural aspects are considered as important factors of the sustainability of local breeds and their long term preservation.

FAO categorization is primarily based on three parameters (FAO, 2013) :

- **Numerical scarcity**
    - total number of breeding females
    - species reproductive capacity (high, low (=high x 3))

and, if available:

- demographic trend (stable, decreasing, increasing)
- % females pure bred (> or < 80%)

- **Inbreeding rate**
    - total number of males (i.e. ΔF)
    - presence of active conservation programmes (sub-categories “maintained”).

In addition, whenever is relevant and possible, FAO suggests to use:

- Population growth combined with current size: population size projected 10 years in the future
- Concentration, measured as:
    - (a) length (km) of the radius (<12.5 km = critical; <25 km = endangered) of the circular area within which ≥75 % of the population lies (Alderson, 2009)
    - (b) number of herds and its trend
- Degree of introgression through the use of cross-bred animals as breeding stock (thresholds introgression per generation: 12.5 (critical), 7.5 (endangered), 2.5 (vulnerable): Alderson, 2010)
- ΔF / year - generation interval

Beside the regional common approach defined under the guidance of FAO and reported above, several European countries have developed their own within-country methodology for estimating breed endangerment. The ERFP WG Documentation and Information carried out a survey in 2016. The

methodologies developed in France, the Netherlands, Portugal and Spain are reported in the Table below.

Examples of methodologies and approaches used in Europe

France *(Verrier et al., 2015, Animal Genetic Resources, 57: 105–118)*

Multicriteria approach - 6 indicators		
1. Number of breeding females	5. Breeders organization and technical support (with 5 sub-indicators)	6. Socio-economic context (with 5 sub-indicators)
2. Evolution of the number breeding females during the last 5 years (mammals) or generations (poultry)	*5.1. Breeders Association present* *5.2. In situ programme* *5.3. Stock in Cryo-bank* *5.4. Technical support* *5.5. Cohesion and collective dynamics of farmers*	*6.1. Young farmers start raising the breed* *6.2. Availability of the breed for sale* *6.3. Markets for products and services* *6.4. Labels* *6.5. Financial support*
3. Proportion of crossbreeding		
4. Effective population size (*Ne*)		

Netherlands *(Hoving and Hiemstra, 2016)*

		Additional parameters			
Demographic	**Genetic**	**Demographic**	**Genetic**	**Geographic**	**Socio-economic**
Number of adult females and males	Inbreeding rate and risks	Number of breeding females and males Number of offspring	% pure breeding/crossbreeding or % breeding females	Geographic spread Subpopulations in other countries	Number of breeders, age of breeders Functioning of breed organization Breeders with enthusiasm

Portugal *(Carolino, Afonso and Calcao, 2013)*

5 indicators				
Number of breeding females and males	Evolution of breeding females the last 5 years	Ne	Number of varieties / ecotypes	Gene banking

Spain *(Castellanos, 2016)*

		Modulation factors (* if the census exceeds the threshold <15%)		
Demographic	**Genetic**	**Demographic**	**Geographic**	**Socio-economic**
Number of pure – bred breeding females available for purebred reproduction, breeding males or female replacements	Inbreeding rate	Nº of farms Population trend	Geographical distribution	Gene banking

2. Methodology

The Ad hoc final action adopted the following three steps methodology:

1. To develop a questionnaire to collect data on the socio-economic context of the breed expected to affect the degree of endangerment.

2. To test the applicability of the questionnaire on a set of twelve local breeds from five different Countries (see Table 1)

3. To identify a list of parameters to be implemented in EFABIS in order to provide a friendly system to systematically collect the socio-economic parameters expected to affect breed endangerment.

The members of the ad hoc action have met in two specific meetings: the first one, in Thessaloniki, 25 February 2016 and the 2nd one in Padova, 3-4 November 2016. In an intermediate meeting (Bled, June 2016) during the annual ERFP WG Documentation & Information meeting, the first results were presented and discussed. The reports of the meetings are included in Annex III.

For the development of the questionnaire to assess the socio-economic context of the breeds, a two steps process was followed. In the first meeting, the different parameters that could describe to socio-economic context have been reviewed by the members of the ad hoc action giving specific focus on the possible sources of data, their relevance and potential impact on the breed. This step resulted to the first version of the questionnaire, that has been tested on specific breed cases that were selected based on availability of data. In total a set of twelve local breeds from five different Countries has been used (see Table 1).

The second step was the evaluation of the approach, presenting to a wider audience the questionnaire (during the ERFP WG Documentation & Information meeting in Bled, June 2016) and the data collected. This step aimed to agree on the final list parameters chosen and on the final range of values that should be used. After the revision of the questionnaire, the data were updated. The results are presented in Annex I.

The last step of the approach aimed to propose a friendly system to systematically collect the socio-economic parameters expected to affect breed endangerment. For this purpose, the complex parameters were further delineated to the specific elements on which they are comprised (i.e. on breeding / conservation programme, or level of cooperation) in order to assess the final score, by scoring each point separately. The proposal of this system has been discussed in connection with the developments in DAD-IS and EFABIS and the ERFP recommendations on possible changes in the European specific fields of EFABIS. The above were discussed in the final meeting in Padova (November 2016).

The 12 breed cases analyzed (6 from France, 2 from Greece and Italy and one from Portugal and Spain) are presented in Table 1, with their risk status according to FAO and female population size.

Table 1. Breed cases surveyed

Breed (species)	Country	Risk Status (FAO 2013)	No of Breeding Females
Abondance (cattle)	France	Not at risk	48876
Solognote (sheep)	France	Vulnerable	3174
Blanc de l'Ouest (pig)	France	Critical maintained	48
Comtois (horse)	France	Not at risk	8418
Ane Grand Noir du Berry (ass)	France	critical maintained	160
Houdan (chicken)	France		80 (last update year 1995)
Greek buffalo	Greece	Vulnerable	2549
Brachykeratiki (cattle)	Greece	Not at risk	6775
Rendena (cattle)	Italy	Vulnerable	4000
Italian Heavy Draught Horse (horse)	Italy	Vulnerable	3000
Maronesa (cattle)	Portugal	Vulnerable	4255
Avileña Negra-Ibérica (cattle)	Spain	Not at risk	33359

3. Results and Discussion

The final list of descriptors that can be used to describe the socio-economic environment of the breed are presented in the following table.

Table 2. Definition of the proposed socio-economic descriptors

Group	Descriptors	Definition
Breed viability (economic context)	**Market recognition**	Proportion of farms commercializing their most important product under specification involving the use of the breed
	Breed profitability	Profitability of the activities (all uses) involving the breed
	Continuity of activities	Proportion of young farmers and / or existence of successor
	Subsidies autonomy	Explanatory factor of breed viability (proportion of subsidies linked with the breed on the total net income). *Not to be included in the charts, but only as explanatory statement in the output*
Organization (genetic management of the breed)	**Breeding/conservation program**	Assessment of the breeding or conservation programme based on elements described in the explanation box* *Some information exist in EFABIS - a new text field need to be included*
	Genebank	Level of Gene Bank development (from not existing to complete) Information on cryoconserved material exist in EFABIS
Social context	**Cooperation level**	Level of cooperation between farmers and with other actors: assessment based on specific elements (provided in the explanation box*)
Cultural	**Cultural value**	Cultural value of the breed: assessment based on the specific elements*, described in existing text field in EFABIS

**The assessment of descriptors is provided in Table 3*

In general it has been commented that it would be difficult to implement a similar approach at European level for all breeds, as such parameters require the availability of detailed data. However, it has been agreed that such information is useful and it could be used after further elaboration for specific breeds. The aspects of costs and efforts in connection with the expected outcome were addressed.

In relation with EFABIS, certain parameters already exist in the system and can be used for the assessment of score values. The proposed approach could be proved also a positive step towards the increase of the use of the regional database. There are also other solutions for implementing such approach in regional level, not necessarily incorporated in the regional database, but developing this process through the ERFP web portal.

Concerns were expressed on how the need for additional parameters will be covered, when currently the annual statistics are characterized by the low completeness of population data (almost 60% of the recorded breeds are without population data).

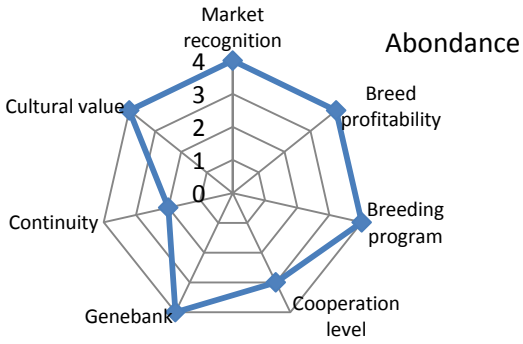
The scoring of the variables, Breeding / Conservation program (assessment), Cooperation level and Cultural value, is based on specific elements that help to provide a more objective and homogenous assessment. These elements are described below:

Table 3. Assessment of descriptors

Cooperation level	Implementation of research activities on the breed in collaboration with research bodies Cooperation with other Breeders' Associations Farmers cooperation in buying farm inputs Organization of visits to other farms of the breed Collaboration of breed markets
Cultural value	Has a role in maintaining handicrafts (taking into account local handicrafts that are directly or indirectly linked to the breed) Has a role in maintaining folklore (taking into account folklore and religious traditions that are directly or indirectly linked to the breed) Has a role in maintaining gastronomy (taking into account linkages between the breed and typical local products or recipes) Has a role in maintaining a specific landscape (taking into account the percentage of farms contributing to maintenance of a traditional landscape) Is represented in forms of higher artistic expression, such as figurative arts, poetry and prose Has a role as custodian of traditional farming practices, including the management of animals Level of cultural attachment of farmers to their breed
Breeding / Conservation programme	collective station, mating plan, use of Artificial Insemination % pure bred (low, intermediate, high), percentage of animals of the breed identified, percentage of farms under the performance recording scheme breeding index clearly defined, successful of breeding program (Does the breeding programme is achieving genetic gain in the breed population?; Genetic variability maintenance)

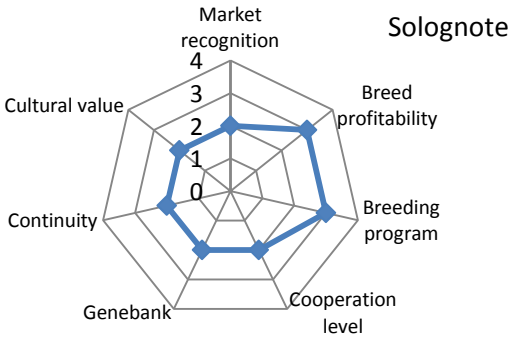
The results of the survey and the scores of the breed cases are presented in Annex I. These results were presented at the Agroecology Conference, Agricultural University of Athens, 3-4 October 2016 (see abstract in Annex II).
In this section the scores are graphically represented using radar charts to visualize the status of each breed.

Abondance cattle, France



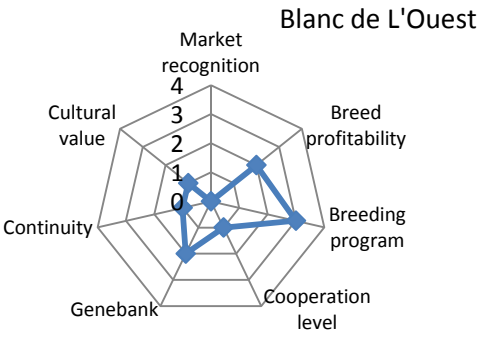
With about 49.000 cows, the Abondance breed is at the fourth rank among dairy cattle breeds in France. It's a local breed strongly linked to mountainous territories and farming systems with transhumance. About 75% of farms are located within the territory defined for PDO cheeses and the specifications of these cheeses include the use of the Abondance breed. Farmers sale milk to factories processing PDO cheeses or process them-selves the milk into PDO cheeses. The image of the breed is used for the promotion of tourism in the "Haute-Savoie" departmental district. Breeders are strongly organized with a well-established breeders association and an effective breeding program including genomic selection. The only weak point of this breed is the competition for access to land which lets difficult the replacement of old farmers by young farmers.

Solognote sheep, France



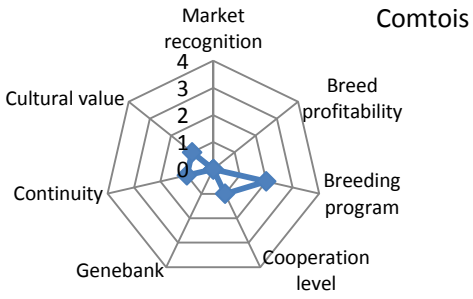
The Solognote sheep breed is the first French breed of livestock having benefited of a conservation program (in 1969). With about 3.000 ewes, it is still an endangered breed. However, efficient breeding methods are adopted for a long time by breeders to monitor the increase of inbreeding. The Solognote sheep breed is linked to the Sologne area (center of France) and, in some parts of this area, the breed is used to maintain typical landscapes. The main difficulty met by farmers is the lack of economic value of the products of the breed, despite some attempts to develop typical products and short market chains. As a consequence, young farmers are not so motivated to develop a flock of this breed.

Blanc de l'Ouest pig, France



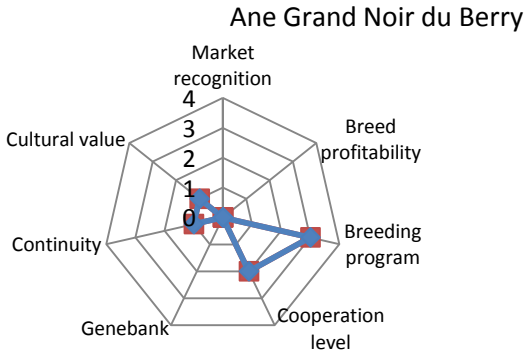
With about 50 sows, the Blanc de l'Ouest breed is one of the endangered French pig breeds and benefits of a conservation program involving both a breeder association and the national technical institute for pig production. The breed is located in the area where more than half the French pig industry is located. As a consequence, locally, there is absolutely no market recognition of the breed.

Comtois horse, France



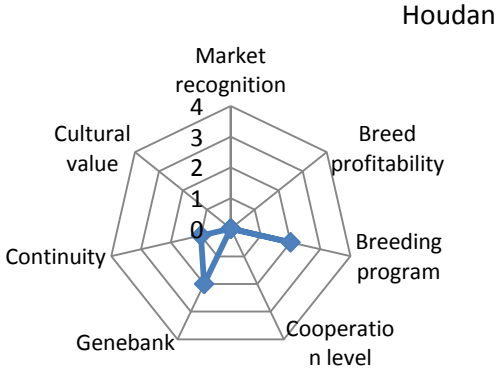
With about 8.500 mares, the Comtois breed is the main French draught horse breed. It is mainly raised in the Jura mountain (Franche-Comté area) and has extension areas in other mountainous areas such as the Massif Central. This breed is considered endangered according to the criteria used in France, despite it is considered not at risk according to the FAO criteria. Since the stop, in 2006, of raising "public" stallions by the Haras Nationaux (horse technical institute), the population size of the breed has decreased. Its main economic outlet is the production of horse meat, which definitely represents a small market.

Ane Grand Noir du Berry ass, France



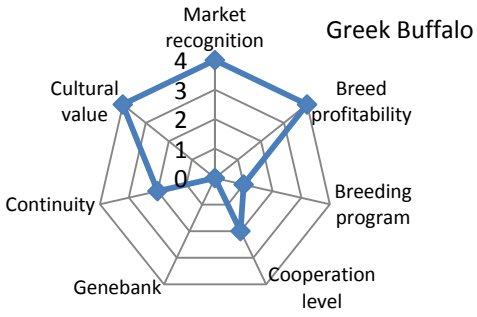
All French ass breeds are considered as endangered… With about 160 breeding females, the Grand Noir du Berry breed is one of the largest French ass breeds and benefits of a well-organized conservation program. The breed is emblematic of its area (Berry) and breeders benefit of the support of local administrative districts. As all asses, the breed is only raised for leisure but only few people are interested by such an activity.

Houdan chicken, France



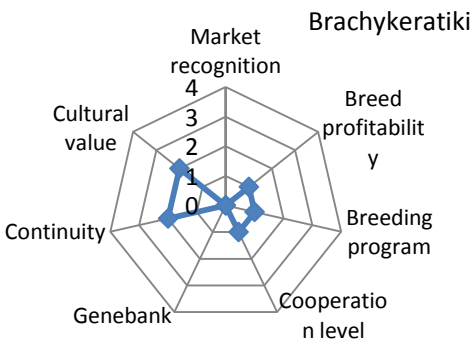
With less than 100 breeding females, the Houdan breed is one among many French old and endangered poultry breeds. There is a breeders association (hobby farmers) and a technical support by the French federation of poultry breeders (SYSAAF). Red Label and Geographic Indication of Origin "Volaille de Houdan" exist but, because of the cost the production for meat, these products are nearly absent and it is very difficult to find Houdan in markets.

Greek buffalo, Greece



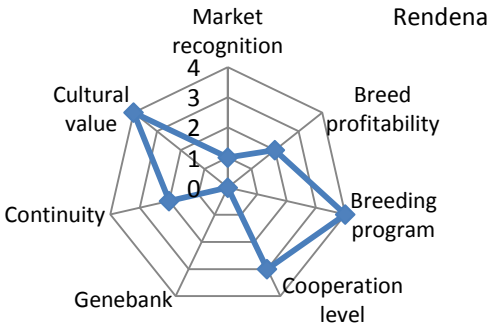
Local breed adapted to the breeding area, with specific cultural and environmental value. The breed is used for the production of typical products (meat and dairy products). The breed is also valorized for its environmental value, through grazing. The population, after a severe decrease due to the mechanization of agriculture, has been increased the recent years and is steadily maintained after the implementation of in situ conservation programmes. However, it has been pointed out, the urgent need to improve the cooperation between farmers and other stakeholders (processors, but also organizations for the protection of the environment), and to plan and implement a breeding scheme.

Brachykeratiki cattle, Greece



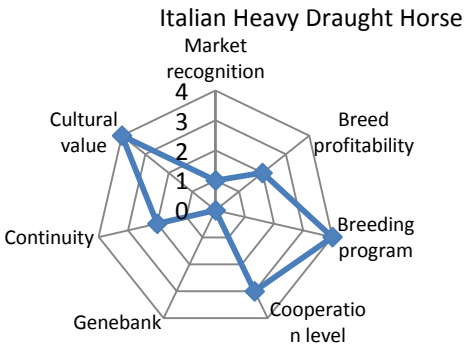
Local cattle breed raised in mountainous and semi-mountainous areas. The breed is appreciated because of its hardiness, limited feeding requirements and adaptation to extensive conditions of management. The population has increased and currently around 6000 heads are raised in the country. The breed is under in situ conservation programmes. The Breeders Association, that is recently established will focus on the breeding programme and further development of the breed.

Rendena cattle, Italy



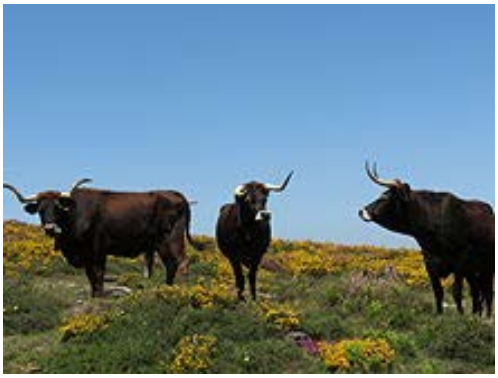
Rendena is a dual-purpose cattle breed of north eastern Italy. Herd book since 1976, the National Association of Breeders Rendena Breed (ANARE) is very active and organized. The cooperation level is good, farmers collaborate to research projects and in several cases are associated in cooperative dairies. Genebank data are absent. The continuity is intermediate, the breeders are able to involve the young generation in farms management. The cultural value is very high, for the level of attachment of the farmers to the breed and also for the organization of traditional events (especially in mountainous areas). The breed is adapted to mountain pastures, and it contributes to the maintenance of traditional landscapes. The milk is used for typical an PDO cheeses, but there isn't a specific label for the breed recognized from the market.

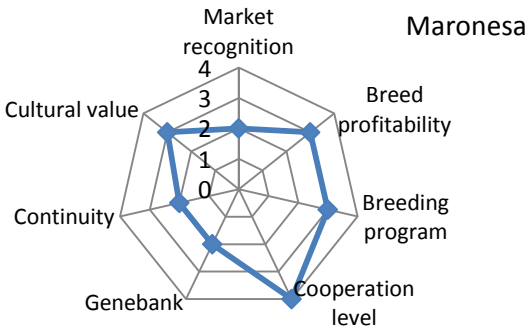
Italian Heavy Draught Horse, Italy



Italian Heavy Draught Horse originates in the north eastern low lands and was mainly employed in the large farms of the area or in the army for field artillery. The National Association, on commission of the Ministry of Agricultural Politics, cares, with the collaboration of the Provincial Book offices, the Stud Book, providing technical assistance to the breeders in order to maintain and improve the race. The cultural value is very high, for the level of attachment of the farmers to the breed and also for the organization of traditional events (national and local expo and meeting). This horse breed is well adapted for breeding in the wild, allowing the use of low-grade pastureland. It can therefore be considered a valid mean of territorial control, especially in areas of delicate environmental stability. There isn't particular products associated to this breed.

Maronesa cattle, Portugal



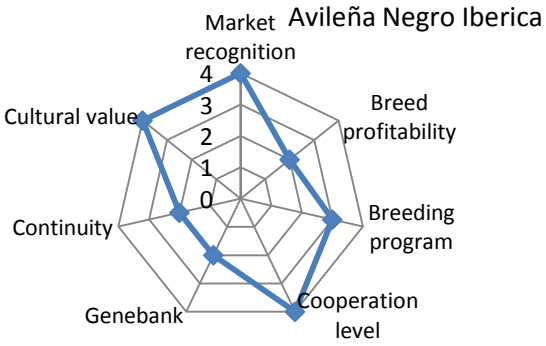


The Maronesa cattle breed is a mountain, primitive, natural and rustic breed. This autochthonous Portuguese breed, is mainly located in mountain areas at northern Portugal, near Vila Real. The Maronesa breed is kept by the agricultural farmers in this mountainous region, where the tractor cannot reach. The cows are reared in traditional farming system, used as fertilization way of soils and mainly to meat production in order to commercialize under the quality label “Carne Maronesa PDO.”

The radar chart above shows that the scores obtained from evaluating all socioeconomic criteria for this breed are at the average or under-average levels. The maximum level has only been reached in the cooperation level. The average level have been reached for the following criteria: the cultural value, the breeding program and the economic viability but further work can be done. Nevertheless, it is worth stressing the importance for future action on the criteria that are at lower level as market recognition, Genebank and the continuity of the breed.

The results derived from the survey allow a more accurate assessment of the breed’s risk status, strengthening its current classification as “vulnerable” according to both FAO categorization (2013) and the Portuguese methodology.

Avileña Negro Iberica cattle, Spain



This autochthonous Spanish breed, widely distributed in different regions of the country, is mainly located in mountain and dehesa areas. Characterized by its high fertility, good mothering ability and its rusticity, this breed is reared in balance with the environment in extensive farms, focused on meat production.

The radar chart above shows that the scores obtained from evaluating all socioeconomic criteria for this breed are at the average or above-average levels. The maximum levels have been reached in the following criteria: cooperation level, market recognition and cultural value of the breed. In this framework, it is worth stressing the relevance of its meat production under quality labels such as "IGP Carne de Ávila" and the logo "100% autochthonous". Furthermore, we could also highlight the transhumance activities that entail the use of natural pasture, as one of the elements that makes a substancial contribution to its cultural value.

The results [1]derived from the survey allow a more accurate assessment of the breed's risk status, strengthening its current classification as "not at risk" according to both FAO categorization (2013) and the Spanish methodology.

[1] ***Source of data:*** *Breeding association, Asociación Nacional de Criadores de de Ganado vacuno selecto de raza Avileña-Negra Ibérica; Martín- Collado D., Carabaño M.J. and Díaz C. (2012) Descriptive analysis of Descriptive analysis of socioeconomic and technical aspects involved in the dynamics of native cattle breeds Avileña- Negra Ibérica, Alistana Sanabresa, Berrenda en Colorado, Pirenaica, Retinta y Terreña (not yet published); Martin-Collado, D., et al., Defining farmer typology to analyze the current state and development prospects of livestock breeds: The Avileña-Negral bérica beef cattle breed as a case study. Livestock Science (2014),* http://dx.doi.org/10.1016/j.livsci.2014.09.003

4. Main Remarks and Recommendations

The proposed approach can be applied in EFABIS and be accessible through a separate environment identified as " *Socio-economic context* ". The objective of such approach will be to provide information on the general environment that a breed is raised and expected to affect the breed status, which could be specifically of interest for breeds that are just above the demographic thresholds.

However, several issues need specific consideration when such approach is implemented. The results are not comparable between countries, as the assessments are dependent on the country (national strategies, priorities, breeding or conservation programmes). Despite this limitation, the approach can be proved very informative to National Coordinators, policy makers, regional administration, as it can show in simple images a general overview of a breed's status at different dimensions (socio-economic and cultural aspects). Other stakeholders as Breeders' Associations, scientists can be also interested in this kind of information.

Implementations in EFABIS

New fields will be required in EFABIS corresponding to the descriptors proposed within the ad hoc action. In total eight socio-economic parameters are proposed. The following parameters are used:

Breed viability (market recognition, breed profitability, continuity of activity, subsidies dependency), existence of breeders organization and assessment of breeding / conservation program, Gene Bank status, Cooperation level, and Cultural value.

The values of the fields (descriptors) are the scores (with values ranging from 0 to 4) that will get, based on the experts knowledge on the breeds. In addition to the 8 score fields that needed to be added in the database, two new text fields are proposed regarding the cooperation level and the breeding / conservation programme. These fields will be visible also in the general EFABIS. Existing relevant fields of EFABIS will be visible and possible to be updated under the "socio-economic context" section.

The specific list of the fields and the amendments, new fields or modifications to existing EFABIS fields follow in a separate table in the end of this section.

Currently, it is proposed that the approach will be implemented for specific species (Cattle, Buffalos, Sheep, Goats, Pigs, Horses).

The scores will be updated in defined time periods and previous values will be stored in the system, so the user will have the possibility to analyse historical data. The results will be presented in specific reports using radar charts and tables. More details on the outputs are presented in the relevant section.

Entering data

All data entry forms and outputs for the socio-economic context will be separated from the standard entry and outputs sections. This section will be also under the NC account and data entering will be done with the same user name and password as for all other data. It is proposed to give the option to the NC to chose

whether the Outputs (and data) will be public or not (both options will be possible). Data in this section will be persistent, with possibility to store data for multiple years.

The user selects a specific breed and enters in the socio-economic environment. In this section the score fields and descriptive text fields appear. The user can both update the descriptive fields and enter the values of the scores.

Previous values of the score fields (and relevant descriptions) are stored as historical data.

Outputs

1. Viewing the results of one breed

The user selects a breed to view the socio-economic context at a given time.
The layout is a dashboard containing:

- Basic information on the breed population, and risk status
- Radar Chart (spiderweb) showing all scores for the most recent available year. The year of the data is also shown.
- Blocks of text around the chart containing the textual description of each score. Each description block is close to its respective score.
- The scores are not updated each year, as socio-economic context is not expected to change annually. The scores are valid for a period of years, not only for the year that the assessment is made.
- The user has the option to "scroll" the chart, i.e. to scroll through the years with available data. At each change of the year the scores on the chart and the descriptions are updated with the data stored for that year.

2. Viewing the results of several breeds

This option gives the possibility to compare the socio-economic context of several breeds within a country. For this purpose, the user has to select breeds to compare. The layout is a set of radar charts, one for each chosen breed with the most recent data. The year of the scores assessment is also shown to each chart.

3. Searching tool.

This tool will allow the user to search for a group of breeds matching to certain criteria based on the scores.
The tool is comprised by two parts:

- search filters part - allowing to set a filter for each score (e.g. min and max value), filter for countries, filter for species
- results table containing list of breeds matching the search filters

With such search tool the user can find:

- Breeds with well developed genebank.
- Breeds with high cultural value, which are not part of well developed breeding programme.
- Profitable breeds, threatened by lack of new farmers.
- Breeds with poor market recognition, but in well developed breeding programme with good level of cooperation of the farmers, etc.

Table 4 . List of proposed descriptors, their definition and related fields

Group	Descriptors	Definition	New fields in EFABIS		Existing EFABIS fields
Breed viability (economic context)	**Market recognition**	Proportion of farms commercializing their most important product connected to the breed	Score		Specific product (text)
	Breed profitability	Profitability of the activities with the breed	Score		
	Continuity of activities	Proportion of young farmers and / or existence of successor	Score		
	Subsidies autonomy	Explanatory factor of breed viability (proportion of subsidies on the total net income). Not to be included in the charts, but only as explanatory statement in the output	Score		
Organization (genetic management of the breed)	**Breeding/conservation program**	Assessment of breeding / conservation programme based on elements described in the explanation box - Some information exist in EFABIS - a new text field need to be included	Score	Text	% pure bred / AI / males in AI / description field on in vivo conservation
	Genebank	Level of completeness (using 5 levels – from not existing to complete, 3 FAO categories + intermediate values) / Information on cryoconserved material exist in EFABIS	Score		Genetic material stored in Cryobanks
Social context	**Cooperation level**	Level of cooperation between farmers and with other actors: assessment based on specific elements (provided in the explanation box)	Score	Text	Description of elements of the cooperation (see next sheet)
Cultural	**Cultural value**	Cultural value of the breed: assessment based on the specific elements described in existing text field in EFABIS	Score		Cultural value (text)

Annex I

Results of the breeds' survey

Breed (species)	status	no breeding females	Market recognition	Economic viability	Subsidies dependency	breeder organization	Breeding program	Cooperation level	Geneban k	Continuity	Cultural value
Greek buffalo	Vulnerable	2549	4	4	2	1	1	2	0	2	4
Avileña Negra-Ibérica (cattle)	Not at risk	33359	4	2	1	1	3	4	2	2	4
Abondance (cattle)	Not at risk	48876	4	4	3	1	4	3	4	2	4
Blanc de l'Ouest (pig)	Critical maintained	48	0	2	1	1	3	1	2	1	1
Brachykeratiki (cattle)	Not at risk	6775	0	1	1	1	1	1	0	2	2
Comtois (Horse)	Not at risk	8418	0	0	3	1	2	1	0	1	1
Ane Grand Noir du Berry (Ass)	critical maintained	160	0	0	3	1	3	2	0	1	1
Houdan (Chicken)		80 (last update year 1995)	0	0	4	1	2	0	2	1	0
Italian Heavy Draught Horse (horse)	Vulnerable	3000	1	2	1	1	4	3	0	2	4
Maronesa (Cattle)	Vulnerable	4255	2	3	1	1	3	4	2	2	3
Rendena (Cattle)	Vulnerable	4000	1	2	1	1	4	3	0	2	4
Solognote (sheep)	Vulnerable	3174	2	3	1	1	3	2	2	2	2

Annex II

Agroecology Conference, Agricultural University of Athens, 3-4 October 2016

Socio-economic and cultural aspects of the assessment of livestock breeds' risk status and trends

Ch. Ligda[1], E. Sturaro[2], E. Charvolin[3], M. Castellanos[4], Z. Duchev[5], S. Winkel[6], F. Afonso[7], M. Cornejo[4], G. Gandini[8] and E. Verrier[9,3]

[1]HAO - Veterinary Research Institute, 57 001 Thessaloniki, GR; [2]Padova University- DAFNAE, Padova, IT'; [3]GABI, INRA, AgroParisTech, Université Paris-Saclay, FR; [4]Ministry of Agriculture, Food and Environment, ES; [5]Exec. Agency on Selection and Reproduction in Animal Breeding, Sofia 1766, BG; [6]IBV, BLE, 53179 Bonn, DE; [7]Dept of AnGR, General Direction of Food and Veterinary, 1050-027 Lisbon, PT; [8]University of Milano, DiMeVet, 20133 Milano - IT; [9] FRB and GABI, INRA, AgroParisTech, Université Paris-Saclay, FR

Abstract

Preserving and promoting the diversity of livestock breeds can contribute to the development of farming systems more compatible with the principles of agro-ecology. Preservation actions are partly based on the risk status of a breed, usually assessed by population data (population size and rate of change of population size), while genetic data and demographic parameters, as level of crossbreeding, geographical concentration can be also considered. Moreover, socio-economic and cultural aspects are considered as important factors of the sustainability of local breeds. This paper aims to propose methodologies to address the complex issues of socio-economic and cultural parameters.

Within the frame of the FAO European Focal Point for Animal Genetic Resources, the cases of 12 breeds (from 6 species) from Greece, Italy, France, Spain and Portugal were analyzed, covering a variety of risk status. In total eight socio-economic and social parameters, that are expected to have impact on the trends of a breed, were implemented, based on the fact that these are rather easy to obtain and objectively assessed. The following parameters were used: market recognition, economic viability, subsidies dependency, breeders organization and breeding / conservation program, cooperation level, Gene Bank status, continuity of activity and cultural value. The parameters were evaluated by experts using a questionnaire, with scores ranging from 0 to 4.

Preliminary results demonstrate that these parameters exhibit sufficient variation among the breeds studied. When compared to population data they permit to have a more holistic evaluation of the status of livestock breeds. This methodology could be used and adjusted at country level based on country's situation and needs. Further steps will focus on the development of as common tool that could be used at regional scale.

Annex III

Meeting Reports (Thessaloniki, 25 February 2016 and Padova, 3-4 November 2016)

Socio-economic and cultural aspects of the assessment of livestock breeds' risk status and trends

Ch. Ligda[1], E. Sturaro[2], E. Charvolin[3], M. Castellanos[4], Z. Duchev[5], S. Winkel[6], F. Afonso[7], M. Cornejo[4], G. Gandini[8] and E. Verrier[9,3]

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Report : ERFP – Ad hoc Action
Thessaloniki 25.02.2016
9:00 -18:00

Attending:
Members of the Ad Hoc Group:
Christina Ligda (Chair), Zhivko Duchev, Eleonore Charvolin, Etienne Verrier, Gustavo Gandini, Enrico Sturaro, Montse Castellanos
Excused: Sebastian Winkel
Dimitrios Tsiokos (observer)

Background , Objectives and Expected outcome (C. Ligda)

This proposal is considered as a continuation of previous works of ERFP (TF risk status and indicators, and the project "Development of models assessing the breeds risk status by utilization of population and relevant georeferenced data"). These actions concluded that additional parameters may be used to further refine the assessment of the breed's development potential or the risk status. Such parameters are categorized as environmental and socio-economic factors and can be provided from different information sources. Addressing socio-economic and environmental parameters requires a multidisciplinary approach.

The work of the ad hoc group, apart from the above mentioned projects, will be based on the work published by FAO on the thresholds to assign breeds to risk categories ("In vivo conservation of AnGR (FAO, 2013), the PEDs Report (FAO, 2008), the study by the Ramage Consortium (Races animals francaises menaces d'abandon pour l'agriculture - Rapport methodologique; INRA, 2014) (a multi criteria assessment of the degree of endangerment) and the document on the work on the definition of national criteria to categorize native breeds developed by the Spanish Ministry of Agriculture. Other relevant studies in European countries will be also considered (a feedback from NCs will be asked).

This meeting aims to discuss on possible approaches and criteria, based on their impact to the trends of a breed and easiness to measure, their relative weight and decide on breed cases to test different approaches depending on availability of data.

ERFP project results (E. Sturaro)

The methodology that was used in the previous ERFP project to test the geographic concentration of the breeds the conclusions of this work, and the proposal of the Risk Status Index using demographic and geographic concentration criteria were presented. The inclusion of geographic distribution represents a useful tool for the integrated evaluation of the breed risk status, as it can be combined also with additional information that are available at spatial level.

FAO - EAAP criteria (G. Gandini)

The presentation aimed to give an overview on the criteria by FAO (FAO, 2013) and explain the process that these were developed combining, in terms of criteria and thresholds, the previous system of the FAO (FAO Secondary Guidelines: Management of Small Populations at Risk, 1998) with several proposals from the literature (Gandini et al., 2004; Alderson 2009 and 2010). FAO categorization is based on primary criteria (numerical scarcity, inbreeding rate and conservation programme existence) while additional parameters may be used when data are available to refine the classification. A list of possible socio-economic parameters was proposed for the discussion.

Multi-criteria approach (RAMAGE Consortium) (E. Verrier / E. Charvolin)

The principles and indicators of the multi - criteria approach developed by RAMAGE Consortium to assess the risk status of livestock populations were presented. Six indicators were used: (i) number of breeding females; (ii) change in the number of breeding females over the last 5 years or generations; (iii) percentage of cross-breeding; (iv) effective population size; (v) breeders organization and technical support; and (vi) socio-economic context.
The observed values were converted into scores on a six-point scale (from 0 = no threat to 5 = maximum threat) and for each breed, the different scores were presented graphically and an overall score was calculated. This approach was applied to 178 French local breeds (ten different species).

National criteria (Spain) (M. Castellanos)
The presentation described (1) the general framework (EU legal framework regulation: Article 28 of Regulation (EU) No 1305/2013 + Regulation (EU) 807/2014, the Zootechnics regulation proposal) and the multiple actors that are involved with different interests, (2) The work that has been developed in national level (National Coordinating Committee for the conservation, improvement and promotion of livestock breed, National System of livestock breeds), (3) analysis of results in a case study and SWOT analysis and (4) the future challenges and prospects.

Geographical approach (E. Sturaro)
The presentation offered an example of possible incorporating geographic information systems (GIS) approach for the evaluation of socio-economic and environmental parameters. Rendena cattle breed (a local dual purpose Italian breed adapted to mountain pastures) was used as case study. The analysis of relationships between Rendena cattle farms and land use was performed at two levels: a) landscape level: using Corine land use and Natura 2000 maps b) farm level: using data on agricultural patches from on farm survey based on 25 Rendena breeds farms. The results shows that GIS can be used to characterize the production environment (and ecosystem services) of local breeds. A key point is the availability and the possibility to merge datasets of different origin. The proposal is to test this approach on different case studies considering different species, population size and geographic concentration.

Using data on regional level (Z. Duchev)
The key elements that need to be clarified in this process were defined in a set of questions. In this context, a brief review on the data available on regional level was made, with specific reference to the transboundary breeds and how they defined, some obstacles that hinder the development of common tool, based on the current status of data availability, and possible integration on a regional system, in case of developing a common tool.

Discussion (Data characteristics, Rating, weighting of the criteria, interpretation of the parameters) ,
The main objective of this action is to elucidate the additional factors that shape the general environment (physical and socio-economic environment), where a breed is raised and affects the dynamics of the breed.

Considering this a list of proposed indicators was discussed, based on the source of data, relevance level, range of values and possible impact to the breed (in certain cases, is not clear whether the parameter is beneficial or unfavorable).
The list of criteria is under revision by the group and will be finalized (20/3).

Tasks and timetable
The timetable agreed:

- Collect information from other countries (by e-mail to the WG docu&info). Circulate the table and finalize (define the parameters and the scale) - (by April (15/4)
- Decide on the breed cases to apply the methodology (beginning of April)
    - The cases should cover:
        - Variety of species (cattle/ sheep/ goats/ horses/ poultry)
        - Different population size cases
    - Prepare a form for collecting data (beginning of April)
- Decide on the content of the report (beginning of April)
- Collect the data and apply these criteria to the selected cases (May)
- include geographic approach, building thematic maps for specific breed cases

Final Report
The expected outcome of the action is a report that will summarize the scope of the action, the existing approaches in different countries, the applied criteria and approach, the results on the tested breed case studies, analyzed in terms of contribution to the understanding of the impact of the different factors to the trends of the breeds, the relevance and connection to ERFP activities and possible implementation.

Next meeting

The date of the next meeting will be decided by e-mail considering the availabilities. The meeting will be end of June - first week of July.

Close of the meeting.

The presentations, the report and the list of participants will be available in the ERFP website.

ERFP ad hoc action: Socio-economic and environmental parameters and their applicability into a tool to evaluate risks and trends

Meeting Report, Padova, 3 -4 November

Participants: Enrico Sturaro, Gustavo Gandini, Zhivko Duchev, Eleonore Charvolin, Etienne Verrier, Filomena Afonso, Monica Cornejo, Anna Renhberg, Christina Ligda

The main objective of the meeting was to review the work that has been done, discuss the breed cases, finalize the list of parameters and relevant fields, and also to draft the content of the final report with recommendations on possible implementation of the approach at regional level.

During the first day, the discussion aimed to the clear definition of the suggested parameters based on the breed cases examined, to suggest ways towards the implementation of this approach, and possible new fields that are needed to be included in EFABIS. Furthermore, Gustavo Gandini gave a short presentation on the risk status criteria (FAO guidelines, 2013) and possible additional ways on risk status estimation for EFABIS and Anna Renhberg presented some observations on the current EFABIS outputs. On the 2nd day, the main points of the discussion were summarized and the recommendations including suggestions for fields were finalized, as following:

Main remarks and recommendations :

- The proposed approach can be applied under a new tool that will be developed in EFABIS and will be accessible through a separate environment identified as " *Socio-economic context* "
- The objective of this tool will be to provide information on the general environment that a breed is raised and expected to affect the breed status. Such tool is specifically of interest for breeds that are just above the demographic thresholds.
- For this purpose, new fields need to be added to EFABIS corresponding to the descriptors proposed within this ad hoc action. In total eight socio-economic and social parameters are proposed.
- The following parameters were used: economic viability (market recognition, breed profitability, continuity of activity, subsidies dependency), breeders organization and breeding / conservation program, Gene Bank status, cooperation level, and cultural value.

- The values of the fields (descriptors) are the scores (with values ranging from 0 to 4) that will get, based on the experts knowledge on the breeds. In addition to the 8 score fields, two new text fields are proposed that will be visible also in the general EFABIS. Existing relevant fields of EFABIS will be visible and possible to be updated under the "socio-economic context" section.
- The specific list of the fields and the amendments, new fields or modifications to existing EFABIS fields follow in a separate table the end.
- The tool is proposed to be implemented for specific species, (Cattle, Buffalos, Sheep, Goats, Pigs, Horses).
- The scores will be updated in defined time periods and previous values will be stored in the system, so the user will have the possibility to analyse historical data. The results will be presented in specific reports using radar charts and tables. Specific proposals for outputs will be included in the final report.

FINAL REPORT

The contents of the report:

- Introduction
  - *Aims and objectives of the ad hoc action*
  - *Background (defining risk categories)*
  - *Review of existing approaches in Europe*
- Methodology
  - *Explain the idea of analyzing the socio-economic context on breed level*
  - *Criteria used and assessment of values*
  - *Breed cases and data collection*
- Results and Discussion
  - *Presentation of the results on breed cases (charts / tables)*
- Recommendations
  - *Proposal of implementation at European level (EFABIS + tools / reports): this is the deliverable of the project*