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Identification of High Nature Value farmland in France through statistical information and farm practice surveys

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Executive Summary

The Concept of High Nature Value (HNV) farmland has been evolving over the last fifteen years in Europe. In the European Union this has been closely linked to the aim of integrating environmental concerns in the Common Agricultural Policy. The idea that nature values, environmental qualities, even cultural heritage are linked to or dependent on farming, also underlies and supports the concept of a multifunctional 'European model of farming' which provides benefits other than food. The 'High Nature Value farming' idea thus ties the preservation of biodiversity and wildlife value of the countryside to the need to safeguard the continuation of farming in certain areas with maintenance of specific farming systems associated to the long-term management of these areas.

High Nature Value farmland is defined as "*those areas in Europe where agriculture is a major (usually the dominant) land use and where agriculture sustains or is associated with either a high species and habitat diversity, or the presence of species of European conservation concern, or both*" (Andersen *et al*. 2003).

According to preliminary estimates, **roughly 15-25 % of the European countryside qualifies as HNV farmland** (EEA, 2004). Agriculture in these areas is usually extensive and vulnerable to change. HNV areas are often under severe pressure due to a weak economy and depopulation. Predominant agricultural trends are, on one hand, intensification, and land abandonment on the other. Both are considered detrimental to biodiversity values.

The HNV farmland methodology distinguishes the following types of high nature value farmland:
Type 1: Farmland with a high proportion of semi-natural vegetation.
Type 2: Farmland with a mosaic of low intensity agriculture and natural and structural elements, such as field margins, hedgerows, stone walls, patches of woodland or scrub, small rivers etc.
Type 3: Farmland supporting rare species or a high proportion of European or world populations.

High Nature Value farmland comprises biodiversity 'hot spots' of in rural areas and is usually characterised by extensive farming practices. Its conservation value is acknowledged in several EU policy documents, such as the EU Regulation on Rural Development (EC 1257/1999). HNV farmland areas will be one of the indicators to assess the Rural Development Community Strategy (programming period 2007-2013) and particularly one of the three priorities of axis 2 "biodiversity and preservation of high nature value farming and forestry systems".

Support to HNV and low input farmland systems by the implementation of the measures of the first and second CAP pillars are also part of the Biodiversity Action Plan (COM 2001 – 162). In their 'Kyiv Resolution', the European Environment Ministers agreed to complete the identification of all high nature value areas in agricultural ecosystems in the pan European region areas by 2006, applying common criteria previously agreed upon. By 2008, financial subsidies and incentive schemes for agriculture will be under biodiversity-sensitive management through the implementation of appropriate mechanisms such as rural development instruments, agri-environmental programmes and organic agriculture to, among others, support their economic and ecological viability (EEA/UNEP, 2004)**.**

The objective of this study is to better identify and characterise HNV farmland at national level (France) with a farm system approach based on FSS statistical data and specific national surveys, taking into account the whole farm with the total agricultural area and its characteristics.

In a first step relevant variables have been selected to calculate the "crop diversity and share of permanent grassland" indicator at municipality scale (NUTS 5). In a second step the crop diversity and share of permanent grassland indicator has been combined with other data sets from other surveys (grassland survey and forestry survey) to build "the landscape elements" and "the extensive crops and grasslands" indicators. In a third step these three indicators have been weighted to calculate a final score and draw maps at NUTS 5. HNV farming systems and areas have been characterised by fixing a

minimum threshold for the HNV score. The final map was crossed with other data to analyse and crosscheck the results.

According to the methodology presented in this report**, in 2000, French HNV farmland covered 6,996,000 ha, plus 1,076,000 ha of common lands managed by 171,000 farms**. The principal HNV French regions are: Limousin (97% of the UAA), Corsica (88%), Auvergne (62%), Rhône-Alpes (59%), PACA (Provence-Alpes-Côte d'Azur) (57%) and the Franche-Comté (49%).

Twenty-one HVN areas were identified, based on their farmland system (animal types, breeds, types of grassland, land use). **HNV farm systems are mainly grazing systems (63%) and mixed systems (29%)**. Furthermore, 84% of the type of farms corresponding to the grazing livestock type are located in HNV areas.

Grasslands mostly cover these areas, amounting to more than 85% if common land is included. 86% of national rough grazing fields, 81% of national common pastures and 50% of national permanent pastures are included in HNV areas. On average, crops associated with the grazing systems occupy only 15% of the UAA; vineyards and orchards 1.3%, and fallow land 1.2%. Traditional landraces characterise most of the HVN farmland areas and 62% of the payments of the "Extensification Payment Scheme" are distributed to farms located in HNV areas.

"Non-Commercial" farms cover 11% of the UAA in HNV areas, versus 7% in non-HNV areas. 90% of the HNV areas are included in Less Favoured Areas. 86% of the agricultural surface located above 500 metres is included in HNV areas but account for only 43% of HNV areas.

Some of these grazing systems have developed specific products (cheese, meat, cider, olive oil) which are now labeled Protected Designation of Origin (PDO). 6% of HNV farms produce products under PDO (excluded wine) corresponding to 72% of the total French farms producing PDO.

HNV farms are characterised by a **low input level** (59€/ha for fertilisers, 23€/ha for crop protection and 165€/ha for animal feed in 2004) and **extensive practices** (high percentage of rough grazing fields and common lands, lower N fertilization of productive permanent grasslands, lower grain crops yields), and include a higher proportion of landscape elements. The Family Farm income per Family Work Unit was 14% lower for HNV farms than for non HNV farms.

Crossing data for HNV Farmland areas with Nitrate Vulnerable zone data shows that **91% of the farmland areas is outside vulnerable zones. HNV areas concentrate between 47 and 61% of areas of natural interest (Natural Areas of Interest for fauna and Flora - ZNIEFF, IBA) and nature protected areas (National Parks, regional Parks and Natura 2000 areas), 86% of natural reserves and 99% of National Parks**.

HNV Farmland sustains about 37% of the national population of farmland bird species in only 25% of the national farmland area. Particularly contrasting responses have been found for species with unfavourable conservation status, with 39% of them well represented in HNVF (over 40% of national population) and 12% strongly underrepresented (under 12% of national population). All of these underrepresented species meet one of two criteria: they are crops specialists (ex: *Perdix perdix or Circus cyaneus*) and/or have low altitude preferences (ex: *Vanellus vanellus*). The difficulty to predict the presence of these species by means of agricultural data is the result of the disappearance of extensive crop systems and the remainder situation of extensive pastures in lowlands.

The Farm System Approach methodology has some weakness mainly due to the way agricultural practices are modelled. Existing data are either not sufficient, or are only available at a larger scale (department or region). Concerning the crops, data are generally available only in the regions where the crop production covers a representative surface and when grassland is concerned, only for the temporary and productive permanent pastures. In general, no data are available concerning extensive crops and permanent pastures.

Few data exist for agricultural practices of extensive grassland and common land. The estimation and evaluation of extensively managed crops are also difficult. When the analysed region (e.g. French

Department) is heterogeneous, average yields at the scale of the department are not sufficient.

The strength of the Farm System Approach methodology is that it produces a map at NUTS5 level accurately describing the farm systems. The methodology can be improved by crosschecking the results with regional experts and getting feedback on the thresholds (such as the level of N mineral fertilization of pastures compatible with high nature value) and the weighting of the indicators.

In addition, this methodology does not take into account small HNV areas when these are located in intensive farmland areas, such as narrow flooding valleys scattered in different farms and municipalities. A solution to identify these areas could be to include NATURA2000 sites, Important Bird Areas, Important Plant Areas and other nature inventories.

The farm system approach based on FSS can be up-scaled to the European level only if specific data concerning extensive agricultural practices and landscape elements are available. At the current moment only some Member States have some of these specific surveys.

It is recommended that a European grassland survey should be developed in the future. Furthermore, the introduction of some specific questions in the next FSS (or specific module on farm practices) concerning N mineral farm consumption and % of grassland without N mineral fertilizer, could provide information to better characterise HNV Farmland and low input farming systems in Europe.

There is also a need for a landscape feature survey, such as, for example, the UK Countryside Survey is regularly doing.

Concerning the mapping of biodiversity, one important need remains the access to detailed resolution data (NUTS5) for EU wide application.

Acronyms list

AOC : Appellation d'Origine Contrôlée

BSPS : Beef Special Premium Scheme

CAP : Common Agricultural Policy

CLC : Corinne Land Cover

EEA : European Environment Agency

EPS : Extensification payment scheme

ESCAPE : Expert System for Constraints to Agricultural Production in Europe

EUNIS : European Nature Information System

FADN : Farm Accountancy Data Network

FSA : Farm System Approach

FSS : Farm Structure Survey

GIS : Geographic Information System

HNV: High Nature Value

IACS : Integrated Administration and Control System

IBA : Important Bird Area

IFN : National Forest Survey

JRC : Joint Research Centre

LFA : Less Favoured Areas

LU : Livestock Unit

NUTS : Nomenclature of Territorial Units for Statistics

PBA : Primary Butterfly Areas

PDO : Protected Designation of Origin

RGA : Recensement Géneral de l'Agriculture

RICA : Réseau d'Information Comptable Agricole (French FADN)

SIGEC : Système Intégré de Gestion et de Contrôle

UAA : Usable Agricultural Area

ZNIEFF : Zones Naturelles d'Interêt Ecologique Faunistique et Floristique.

1 Introduction: Context and objectives of the study

1.1 The concept of High Nature Value farmland

The concept of High Nature Value (HNV) farmland has been evolving over the last fifteen years in Europe. In the European Union this has been closely linked to the aim of integrating environmental concerns into the European Community policies. The idea that nature values, environmental qualities and even cultural heritage are linked to or dependent on farming also underlies and supports the concept of a multifunctional 'European model of farming' which provides other benefits besides food. The 'High Nature Value farming' idea thus ties the preservation of the diversity and wildlife value of the countryside to the need to safeguard the continuation of farming in certain areas, and to the maintenance of specific farming systems associated with the long term management of these areas.

'High Nature Value farmland' comprises the 'hot spots' of biodiversity in rural areas and is usually characterised by extensive farming practices. Its conservation value is acknowledged in several EU policy documents, such as the EU Regulations on rural development (EC 1257/1999 and Council Reg. (1698/2005)). The on-going debate on HNV farmland, carried out by EU institutions and at Member State level, has led to the acceptance of the concept introduced by Andersen *et al*. (2003) as formal definition of these areas; nevertheless the knowledge of what constitutes high nature value farmland and its precise distribution is still limited. Consequently, the lack of distribution and monitoring data has prevented insight into the targeting and effectiveness of policy measures. During the programming period 2000-2006, some mid-term evaluation showed there was no relation between present expenses in the different countries and their share of HNV farmland.

In their 'Kyiv Resolution', the European Environment Ministers agreed to complete, by 2006, "the identification of all high nature value areas in agricultural ecosystems in the pan European region areas, using agreed common criteria. By 2008 a substantial proportion of these areas will be under biodiversity-sensitive management by using appropriate mechanisms such as rural development instruments, agri-environment programmes and organic agriculture, to inter alia support their economic and ecological viability" (UNEP, 2003). Also, binding for all Member States, three HNV related indicators (baseline, result, impact) are part of the Common Monitoring and Evaluation Framework for Rural Development Programs 2007-2013.

1.2 Background

The HNV concept has been gradually integrated in the Common Agricultural Policy:
- Integration in Rural Development Regulation CE n°1257/1999 "preserve *and promote a high nature value sustainable agriculture* " – (article 2)
- Integration of HNV as an indicator to evaluate the environmental impact of the CAP (COM(2000) 20, COM(2001) 144, COM(2006) 508)
- Integration in the new Rural Development Regulation (COM (2004) 490): "*The payments have to contribute to preserve the landscape and the natural environme*nt"
- The Rural Development Extended Impact Assessment indicator (DOC STAR VI/2004/00 Final) : Part D –Questions VI. 2.B on the impact of agri-environmental measures on biodiversity (and especially on the conservation of HNV habitats); assessment criteria VI.2.B-1 "*conservation of HNV habitats on farmland"*
- The new Council Regulation (Reg. 1698/2005)

Different studies have been done on the HNV concept, aside the CAP:
- Agro-environmental indicators from OECD on natural habitats: indicator *"percentage of HNV farmland surface on the total agricultural area*" 2001
- First report realised by EEA in 2003 "Developing a High Nature Value Farming area indicator" and publication of the document "HNV Farmland – Characteristics, Trends and Policy Challenges"
- IRENA Operation on the agri-environmental indicators for monitoring the integration of environmental concerns into the CAP – Indicator n°26 on "High nature value (Farmland) areas" to assess agricultural impact on biodiversity and landscapes (EEA 2005)
- Work done by the JRC in collaboration with the EEA to improve the IRENA approach and identify HNV farmland at EU level (Paracchini et al. 2006)

The important work coordinated by the EEA and carried out by Andersen et al. (2003), represents one of the frameworks of the present study.

1.3 Technical considerations

High Nature Value farmland comprises those areas in Europe where agriculture is a major (usually the dominant) land use and where agriculture supports or is associated with either a high diversity of species and habitat, or the presence of species of European conservation, concern or both – Erling Andersen.

According to preliminary estimates, roughly 20% of the European countryside qualifies as HNV farmland. The largest areas of HNV farmland are found in eastern and southern Europe. They consist of habitats such as semi-natural grasslands, dehesas, montados, steppe habitats and small-scale mosaic fields with abundant landscape features. HNV farmland is also relatively abundant in mountainous areas. Examples are grazed uplands in the UK and Alpine pastures and meadows. Also the wet heaths and moors of Western Ireland and the grazed salt marshes of Northern Germany qualify for HNV. These at first glance, very diverse areas, are in fact landscapes that have in common the fact that valued habitats and species and specific types of farming -mostly characterised by low stocking densities, low use of chemical inputs- are present.
Agriculture in these areas is usually extensive and vulnerable to change. HNV areas are often under severe pressure due to a vulnerable economy and depopulation. Predominant agricultural trends are, on the one hand, intensification, and land abandonment on the other. Both are considered detrimental to biodiversity value.

The HNV farmland methodology (cf. Andersen et al., 2003, revised in 2006 in the JRC/EEA implementation of the methodology) distinguishes the following types of high nature value farmland (see table 1) :
Type 1 : Farmland with a high proportion of semi-natural vegetation
Type 2 : Farmland with a mosaic of low intensity agriculture and natural and structural elements,

such as field margins, hedgerows, stone walls, patches of woodland or scrub, small rivers etc.
Type 3 : Farmland supporting rare species or a high proportion of European or World populations

The three types of HNV farmland pose different problems regarding their characterisation and location. To address this, at EU level two complementary approaches have been developed to describe and locate types 1 and 2. The first approach used for the identification is based on the use of **land cover** maps**,** which is suited for the localisation of HNV farmland areas. The second is the **farm system** typology, which combines agronomic and economic data derived from farms (e.g. FADN). By analysing the pressure from farming practices, it gives a general indication of the presence and character of farming systems that are likely to manage HNV farmland.
When combined, these two approaches give information on distribution of HNV farming characteristics.

Type 3 areas can only be identified on the basis of species distribution data. At EU level existing networks such as NATURA2000, Important Bird Areas, Prime Butterfly Areas and Important Plant Areas (when available) can provide the necessary information.

Table 1 : Expected output of the different approaches in relation to the different types of HNV farmland

	HNV farmland type 1	**HNV farmland type 2**	**HNV farmland type 3**
Land cover approach (based on CORINE LC)	Presence of CLC categories related to HNV farming. Indicative maps of the location of HNV farmland.	Presence of CLC categories related to HNV farming. Indicative maps of the location of HNV farmland.	- Not applicable
Farming system approach (based on FADN)	Presence and extent of HNV farming systems. Indicators on the extent of HNV farmland. Indicators on the pressure from farming on HNV farmland.	Presence and extent of HNV farming systems. Indicators on the extent of HNV farmland. Indicators on the pressure from farming on HNV farmland.	- Not applicable
Species and habitats approach	Predicted occurrence of the habitats of key farmland species. Indicative maps.	Predicted occurrence of the habitats of key farmland species. Indicative maps.	Species and habitats distribution maps show relationship to other approaches and help identify other types of farmland.

In the work carried out by Andersen *et al*. (2003) the potential HNV farmland has been identified according to the combined minimum CORINE Land Cover selection and FADN based minimum estimates. Although useful for a general impression of the potential distribution of high nature value farmland, these maps needed revisions using updated and more detailed data, and refinements on the basis of national data sets. For this reason JRC and EEA have carried out in the period 2005-2007 a revision of the part of the methodology based on land cover, which has lead to the preparation of a new EU map.

Even though CORINE is the best source of land cover data available at EU level, it is clear that the use of CORINE land-cover categories as a means of potentially locating High Nature Value Farmland has limitations. One of these is that the minimum estimate tends to underrepresent Type 2 high nature value farmland (for example some bocage landscapes in north-western France).

The land cover approach is useful for identifying the potential location of HNV farmland, or at least where a higher or lower probability of HNV farmland occurs. The strength of the land cover approach is its potential to highlight areas where HNV farmland may be occurring and thereby it also provides a means of targeting any future validation more accurately. However, it cannot be used to assess the intensity of the farming systems or management practices occurring in the identified areas, or even whether the Land Cover categories mapped are presently under agricultural management at all (e.g. the CORINE categories “pastures” and “non-irrigated arable land” do not distinguish between intensive and extensively managed types).

The strength of the farming systems approach (using FADN) is that it relates to the management practices of the farms. This means that the approach can help understand the management needs of High Nature Value farmland and support the identification of further potential HNV areas. In monitoring terms this means that the farming system approach can be used to give indications on the pressure from farming in relation to nature values, and that it can be a tool for designing and assessing relevant policy initiatives. Data from the Farm Accountancy Data Network (FADN) have been tested by Andersen *et al*. (2003) for this purpose because, firstly, FADN contains a broad set of data that enable links to environmental aspects. In particular, it contains data on farm area, stocking and input levels - all-important if intensity of use is at all related to HNV. Secondly, FADN contains data at the individual farms level, enabling the grouping of farms on the basis of a range of variables. Finally, FADN is updated regularly, which enhances its usefulness for monitoring purposes.

The conclusions of the study show that, although the FADN database is very extensive, its use imposes restrictions on the outcome. The most important limitation is that the sample farms that occur in FADN might not represent all HNV farming systems well. Due to the elimination of small farms, when compared to the data in the Farm Structure Survey (FSS), the total FADN represents 52% of the farms and 86% of the Utilised Agricultural Area in EU-15.

This varies from Ireland, where only 12% of the farms and 4% of the Utilised Agricultural Area are not included, to Austria, where 58% of the farms and 38% of the Utilised Agricultural Area are not represented. It is important to stress that economically small and 'non-professional' farms may in fact be physically large and provide a full-time activity, particularly in marginal areas where the land has low productivity but alternative employment is scarce.

Lastly, a major weakness of FADN is that its largest data collection unit is the Utilised Agricultural Area (UAA), *not* the area presently occupied by the agricultural business. Seasonal lets (common in some countries, such as Ireland) or wintering/summering arrangements, as well as the use of common land and the grazing of fallows, are excluded from consideration. Due to the sampling methodology, maps can only be produced at NUTS2.

1.4 Objectives

The existence of a wide range of predominantly low intensity farming systems, of value for the rural environment, has been recognised for more than a decade. However, studies focus on very specific

farming systems such as the Mediterranean dehesas and montados, steppe areas of Eastern Europe, extensively grazed uplands in the United Kingdom or alpine meadows and pasture. There is a lack of data on the precise distribution, character and evolution of the farmland and farming systems under study. The current mapping exercises at EU level provide a general overview and do not allow for detailed and quantified geographical analysis, and furthermore they do not provide information on farming systems.

This study is structured in the following sections:

- revision of the state of the art, at the European level, of the definition / concept of High Nature Value farmland.
- testing, based on the farm system approach and on statistical survey variables (or combination of variables) of the possibility to characterise HNV farms with a better resolution than the one provided by FADN. The scope is to improve the FADN method, in particular the management intensity aspect of the farm (and its pastures / grasslands) and the livestock density. The possibility is considered that a combined approach using FSS + FADN is necessary. This is verified, together with the resolution of the statistical data to be used (aggregated or individual farm data).
- comparison of the European approach based on land cover information with the available ground level biodiversity data (animal species atlases, botanical surveys, semi-natural grassland surveys, Natura 2000, CORINE Biotopes, EUNIS databases, Important Bird Area, Regional or National parks info etc.), in order to identify where the problems are and to refine and improve the land cover approach.

These methodological developments are tested on France, based on availability and access to national data sets (for France, this implies RGA, RICA, biodiversity ground data such as bird surveys, animal distribution atlases, Natura 2000, Important Bird Area, Regional or National parks...).
Finally, the up-scaling of results to the European level is considered. Data constraints for EU level are analysed and potential solutions sought out.

2 Review of the state of the art at the European level

2.1 State of the art concerning HNV Farmland

The study "Developing a High Nature Value Farming area indicator" (*Andersen et al*, 2003) provides the first attempt for a harmonised identification and mapping of HNV farmland at EU level.

This project has yielded different results:

- a first definition of High Nature Value Farmland
- a first typology of HNV farmland (3 types)
- a first typology of HNV farming systems in Europe (6 types) based on FADN data
- a first European map at the regional scale, showing the share of Utilised Agricultural Area managed by HNV farming systems with a minimum and a maximum approach, based on FADN data
- a European map of potential HNV farmland according to CORINE, with a minimum and a maximum land cover categories re-selection
- two maps based on a bird system approach, to identify habitats linked to HNV farmland with two indicators (breeding birds indicator of farmland habitats, and bird species under conservation associated with farmland)

The CLC approach was later refined by JRC, EEA and expert advice. A new map was produced using:

- The new CLC 2000
- Altitude
- ESCAPE (Expert System for Constraints to Agricultural Production in Europe) data base for a proxy on intensity of pastures management
- Environmental zones
- Natura 2000
- Important Bird Areas (provided by Birdlife International)
- Prime Butterfly Areas (provided by De Vlindersticking)
- national biodiversity datasets

A common characteristic of the above mentioned approaches is the reference to the regional level: regions defined by FADN or Environmental zones defined for CLC. The reasons for this choice are that threshold values (i.e. for livestock density) are different due to varying ecological conditions (i.e. grasslands biomass production) and the representativeness of HNV farm types is different in each region.

Presently, the land cover approach gives the most accurate picture of where the higher probabilities of finding HNV farmland in Europe are. The map can be refined with GIS data from national biological sites of interest, but a weakness remains in the difficulty to discriminate the intensity of management, and the possibility to link the map with farm systems and characterise HNV farms.

The FADN approach has provided a first typology and description of HNV farms, which can be used for further work. Its main weakness concerns the precision of the map produced. This approach, in fact, does not allow a sufficiently precise localisation of HNV farmland, for two main reasons: data are made available on large scale units (NUTS2 or similar) and in total the FADN sample represents 52% of the farms and 86% of the Utilised Agricultural Area (UAA) in EU-15, therefore sample farms which occur in FADN might not represent all HNV farming systems well, due to the elimination of farms which are too small in economic terms and therefore not included in the census, but which are at the same time extremely important for HNV areas, being mostly under extensive management. Furthermore seasonal lets and wintering/summering arrangements, as well as the use of common land and grazing of fallows, are excluded from consideration.

The bird species approach can only be used to verify the underlying assumptions of the other approaches. The bird approach contributes to validate HNV areas produced by the FSA in terms of biodiversity.

2.1.1 Assumptions, definitions and concepts

The **Farm System Approach (FSA) based on FSS data** is tested in France, since FSS can provide data for each farm, commercial and non-commercial, and a large quantity of information concerning the farm system (size, land use, animals) and practices (stocking densities, irrigation, drainage, use of common land) which can be used as indicators.
With this information, indicators at the scale of the municipality can be produced with a weighting based on UAA. Based on these indicators a map at NUTS 5 can be drawn and implemented with other data provided at NUTS 4 or 3.

The FSA can be considered as a complementary approach of the CLC approach.

FSA is a consistent way to describe and assess the dominant farm systems in HNV areas. Furthermore, the FSA approach can provide relevant information for the application of the concept of HNV Farmland and the targeting of specific policies (LFA, agri-environmental measures, Leader etc).

In particular, HNV grasslands or other types of land with high levels of biodiversity, and landscape elements (such as hedges or traditional orchards), are always managed at the farm level. The area managed by a farm often consists of parcels with and without high natural value. Farms consisting entirely of HNV parcels are very rare in Europe. The dehesa farm system is a good example, but it is only located in the dry regions of the south of Spain and Portugal. Extensively grazed mountain pastures or steppe areas with transhumance maintain very large HNV areas, but these systems often need to purchase grain or fodder for the cattle.

Parcels with high nature value such as wet grasslands, moorlands, dry grasslands, traditional orchards or fallow land cover only a part of the farm UAA. They are generally grazed. The fodder (winter feed) and the grain for animal feed, as well as the straw, are produced on more intensively managed lands with low nature value.

Landscape elements such as hedges, ponds, traditional orchards, trees, stonewalls, terraces, can be included in more intensive parcels. However, they contribute to the maintenance of high level of biodiversity if their density is sufficient (more than 10% of the UAA).

Low input farming systems can be considered as a privileged solution to maintaining high nature value agricultural habitats:

- Extensive practices (late cutting, grazing, transhumance, low stocking density, low fertilizer input, no use of pesticides) have a central role in conserving biodiversity.
- A relevant number of raptors species (especially vultures) needs large extensive grazing areas to survive and not only specific habitats
- The low level of pesticides use maintains the food chain and preserves water quality and biodiversity

But the sustainability of these low input farms depends of the farm's income. Low input costs and the quality of the products can contribute to this income, which can be increased with the processing of farm products, if local industrial plants (slaughterhouses, dairy industries, meals) exist. Subsidies such as LFA payments, Extensification Payment Scheme or AEM also contribute to the farm viability.

HNV farms must directly and indirectly preserve natural resources (soil, water, biodiversity), both locally and abroad (in case of imported feedstuff such as soy beans from Brazil or Argentina). In this perspective the economic viability of the farm is a crucial point in maintaining low levels of input.

❖ **Conclusions**

HNV farmland characterisation should consider:

- The sustainability of the farm (net value added of the farm, incomes, farmers' age, input levels, autonomy of the farm system).

- The size of the area, to ensure the maintenance of local industrial plants.
- The low input farming systems which manage, use and preserve a minimum HNV habitats.
- The income level, to preserve agricultural land against land abandonment and afforestation.

HNV farmland areas are generally based on low input farming systems, which allow for the protection of natural resources and preserve biodiversity. **A minimum size of such area is necessary to preserve both the farming systems and biodiversity**. The farm income is the key point to preserve HNV farmland areas from abandonment, afforestation, intensification or artificialisation.

3 The national approach in France

3.1 "Farm System Approach based on FSS" - Summary

The French FSS (Enquête Structure) provides the data for the national approach for HNV mapping called "Farm System Approach". In a first stage relevant variables were selected, the "crop diversity and share of permanent grassland" indicator was calculated and thresholds defined. This first part provides results at NUTS5. In a second stage the crop diversity and share of permanent grassland indicator was analysed together with data sets from other surveys (see table 2) to build "the landscape elements" and "the extensive crops and grasslands" indicators. In a third stage these three indicators were weighted to calculate a final score and draw maps. HNV farm systems and areas (Step 4) were characterised by fixing a minimum threshold for the HNV score, then the results were crossed with other data to analyse and to crosscheck the results (Step 5). The methodology is presented in figure1.

The FSS approach is a farming system approach that takes into account the whole farm, with the total agricultural area and all its components.

The methodology is based on the calculation of a score of intensity management, weighted per hectare, in order to get a result for every municipality.

The score system allows trying different thresholds and testing various scenarios of HNV area. In this study **HNV areas are limited to the first 25% of the best municipality scores**. This threshold can be modified once results have been compared with biodiversity indicators.

The results of the HNV farming project (Andersen, 2003) gave a first initial estimate of the agricultural surface managed by the HNV farming system. This surface varies between 3 and 10% (FADN Approach) and 11% and 72% (CLC approach).

Table 2 : Share of UAA managed by HNV farming systems, from Andersen 2003*

	CLC approach		**FADN approach**	
	Maximum	Minimum	Maximum	Minimum
Southern Europe	91.5	37	38.7	17.9
Southern France	86.2	25.4	9	1.4
Western Europe and Scandinavia	58.3	18.3	20.8	10.7
Northern France	63.3	2	10	2.8
Weighted average France	71.8	10.7	9.9	2.6

** UAA estimate is 37.5 millions ha for the CLC approach, 21.3 for the FADN approach, and 27.7 using the French Survey (Statistiques agricoles annuelles, 2004).*

In the present study farm systems are characterised according to (see chapter 3.2.2): UAA, farm size, farm practices, grassland management, type of animals, landraces, off-farm grazing and input levels using FADN data.

The HNV area identified has been overlaid to other data sets, such as Vulnerable Zones, Mineral Water Sources, LFA, municipalities with farms producing under Protected Designation of Origin, Animal Compensatory Payments and, especially, the Extensification Payment Scheme, intensive practices (such as irrigation and drainage) and bird indicators.

Table 3 : Overview of information used to characterise HNV in France

Survey	Statistical variables	Administrative Scale and year	Relevant indicators
FSS 2000	Crops and grasslands, farm ponds, farms having common pastures	"commune", 2000	Crop diversity, % of permanent grassland/UAA, number of farms with fishing ponds, surface of common lands
FSS 2000 "specific regional questions"	Traditional orchards	"commune", 2000 (see table11)	Number of traditional apple, chestnut, walnut and olive trees
Agricultural Annual Survey 2000	Common land	Department, 2000	Surface of common land per department, grain yields
National Forest Survey (IFN)	Forest borders and hedges	"Department", 1985-2004 (one survey per "department" every 12 years)	Length of borders and hedges /UAA
Grassland survey	Grassland management of productive grasslands	Small grassland region, 1998	Nitrogen units/ha of grassland, % of unfertilised grassland
Regional data	Traditional orchards	Communes	Number of traditional apple trees

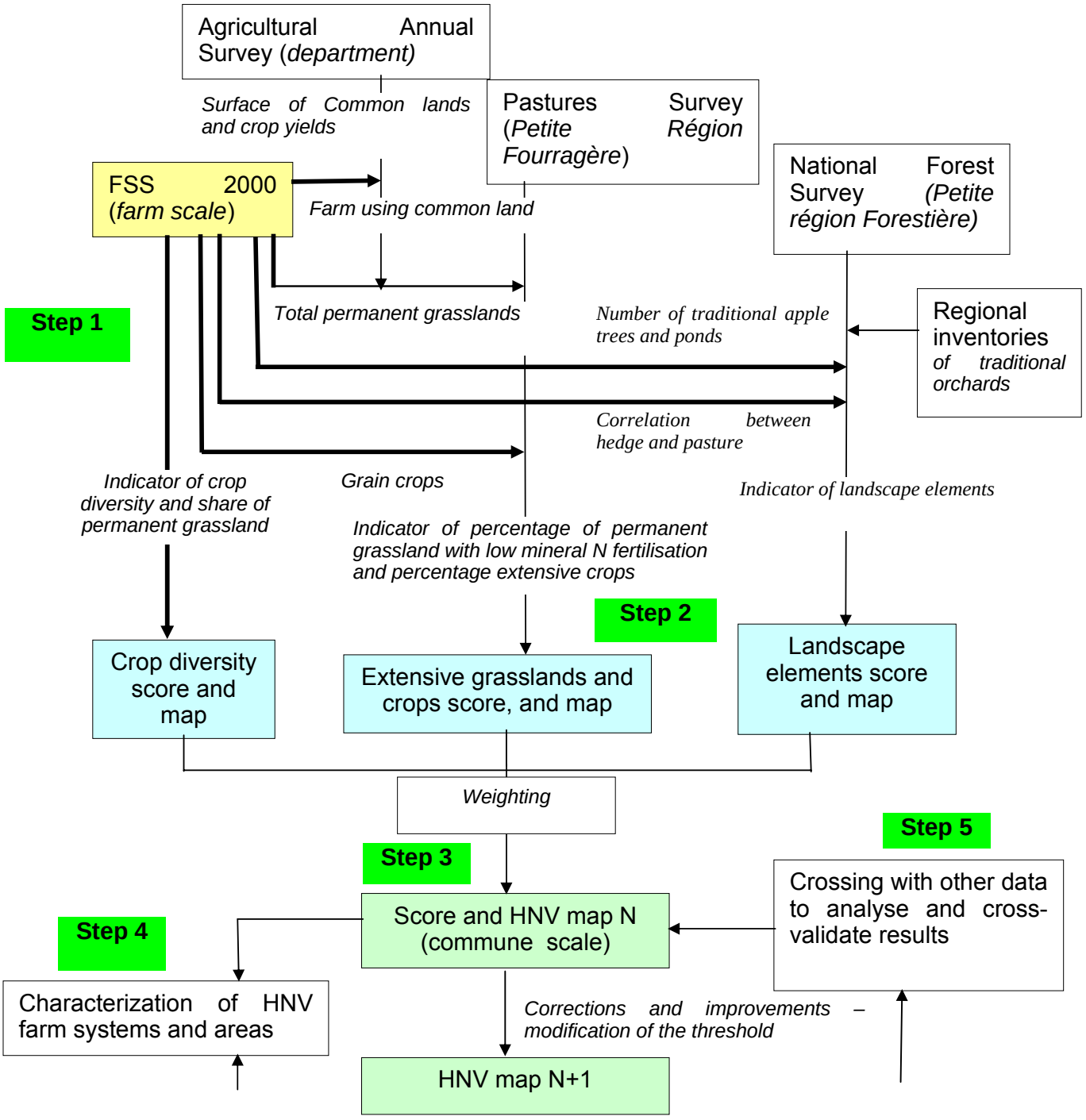


Figure 1 : Presentation of the Farm System Approach

3.1.1 Definition of indicators used to map out the data

A set of three indicators is identified:

- Indicator 1 : “Diversity of crops” with a maximum value of 10 points
- Indicator 2 : “Extensive practices” with a maximum value of 5 points
- Indicator 3 : “Landscape elements” with a maximum value of 5 points

The minimum score is 1 (the score of the indicator “diversity of crops” can not be smaller than 1), and the maximum score is 20.

Indicator 1 takes into account the sustainability of agriculture and the maintenance of grasslands. Large rotations prevent pesticide use and their negative impact on biodiversity.

Indicator 2 takes into account agricultural practices and their level of intensity using two variables: the level of mineral nitrogen fertilization of grasslands and the yields of cereals.

Indicator 3 takes into account the landscape elements in the agricultural areas and managed by agriculture. These semi-natural habitats are considered to be very important for the fauna and flora (refuges, food etc).

Indicator 1 is based on very accurate data at the municipality level, and allows discriminating intensive from extensive farmlands. For this reason, a higher weighting was given to it.

3.1.2 Indicator 1 : “Diversity of crops”

This indicator is calculated with FSS data. Common pastures are not taken into account in the calculation of the indicator. It shows, at the municipality level (weighting of the farm scores), the diversity of crops and the presence of pasture. This indicator is a proxy for the rotation system, and allows a first approach to the diversity of landscape. Longer rotations are indicative of less intensive agriculture and allow a reduction of pesticide use.

The score is calculated for each farm (660 000 farms in France) with a weighting (taking into account the UAA surface of the farm) at the scale of the municipality.

To simplify the calculation, some crops have been grouped (see table 4).

The equation is as follows:

$I1 = 10 + ((1-C1/UAA*10))+(1-(C2/UAA*10))+\ldots$

Where C1 is a crop covering a surface larger than 10% of UAA, other than temporary and permanent grasslands

The value of the indicator ranges from 1 to 10.

Example 1 : total UAA 100 ha, out of which 50 ha of grassland, 25 ha of wheat, 20 ha of sunflower and 5 ha of peas
I1 = 10 + (1-25/100*10) + (1-20/100*10) = 10 –1.5-1 = 7.5

Example 2 : total UAA 100 ha, out of which 35 ha of grassland, 25 ha of wheat, 15 ha of sunflower, 5 ha of rapeseed, 5 ha of sugar beet and 10 ha of rye
I1 = 10 –1.5-0.5 = 7

Example 3 : total surface 100 ha, out of which 100 ha of maize
I1 = 10+(1-10) =1

Example 4 : total surface 100 ha, out of which 100 ha of grassland or 10 crops covering 10 ha each
I1 = 10 + 0 = 10

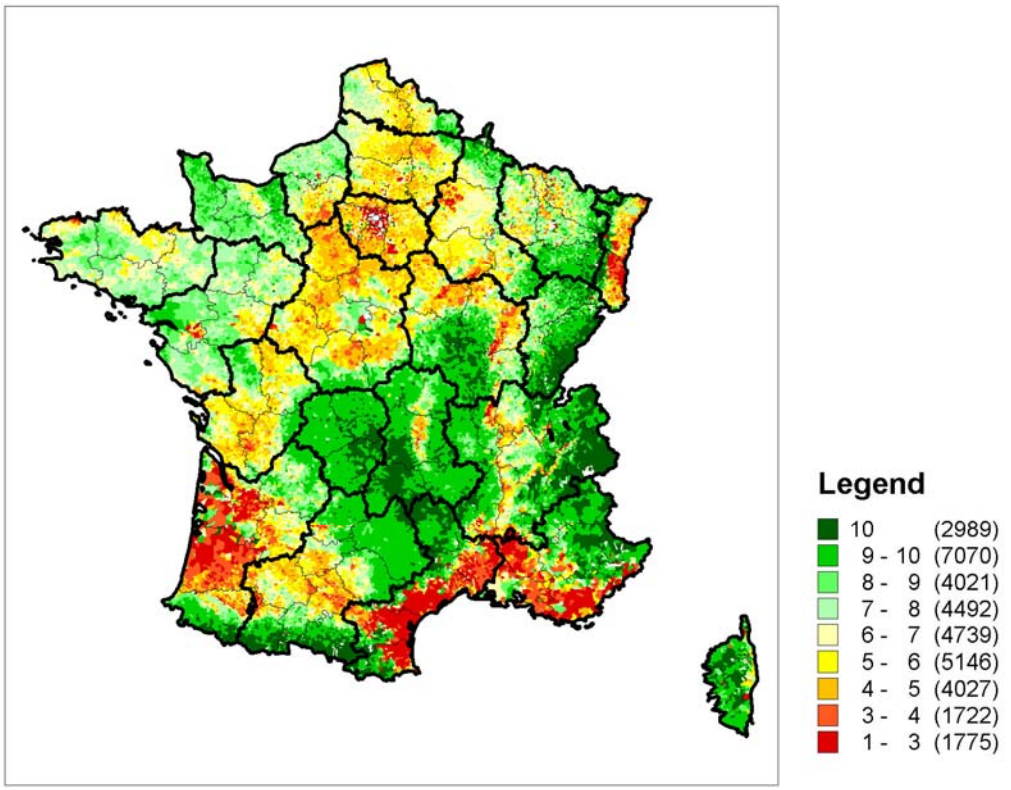
Table 4 : Aggregation of the crops surveyed in FSS

Common and durum wheat	Peas
Barley	Broad beans
Maize for grain, maize for seeds and green maize	Other legumes and dry vegetables
Oats	Other root crops
Triticale	Other annual forages
Rye	Potatoes
Sorghum	Fresh vegetables
Other grains	Floriculture
Sugar beet	Vineyard
Rapeseed	Fruit production (apple, pear, plum, cherry, peach, apricot trees only)
Sun flower	Others fruit trees and nurseries
Soy beans	Fallow land
Other industrial crops	

- **Results**

Map 1 shows the indicator “crop diversity and share of permanent grasslands” for France, with regions with short rotations or monoculture (maize or vineyard) in red, and regions dominated by grasslands in green.
Final results for France are :

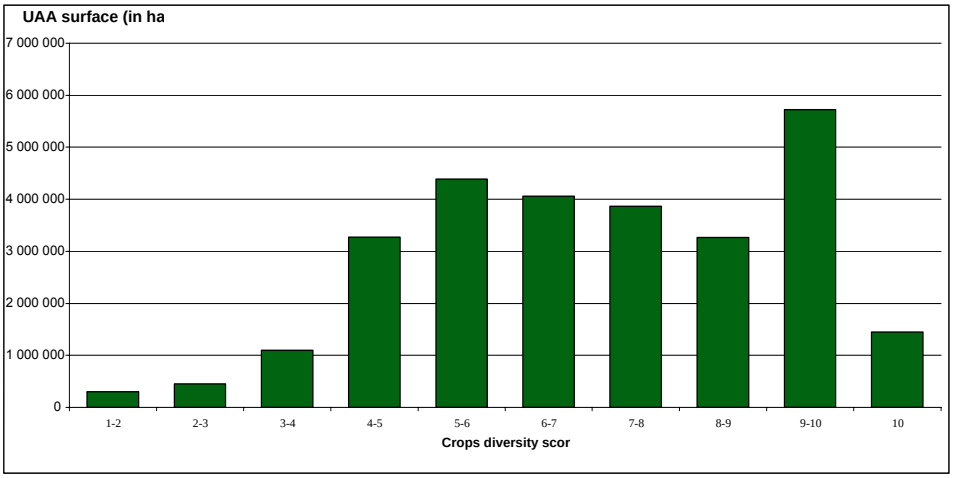
- 6.46 points - average of farm scores
- 7.02 points - average of farm scores weighted with the farm UAA.



Map 1 : Indicator 'Diversity of crops and share of permanent grassland' by municipality, France, 2000.

Figure 2 presents the results per class.

Figure 2 : Crop diversity and share of permanent grassland score distribution



3.1.3 Indicator 2 : "Extensive practices"

- **General considerations and data availability**

Extensive practices are considered as favourable to biodiversity. There are, though, no specific data available on agricultural practices at the European scale. The only information available concerns organic farming and irrigation.

However, low intensity management can be indirectly estimated with **FSS data**:

- Low stocking density
- High percentage of permanent grasslands (including rough grasslands and use of common lands)
- Absence of pigs and poultry
- Presence of landraces
- Non irrigated and non drained areas
- Presence of crops which can be considered as extensive (oats, alfalfa and other fodder legumes)
- Absence of crops which can be considered as intensive (maize, sugar beet, industrial crops)
- Fallow land and particularly fallow land with no subsidies

Other data, such as crop yields and milk production per cow, are also directly linked to extensive or intensive practices.

The presence of high power machines (four-wheel tractors) is not considered a good indicator of more intensive farming practices. This indicator is more linked to farm size and also to the possibility of starting a cooperative, furthermore, some farms can also use external services.

Few data concerning permanent crop practices are available. Concerning fruit production, it is necessary to discriminate dry extensive productions (a large part of the olive trees, traditional chestnut trees, traditional apple trees for cider or alcohol). “Traditional” fruit production can be identified with variables such as:

- Low input levels compared to intensified productions
- Yields (for example 1T of olives in an extensive managed olive plantation, compared to 5T in an intensive managed one)
- Non irrigated
- Use of traditional varieties (no hybrids, as for chestnut trees)
- Low density (less than 100 trees per ha)
- Grassland under trees, generally grazed

Traditional apple orchards (“pré-verger”) are assumed to be part of the permanent grassland surface. Consequently, the surface of orchards is not taken into account.

In the present study olive plantations, traditional chestnut plantations, isolated walnut trees and “pré-verger” are listed among the landscape elements.

Few data are available concerning vineyards. The definition of extensive management is difficult, it may include organic production, low level of pesticide use, low yields, terraces, association with others crops, but at the moment not enough information and data are available to include vineyards in the calculation of this indicator.

In France there are three specific surveys concerning agricultural practices: The ”Grasslands” Survey (1998) –see Appendix 2--, the “Agricultural Practices of the Main Crops “ (1994 and 2001) and the “Fruit Productions” survey (1997 and 2003). All three supply data on mineral fertilization and other practices (number of pesticide treatments).

Table 5 lists available data for modelling land intensity management.

FADN can also provide relevant indicators for professional farms (see chapter 3.2.5) but only at the regional scale and for representative farm systems of the region.

Table 5 : Available variables linked with the intensity level of agricultural practices

Variables	Survey	Extensive practices	Semi-extensive practices	Semi-Intensive practices	Intensive practices	Used in the French approach	Used in the Walloon approach	Remarks
Stocking densities	FSS	Below 1%	1 to 1.4%	1.4 to 1.8%	More than 1.8%	no	yes	Soil fertility and rainfall must be taken into account
Percentage of permanent grassland	FSS	More than 80% of fodder surface	50 to 80%	20 to 50%	Less than 20%	yes	yes	
Common land use	French FSS	yes	Yes or no	Yes or no	no	yes	no	
Pig and poultry farms	FSS	Only extensive pig production (dehesa)	same + some pigs and poultry to upgrade by-products	maximum size with animal feed produced on the farm	Specialized farming with imported animal feed	no	yes	Important to calculate the N organic pressure indicator
Irrigated areas	FSS	No (or only flooding traditional irrigation of grassland in mountains)	no	Some specific crops	More than 10% UAA	To be validated	no	
Oats, mixed crops, alfalfa and other fodder legumes	FSS	More than 20% UAA	10 to 20%	0 to 10%	No	yes	no	crops can be defined by country
maize, sugar beet and other roots	FSS	no	Only fodder roots	1 to 10% UAA	More than 10%	no	no	crops can be defined by country
Fallow land (fallow land without any subsidies)	FSS	More than 10% of arable land	5 to 10%	0 to 5%	no	no	no	Only in crop systems
crop yields (wheat, barley and rye)	Annual agricultural statistics	Less than 5T (wheat)	5 to 6 T	6 to 7 T	More than 7	yes	no	Make an average of more than 3 years
milk production per cow	Annual agricultural statistics	Less than 5000 litres	5000 to 6000	6000 to 8000	More than 8000	no	no	Make an average of more than 3 years
Mineral N fertilization on permanent grassland	French Grassland Survey	0 to 50 N units	50 to 100 N units	100 to 150 N units	More than 150 N units	Yes	no	
Number of pesticide treatments	French survey of agricultural practices	Less than 0.5/haUAA	0.5 to 1/ha UAA	1 to 5/ha UAA	More than 5	no	no	

b) "Extensive (rough) permanent grasslands"

In the presented methodology only extensive permanent grasslands and extensive grain crops were considered. Grasslands cover, in France, 13 million hectares (44% of UAA). Grassland productivity is strongly linked to pedo-climatic conditions :

- soil fertility
- annual rainfall distribution and climate

The most suitable conditions are in North-West France (Brittany, Normandy, Picardy).

Grassland typology and surfaces can be estimated in France with two different surveys (see tables 6 and 7).

Table 6 : Grassland typology and surfaces in France

Type of grassland	Surface in Ha	% of UAA
Annual fodders*	12,000	0.0
Cultivated legume grasslands	328,000	1.1
Temporary grasslands	2,050,000	7.0
Productive permanent grasslands	8,461,000	28.8
Permanent grasslands with traditional orchards	151,000	0.5
Summer grasslands	700,000	2.4
Extensive permanent grasslands	1,150,000	3.9
Total	**12,840,000**	**43.7**

Source : TERUTI, 2000

** without green maize, green sorghum and green rape*

Table 7 : Grassland typology and surfaces in France

Type of grassland	Surface in Ha	% of UAA
Annual fodders*	322,000	1.1
Cultivated legume grasslands	436,000	1.5
Temporary grasslands	2,283,000	7.7
Productive permanent grasslands	7,952,000	26.8
Permanent grasslands with traditional orchards		
Summer grasslands		
Extensive permanent grasslands	2,435,000	8.2
Total	**13,428,000**	**45.2**

** without green maize, green sorghum and green rape*

Source : Statistiques agricoles annuelles, 1999

The Grassland Survey of 1998 (cf Appendix 2) is a sample survey concerning only **productive grasslands** based on TERUTI 1997 Survey (French LUCAS). The survey includes 8643 parcels in 200 so–called "small grassland regions" (average 250,000 Ha).

This survey excluded pastures located in Mediterranean areas. It can be assumed that permanent pastures in these areas are generally not fertilised.
Grasslands are divided in 3 categories: permanent grasslands, temporary grasslands and cultivated legume grasslands.

Neither extensive grasslands (low productivity grasslands) nor common pastures are taken into account in the grassland survey.

Three types of information were used:

- percentage of permanent grasslands
- Nitrogen mineral fertilization of permanent productive grasslands
- percentage of unfertilised parcels

considering that :

- neither the grasslands yield nor the number of cuts are the best indicators of intensity management

- only permanent grasslands can be considered as potential HNV grasslands.

This indicator is calculated with Grassland Survey data crossed with FSS data (permanent grassland surfaces) and common pasture surfaces.

Estimate and location of common pasture surfaces

The French FSS 2000 contained the question "*do you use common pasture*?".
In the Agricultural Annual Statistic there is an estimate of the common pasture surface for each department.
In order to estimate the surface of common pasture by municipality, the common pasture surface of the department was divided by the number of farms in the municipality, which have declared using common pastures. This surface was limited to the size of the municipality minus UAA. The estimate of hectares of common pasture and other lands not owned by farmers in France is 1 843 000 Ha. With this assumption 1,351,000 Ha of this surface were allocated. The difference corresponds in part to land belonging to non-farmer owners.

Management of summer pastures in France

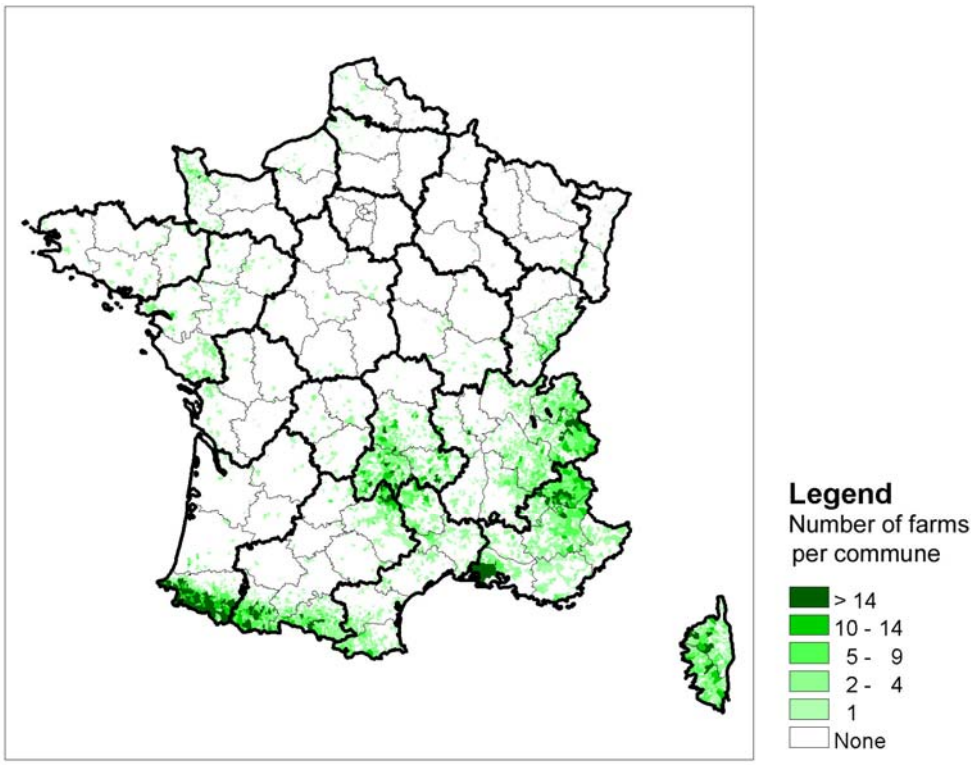
Summer pastures can be considered as extensively managed with no or very limited use of chemicals. The stocking densities vary from 0,15 (the Southern Alps or Corsica) to 1 (Cantal, Basque Pyrenees) depending on the productivity of the pasture. Stocking densities are calculated by dividing the LU present on the 15th of July, by the surface of summer pastures.

The case of the **Cantal summer pastures**. The Cantal summer pastures cover 58 000 Ha (1,511 entities with an average size of 38 Ha, distributed over 109 municipalities and used by 2,323 farmers). 97,000 cows - mainly of the Salers landrace- and 5,000 sheep occupy these summer pastures during 150 days (from the beginning of May to the end of September) with a LU on the 15th of July of **1.03 per Ha**. The status of these summer pastures is particular, compared to the others, which have a ratio of private ownership of 80% (which means these pastures are included in the UAA).

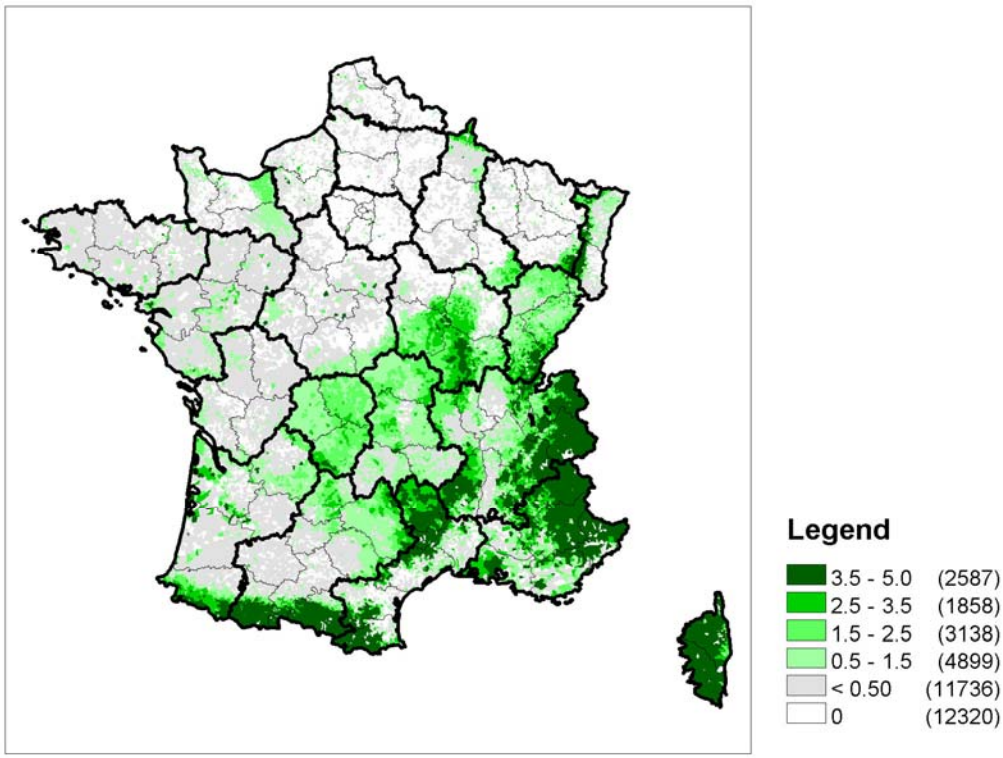
The case of **the Southern Alps** : common pastures cover 732,000 Ha of the Provence-Alpes-Côte d'Azur Region. The average length of summer pasture is 90 days in high altitudes and 130 days in lower altitudes. There are mainly occupied by sheep (545,000 sheep and 24,000 cows). 5 % received mineral fertilizers. The LU on the 15th of July is **0.15 per Ha.**

Case of **Corsica :** common pastures cover 126 990 Ha in Corsica occupied by cows (20,000), sheep (37,000), goats (21,000) and pigs (10,000). The LU at the 15th o July is **0.13 per Ha.**

Map 2 shows the location of farms using common lands and map 3 the location of the extensive permanent grasslands.



Map 2 : Location of farms using common lands by municipality in France



Map 3 : Location of extensive permanent grasslands by municipality in France

❖ **Conclusion concerning grasslands and permanent crops**

- Only permanent grasslands, including common grasslands, with an N mineral fertilization below 50 N units, are taken into account. Linear weighting is used to integrate the level of fertilization (from 0 for 50 N units, to 1 for zero N units). Extensive permanent grasslands and common grasslands are assumed not to receive any N mineral fertilization.

c) Extensive grain crops

Extensive crop management does not really happen in France. With a higher use of inputs (mineral fertilizers, pesticides, seeds, irrigation, drainage, high power machines , dryers...), crop yields have continuously increased (see table 8).

Extensive grains are limited in France to some areas in the southeast and mainly in mixed farms, due to unfavourable conditions (poor soils, low rainfall). Grains are generally used to feed cattle. Only 2% of the wheat surface can be considered as extensively managed in France 5 (see table 9).

Table 8 : Yield evolution of the main crops in France between 1990 and 2000

Culture	Yield 1990 (in T/Ha)	Yield 2000 (in T/Ha)	Evolution 1990/2000
Grain maize	6.0	8.9	+48%
Wheat	6.6	7.2	+9%
Durum wheat	3.7	4.7	+27%
Barley	5.7	6.1	+7%
Triticale	4.3	5.0	+16%
Oats	3.9	4.5	+15%

The following crops were excluded from extensive management : grain maize, green maize, rice, protein crops, potatoes, sugar beets and industrial crops

❖ **Conclusion concerning extensively managed crops**

Only extensive managed crops are taken into account to calculate the second sub-indicator.

The following have been considered as extensively managed crops :
- wheat, barley and triticale, with departmental average yields under 30% of the national average
- all surfaces of oats, rye, other grains and mixed grains
- all surfaces of legume fodders (alfalfa etc.)

The result sums up to 750,000 Ha (see table 9) corresponding to 4 % of the total arable land. Most of these extensive managed crops are located in the mountain areas and in the Mediterranean zone.

Table 9 : Surfaces considered as extensive managed crops in France

Crop	Average yield 1999/2000/2001	Maximum yield for extensive management	Total surface of the crop (in Ha)	Extensive managed crops (in Ha)	% of extensive managed crops
Durum wheat	4.7 T/ha	3.3 T/ha	338, 586	13,389	4%
Wheat	7.2 T/ha	5.0 T/ha	4,806, 507	99, 707	2 %
Barley	6.1 T/ha	4.3 T/ha	1,521, 928	60,184	14%
Triticale	5.0 T/ha	3.5 T/ha	241,159	536	0%
Others grains buckwheat) and mixed grains	2.5 T/ha	1.8 T/ha	64,819	60,819	100%
Aot			101,393	101,393	100%
Rye			30,481	30,481	100%
Legume Fodder			379,781	379,781	100%
Total			7,574,664	750, 288	10%

d) Calculation of the indicator "Extensive practices"

Permanent crops are not taken into account for the calculation of the indicator.
The indicator value depends on the percentage of agricultural surface with permanent grasslands, weighted by the level of nitrogen mineral fertilization, and the extensively managed crops. A minimum percentage of permanent grasslands has been fixed, corresponding to 10% of the UAA.

The equation, to be calculated at municipality level is :

I2 = 5*(level of mineral fertilization under 50 U * surface of productive permanent grasslands)/(UAA + common pastures) + 5*(low productive permanent grasslands + common grasslands)/(UAA + common pastures) +5 (extensive managed crops)/(UAA)

Example 1 : productive permanent grasslands under 10% of UAA or only temporary grassland or only productive grassland with a mineral nitrogen fertilisation larger than 50 U
I2 = 0

Example 2 : UAA with only non fertilised permanent grasslands, and/or low productive permanent grasslands, and/or common pastures, and/or only extensive managed crops
I2 = 5

Example 3 : only crops extensively managed and covering 100% of the UAA
I2 = 5

Example 4 : only productive permanent grasslands with a mineral fertilization of 25U
I2 = 5*0,5 = 2.5

Example 5 : 20% of permanent grasslands with 25U fertilisation + 40% of extensive permanent grasslands + 20% of extensive cereal crops + 20% of other crops (maize, fruit treesetc.)
I2 = (0.2*0.5*5) + (0.4*5)+(0.2*5) = 0.5 + 2 + 1 = 3.5

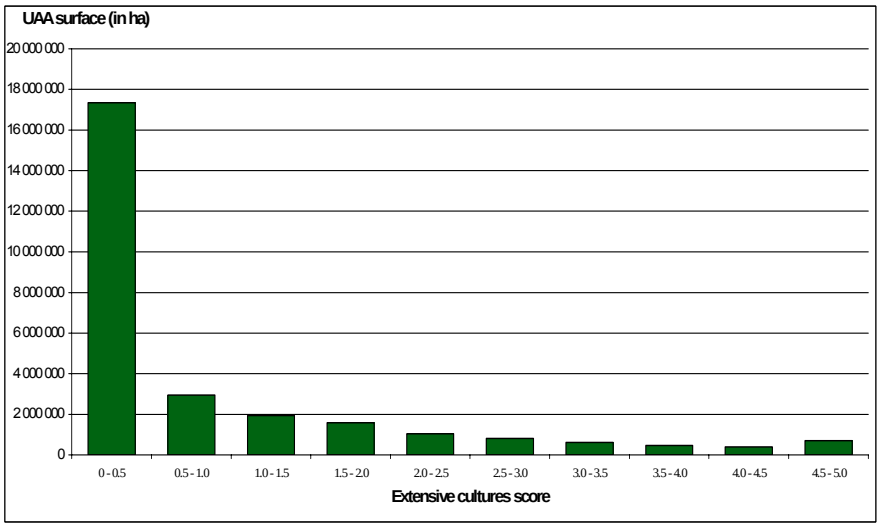


Figure 3 : Extensive Practices Score Distribution

Figure 3 shows that only few parts of the agricultural surface obtained a good score for the indicator "extensive practices".

3.1.4 Indicator 3 : "landscape elements"

The French surveys FSS and IFN, as well as specific regional surveys, provide four types of information :

a) number of traditional fruit trees (apple trees, pear trees, chestnut trees, walnut trees and olive trees) for the most important regions
b) length of hedges
c) length of wood edges
d) number of farm ponds

An indicator has been elaborated that takes into account these four landscape elements.

a) Traditional fruit trees

The TERUTI Survey estimated the surface of "pré-verger" to 146 000 Ha in 2002 (0.52% of the UAA).

Different factors can be used to define traditional fruit trees or traditional orchards

- trees are widely spaced
- the trunk of the tree is taller than 1.8 meter
- the average age is more than 50 years
- traditional varieties (and generally several varieties) are found in the parcel
- the soil is covered with grass and can be grazed (the "pré-verger" system of Normandy or Asturias)
- parcels are generally not fertilised with mineral fertilisers
- parcels are generally not treated with pesticides
- parcels are not irrigated

The French FSS gave some information on traditional fruit trees and especially on "Regional requests" (see table 10).

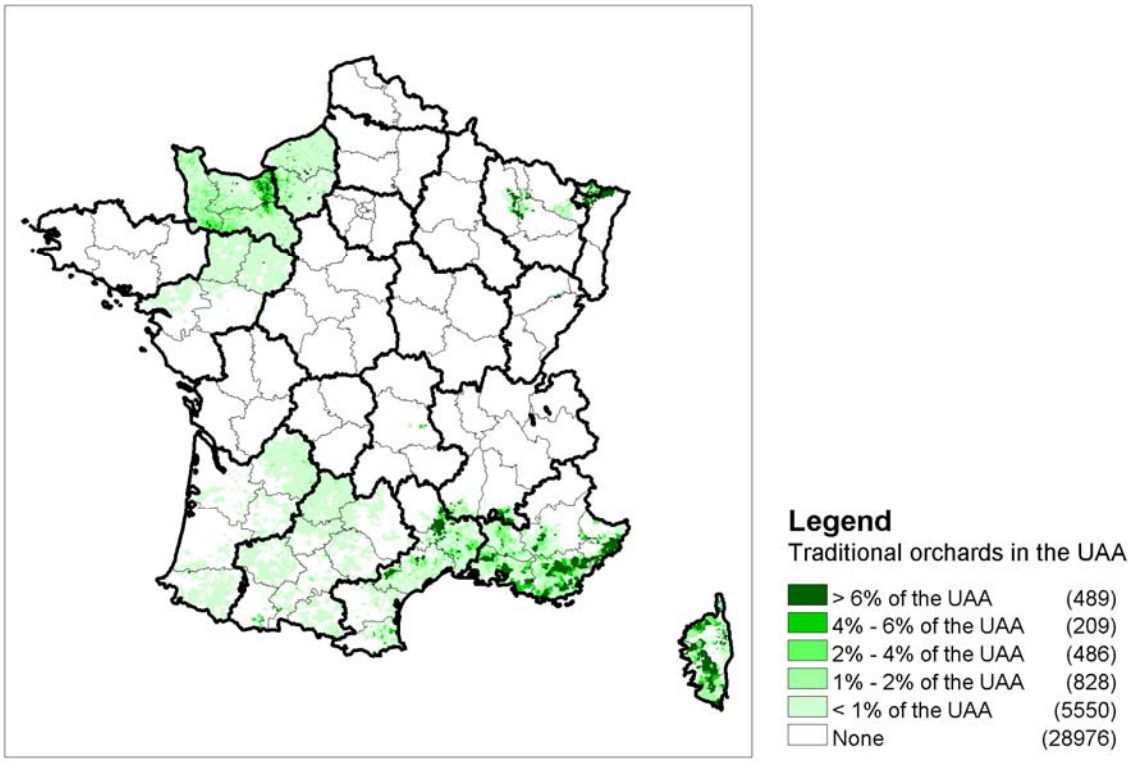
Table 10 : Data on traditional fruit trees from the French FSS 2000

Species	Question	Regions	Units	Remarks
Apple trees, pear trees	Regional Request	Basse-Normandie, Haute Normandie, Pays de Loire	Number of trees	Only traditional orchards. These 3 regions are the most important
Pear trees	Regional Request	Basse-Normandie, Haute Normandie	Number of trees	Only traditional orchards. These 2 regions are the most important
Chestnut trees	Regional Request	Regions of PACA, Languedoc-Roussillon and Corsica	surface	Chestnut orchards are grazed
Walnut trees	Regional Request	Midi-Pyrénées et Aquitaine	Number of trees	Only isolated trees
Olive trees	National Request	France	surface	At present all the olive trees are considered to be managed in an extensive way

These data have been complemented with the specific regional survey of traditional orchards (see table 11).

Table 11 : Local surveys of traditional orchards

Region	Institutions	territory	Unit
Lorraine	Parc naturel régional de Lorraine	Communes of the park	surface
Alsace	Parc Naturel régional des Vosges du Nord	Communes of the park	Number of trees
Alsace and Lorraine	Parc Naturel régional des ballons des Vosges	Communes of the park	Number of trees
Franche-Comté	Commune of Fougerolles	Commune of Fougerolles	Number of trees
Auvergne	Parc Naturel régional du Livradois-Forez	Communes of the park	Number of trees
Midi-Pyrénées	SOLAGRO and CBP	Some communes	Number of trees



Map 4 : Location of traditional orchards by municipality in France

❖ **Calculation of the sub-indicator**

Concerning the traditional fruit trees (pré-verger), the threshold has been set (arbitrarily) to 75 traditional apple trees per hectare. Table 12 presents the calculation of the sub-indicator.

Table 12 : Calculation of the sub-indicator for traditional orchards

% of traditional orchards in the UAA	score
Less than 0,5%	0
0,5% to 1,5 %	0.5
1,5% to 2,5%	1.0
2,5% to 3,5%	1.5
More than 3,5%	2.0

b) Hedges

The length of hedges is provided by the French Forestry Survey (IFN) at the department scale and was disaggregated to the municipality level.

The IFN survey was preferred to TERUTI survey for the following reasons:

- TERUTI is a sample survey and results concerning hedges are provided only at the regional scale
- The IFN survey considers only wooded hedges that are more interesting for biodiversity than bushy hedges of 1 or 2 meters high and wide; these are taken into account by TERUTI.

Concerning hedges it was assumed that, in a department, the density of hedges is related to the land use :

- hedges density is 10 times higher in permanent grasslands than in crops
- hedges density is 5 times higher in temporary grasslands than in crops
- hedges density is 2 times higher in legume forages than in crops

The width of hedges has been considered equal to 10 meters, in order to transform the length of hedges (IFN data) into a surface.

c) Wood edges

The length of wood edges is provided by the French Forestry Survey (IFN) at the department scale. Also in this case the width of edges is considered to be equal to 10 meters and data were disaggregated to the municipality level.

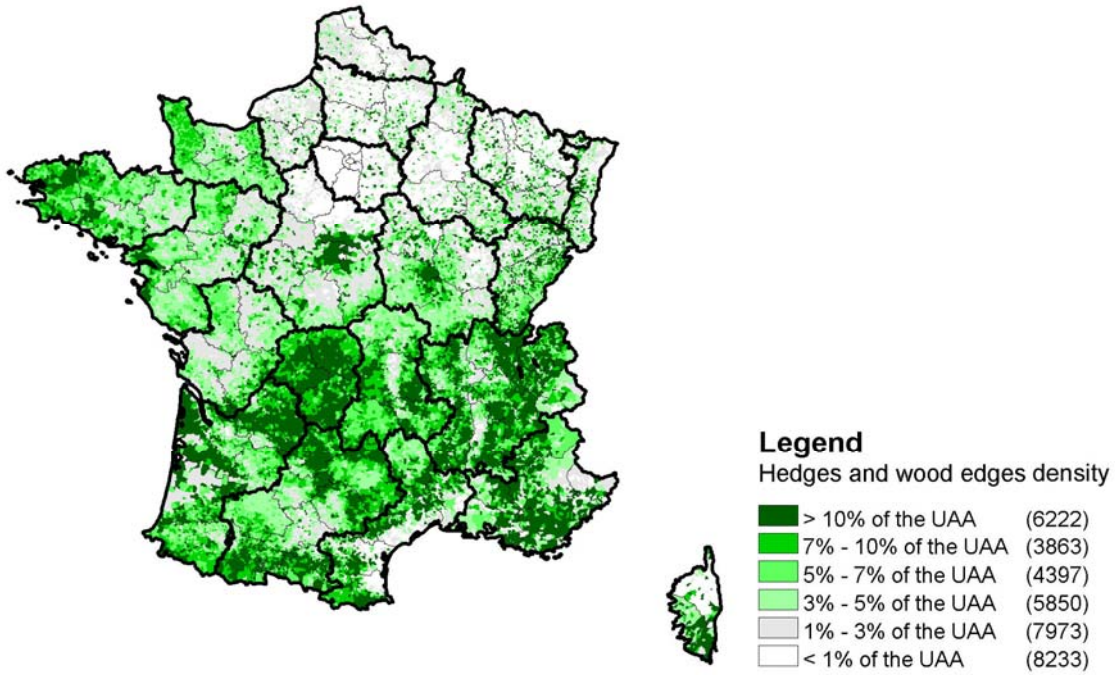
The length of edges can also be eventually calculated at a more precise scale because all data are geo-referenced.

- **Calculation of the sub-indicator**

Table 13 presents the calculation of the sub-indicator and map 5 presents the results.

Table 13 : Calculation of the score for hedges and edges

Surface of hedges and edges/UAA	Score
Less than 4% of UAA	0
More than 14% of UAA	5
Between 4 and 14%	Linear evolution



Map 5 : Hedges and wood borders density by municipality in France

d) Ponds

Concerning ponds, the data on fishponds in each farm included in the French FSS have been used. 1345 farms declare to own fish ponds in France, though this situation is likely to be underestimated (other ponds not declared as fishponds, private ponds included in farmland etc.).

However, the number and surface of the ponds is not known, nor management intensity. Notwithstanding, these data have been considered valuable, since most of these farms are located in Natura2000 areas, such as Sologne, Dombes, Brenne and Armagnac, where the high biological interest due to the presence of ponds is recognised.

Table 14 presents the calculation of the sub-indicator.

Table 14 : Calculation of the sub-indicator for ponds

Number of farms which have a fish pond, by municipality	Score
More than 5 farms	5
4 farms	4
3 farms	3
Less than 3 farms	0

The value of Indicator 3 (landscape elements) is given by the sum of the four sub-indicators (traditional fruit trees, hedges, wood edges and ponds). The maximum score of the "landscape elements" indicator is 5.

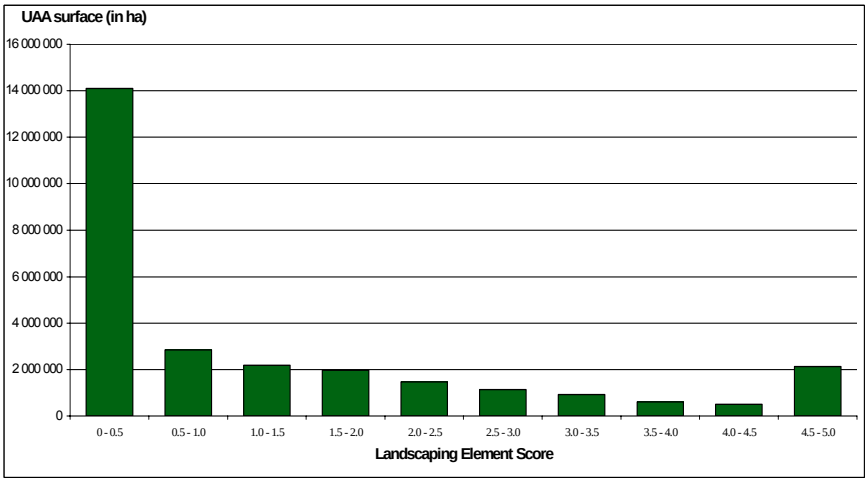


Figure 4 : Landscape Elements Score Distribution

Figure 4 shows that only a small part of agricultural surfaces obtains a good score for the indicator "landscape elements".

3.1.5 Conclusion

What presented above shows the feasibility of the application of FSS data, complemented by other surveys, to derive an indicator on the nature value of farm systems at NUTS5 level.
The methodology is based on the definition and the weighting of three indicators which cover the different aspects of the natural value of a farming system. Some information is still missing, particularly concerning vineyards (3.2% of French UAA), and the breakdown of departmental data (hedges and forest borders) needs to be validated with specific local surveys, nevertheless the methodology is structured in a way that it can be improved if new data become available.

3.2 Results and mapping of the French HNV farmland areas

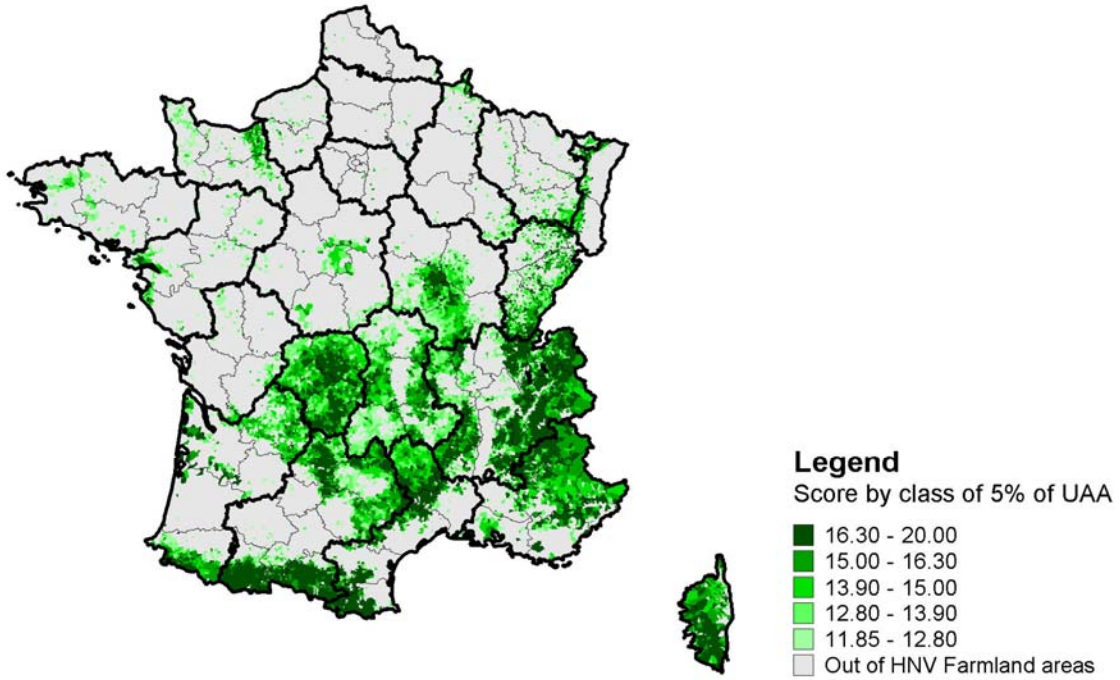
3.2.1 General results

The minimum threshold to qualify as HNV farmland was decided by selecting the 25% percentile best NUTS5 scores. This indicative threshold is taken from the European estimates made during the IRENA operation for the "HNV" indicator (EEA 2005). However, the score system allows establishing alternative thresholds and therefore testing different values or scenarios for identifying the HNV farmland area.
According to this threshold a score higher than 11.85 points characterises farmland with high natural value; this corresponds to 10139 municipalities.

Map 6 and table 15 show HNV farmland areas. The main HNV French regions are : Limousin (97% of UAA), Corsica (88%), Auvergne (62%), Rhône-Alpes (59%), PACA (57%) and Franche-Comté (49%).

Table 15 : HNV farmland index – overview of results

Final Score	UAA (in Ha)	% of the UAA	Cumulated percentage of the UAA	Number of municipalities	% of the municipalities
19-20	216,658	0.8%	0.8%	621	1.7%
18-19	253,107	0.9%	1.7%	580	1.6%
17-18	419,102	1.5%	3.2%	868	2,4%
16-17	812,101	2.9%	6.1%	1,244	3.5%
15-16	1,011,621	3.6%	9.7%	1,519	4.2%
14-15	1,289,763	4.6%	14.4%	1,645	4.6%
13-14	1,353,304	4.9%	19.2%	1,654	4.6%
12-13	1,405,281	5.0%	24.3%	1,744	4.8%
11-12	1,659,127	6.0%	30.2%	1,898	5.3%
10-11	1,707,083	6.1%	36.4%	2,142	5.9%
9-10	2,164,053	7.8%	44.1%	2,588	7.2%
8-9	2,329,579	8.4%	52.5%	2,829	7.9%
7-8	2,942,880	10.6%	63.1%	3,452	9.6%
6-7	3,112,988	11.2%	74.2%	3,821	10.6%
5-6	3,448,860	12.4%	86.6%	4,111	11.4%
4-5	2,570,135	9.2%	95.8%	3,141	8.7%
3-4	736,048	2.6%	98.5%	1,132	3.1%
2-3	240,586	0.9%	99.3%	529	1.5%
1-2	184,038	0.7%	100.0%	512	1.4%
Total	**27,856,313**	**100.0%**	**100.0%**	**36,027**	**100.0%**



Map 6: HNV Farmland areas – with top 25 percentile threshold (> 11.85)

Figure 5 : UAA distribution by HNV score

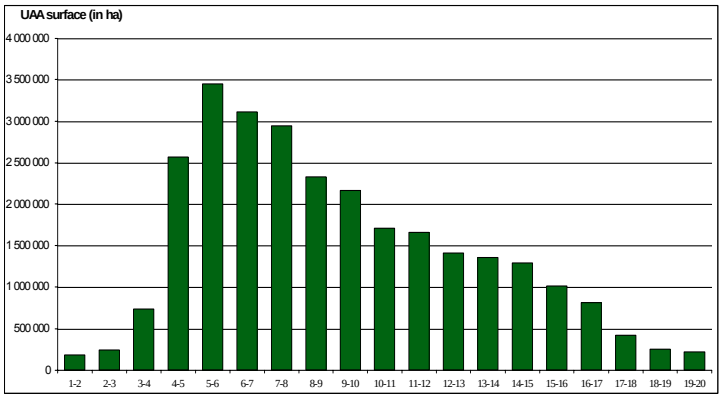


Figure 6 : distribution of the number of municipalities by HNV score

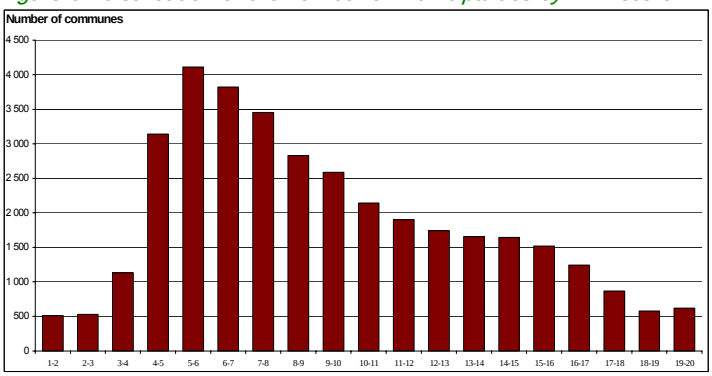


Table 16 shows that the low score categories get their points mainly from the Crop diversity and share of permanent grassland indicator, while the high score categories get half of their points from the two other indicators (extensive practices and landscape elements).

Table 16 : Points Distribution of the score by HNV Categories

Score HNV Classes	Part of the score coming from the indicator "Crops diversity"	Part of the score coming from the indicator "Extensive practices"	Part of the score coming from the indicator "Landscape Elements"
19-20	51%	24%	25%
18-19	53%	22%	25%
17-18	56%	20%	24%
16-17	59%	17%	24%
15-16	62%	17%	21%
14-15	65%	16%	18%
13-14	68%	13%	18%
12-13	71%	11%	17%
11-12	82%	5%	13%
10-11	78%	7%	15%
9-10	74%	9%	17%
8-9	85%	5%	10%
7-8	88%	4%	8%
6-7	91%	3%	6%
5-6	94%	2%	3%
4-5	95%	2%	3%
3-4	92%	3%	5%
2-3	92%	4%	4%
1-2	98%	1%	1%
	75%	**10%**	**15%**

Table 17 shows the surface of HNV by administrative region.

Table 17 : Percentage of HNV Farmland by Administrative Region

Administrative Regions	HNV Area in UAA (ha)	UAA in the region (ha)	HNV/UAA (%)
Alsace	35,182	336,229	10%
Aquitaine	357,809	1,473,396	24%
Auvergne	939,887	1,510,577	62%
Basse-Normandie	254, 601	1,264,133	20%
Bourgogne	694,871	1,775,182	39%
Bretagne	133,185	1,701,566	8%
Centre	130,549	2,365,694	6%
Corse	137,427	155,888	88%
Franche-Comté	330,114	667,674	49%
Haute-Normandie	23,882	794,026	3%
Ile de France	1,267	583,246	0%
Languedoc-Roussillon	447,198	981,459	46%
Limousin	837,285	861,021	97%
Lorraine	79,100	1,132,531	7%
Midi-Pyrénées	945,924	2,361,914	40%
Nord-Pas-de-Calais	5,369	838,166	1%
Pays de la Loire	154,499	2,169,981	7%
Picardie	5,306	1,341,461	0%
Poitou-Charente	101,406	1,761,867	6%
Provence-Alpes-Côte d'Azur	397,461	693,252	57%
Rhône-Alpes	898,445	1,526,724	59%
France	**6,996,146**	**27,856,313**	**25%**

3.2.2 Description of the HNV Farmland areas

On the basis of the results it is possible to establish a first classification of HNV areas (see table 18); identify and name 21 main zones (plus one zone that includes all isolated municipalities); draft a description of the farmland systems of these zones.

Table 18 : The 21 HNV zones

N°	HNV areas	Natural regions	UAA in ha	Number of farms	% of farms
1	Normandie	Pays d'Auge, Cotentin et Bessin	271,589	8,912	5.2%
2	Monts d'Arrée - Bretagne	Monts d'Arrée et Montagne Noire	136,437	3,803	2.2%
3	Sologne	Sologne	30,753	553	0.3%
4	Nord Massif Central	Bourbonnais, Charolais, Autunois, Morvan, Auxois,Combrailles, Boischaut	1,377,575	23,073	13.5%
5	Vosges	montagnes vosgiennes	126,524	3,838	2.2%
6	Limousin	Limousin, Périgord	862,792	22,175	13.0%
7	Marais de l'Ouest	Brouage, Marais Poitevin, Marais Breton, Grande Brière, estuaire de la Seine	87,923	2,416	1.4%
8	Sud Ouest Massif Central	Segala, Montagne Noire, Rouergue	423,979	12,456	7.3%
9	Auvergne Centre-Est	Margeride, Velay, Livradois, Forez, Monts du Lyonnais	659,091	18,073	10.6%
10	Franche-Comté et Pré-Alpes du Nord	Jura et Pré-Alpes du Nord	591,288	15,760	9.2%
11	Cantal	Cantal	186,003	3,364	2.1%
12	Alpes du Nord	Montagnes de Savoie et Haute Savoie	153,908	5,170	3.0%
13	Provence-Alpes du sud	Provence, Crau , Camargue, Baronnies, Vercors, Mercantour, Ubaye	526,925	12,150	7.1%
14	Grands Causses	Grands Causses, Monts de Lacaune	266,196	3,511	2.1%
15	Aubrac	Aubrac	203,635	3,003	1.8%
16	Cévennes	Ardèche, Cévennes, Haut Vivarais	135,171	3,722	2.2%
17	Causse du Quercy	Causse du Quercy	80,344	1,816	1.1%
18	Pyrénées centrales et Orientales	Pyrénées, Corbières	297,223	10,123	5.9%
19	Montagnes basques	Montagnes basques	97,276	4,079	2.4%
20	Corse	Montagne corse	137,427	2,913	1.7%
21	Ardennes	Montage ardennaise	36,016	691	0.4%
0	Other		301,671	9,288	5.4%
	Total		**6,989,745**	**171,159**	**100.0%**

Each zone can be characterised by:

- its size : agricultural surface and number of municipalities
- presence of small natural areas
- farm types (animal type and landrace, type of grassland and grassland management, other crops included in the rotation, landscape elements)

- main bird species in the zone (species listed in Annex 1 of the Bird Directive)
- other information (input level etc.)

Furthermore, eight types of grassland management can be defined and described. In France specific extensive grain areas do not exist (see Table 32 – only 118 HNV municipalities are classified for grain crops). All the grain fields are included in extensive grazing systems:

Type 1 : Mainly permanent productive grasslands with temporary grasslands, associated with hedges (bocage) + arable land
Type 2 : Hay meadows with summer pastures, associated with local transhumance
Type 3 : Winter pastures in Crau associated with summer pastures located in the Alps, with a long distance transhumance
Type 4 : Rough grazing land and pastoralism
Type 5 : Rough grazing in Causse and productive pasture
Type 6 : Hay meadows associated with summer pastures including wood-pastures
Type 7 : Grasslands associated with a high percentage of permanent grassland and traditional orchards
Type 8 : Grasslands associated with salt marshes ("pré-salés") or wetlands.

These categories of grassland management are associated to animal productions and landraces :
- cow milk for cheese production
- sheep milk for cheese production
- sheep
- beef cattle (calf, ox)
- mixed animal farms

a) Agricultural land use and number of farms

171000 farms (26% of the total) manage 25% of UAA classed in HVN plus 1 million hectares of common lands.

Table 19 : Share of commercial and non-commercial farms (FSS 2000)

	HNV municipalities	Non HNV municipalities	Difference HNV / non HNV
Number of non commercial farms	78,262	191,844	
% of non-commercial farms	45%	39%	+ 13%
UAA of non commercial farms	758,047	1,532,900	
% of UAA of non commercial farms	11%	7%	+ 36%

Farms can be distinguished in "commercial" and "non-commercial" (see 3.2.5). The share of non-commercial farms in HNV municipalities is higher (45% versus 39%) than in non-HNV municipalities. Furthermore, the non-commercial farms cover 11% of the UAA in HNV areas versus 7% in non-HNV areas.

90% of HNV farmland areas are included in Less Favoured Areas; out of this total, 100% of "High Mountains" LFA and 86% of "Mountains" LFA are located in HNV areas (Table 20). About 85% of LFA "high mountains, mountains and piedmont" are located in HNV areas.

Table 20 : HNV Areas and LFA

Less Favoured areas	% of all Municipalities	% of HNV municipalities	% of the UAA HNV	% of HNV Farms	% of the UAA in HNV areas
Out LFA	55%	11%	10%	13%	4.5%
High mountains	2%	6%	4%	4%	99.8%
Mountains	15%	46%	46%	45%	86.2%
Piedmont	5%	13%	13%	13%	77.1%
Other Less Favoured areas	23%	25%	28%	24%	27.1%
All LFA	**45%**	**89%**	**90%**	**87%**	**51.4%**
TOTAL	100%	100%	100%	100%	

Table 21 shows that 86% of the agricultural surface located above 500 metres is included in HNV areas, but represents only 43% of HNV areas.

Table 21 : HNV Areas and altitude

Average altitude	Total UAA (in Ha)	UAA in HNV areas (in Ha)	% in HNV areas	% of HNV areas
0 - 100 m	6,830,099	407,739	6.0%	5.8%
100 - 250 m	12,224,495	1,093,557	8.9%	15.6%
250 - 500 m	5,328,392	2,511,922	47.1%	35.9%
500 - 800 m	1,801,800	1,483,981	82.4%	21.2%
800-10000 m	782,384	689,197	88.1%	9.9%
>= 1000 m	880,112	809,684	92.0%	11.6%
Total UAA	27,856,313	6,996,146	25.1%	100.0%

Crops associated with the grazing systems listed above cover on average only 15% of the UAA, vineyards and orchards 1.3%, and fallow land 1.2% (see Tables 22 and 23). More in particular:

- Grain (wheat, barley, green maize, triticale, rye and oats) used to feed animals during wintertime and produce straw, in rotation with temporary pastures: these grains are managed with low inputs and cover between 10 and 20% of the UAA. The production is not sufficient to feed animals and farmers have to buy feed, especially for the dairy cattle (see chapter 3.3.2). Some crops are specific of these areas: oats, triticale, rye sorghum, lentil, buckwheat and mixed cereals. Fallow land is important only in Sologne (n.3), where it coincides with abandonment of the land.

- Fruit trees associated with grasslands ("pré-verger"): apple and pear trees in Normandy, prune trees (Mirabelle) in Lorraine, cherry trees and other fruit trees in Vosges and Pyrénées. Such species are not taken into account in the orchard surface, but rather are included in the permanent grassland surface. HNV areas also include olive trees in Mediterranean areas and traditional chestnut trees associated with vineyards in Ardèche. It should be possible to create a specific "HNV Mediterranean system" on the east-south border of the Massif Central and the south-west of the Alps, where extensive grasslands are associated with vineyards, olive trees or chestnut trees and grain (in these HNV areas extensive grazing cattle produce less than 66% of farm income).

Table 22 : Agricultural land use of HNV Farmland areas

Agricultural land use	Total surface (ha)	HNV Area (ha)	% in HNV area	% of the HNV land use
Rough grazing fields	1,404,495	1,211,583	86.3%	17.3%
Productive permanent grassland	6,911,575	3,426,560	49.6%	49.0%
Temporary grassland	2,873,136	985,822	34.3%	14%
Grain crops (wheat, maize, barley, rice...)	9,915,706	735,711	7.4%	10.5%
Aot, triticale, rye, sorghum, other grain	496,309	205,175	41.3%	3%
Industrials crops, rape, sunflower	2,567,515	92,503	3.6%	1%
Protein crops, vegetables, sugar beet, fodder roots, potatoes	912,605	25,947	2.8%	0.4%
Permanent crops (vineyards, orchards...)	1,120,911	87,763	7.8%	1.3%
Fallow land	1,226,698	80,543	6.6%	1.2%
Other (garden)	23,676	7,742	32.7%	0.1%
UAA	27,856,313	6,996,146	25.1%	100.0%
Common land (Non UAA)	1,350,904	1,075,701	89.6%	15%
Number of farms	653,090	171,319	26.2%	

b) Description of the farming systems

Table 23 : Land use of the 21 HNV zones in France

N°	HNV areas	Temporary grasslands and annual fodders	Productive permanent grasslands	Rough grasslands	Common land (*)	Other arable land , vineyards, orchards	Fallow land
1	Normandie	4.3%	72.6%	0.9%	9.4%	20,9%	1,3%
2	Monts d'Arrée - Bretagne	35.1%	19.1%	1.7%	3.7%	40,6%	3,5%
3	Sologne	11.3%	20.6%	3.1%	28.3%	48,8%	16,2%
4	Nord Massif Central	15,4%	66.6%	2.2%	1.8%	15,0%	0,9%
5	Vosges	5.4%	68.2%	7.6%	3.2%	17,7%	1,1%
6	Limousin	24.6%	52.4%	5.5%	3.6%	16,4%	1,0%
7	Marais de l'Ouest	19.2%	53.0%	2.4%	12.0%	22,8%	2,7%
8	Sud Ouest Massif Central	29.0%	38.8%	10.4%	2.2%	20,6%	1,2%
9	Auvergne Centre-Est	12.8%	59.3%	15.8%	4.4%	11,9%	0,2%
10	Franche-Comté et Pré-Alpes du Nord	13.9%	60,3%	7.7%	14.9%	17,3%	0,8%
11	Cantal	17.3%	68.8%	8.4%	0.9%	5,5%	0,0%
12	Alpes du Nord	2.5%	40.2%	52.8%	27.4%	4,4%	0,2%
13	Provence-Alpes du sud	9.6%	13.5%	56.2%	58.0%	18,3%	2,4%
14	Grands Causses	33.4%	15.4%	36.6%	1.1%	14,2%	0,4%
15	Aubrac	11.8%	49.9%	34.4%	2.5%	4,0%	0,0%
16	Cévennes	3.2%	13.0 %	75.6%	12.1%	7,4%	0,4%
17	Causse du Quercy	26.1%	19.8%	38.1%	0.4%	15,0%	1,0%
18	Pyrénées centrales et Orientales	10.2%	43.4%	31.6%	82.8%	13,7%	1,1%
19	Montagnes basques	16.2%	45.9%	28.1%	55.4%	9,6%	0,2%
20	Corse	3.8%	19.3%	70.2%	94.2%	6,4%	0,3%
21	Ardennes	1.0%	74.7%	0.7%	27.8%	22,1%	1,4%
0	Others	15.8%	37.9%	3.8%	8.6%	38,6%	3,8%
	Total	**16.1%**	**49.0%**	**17.3%**	**15.4%**	**16.4%**	**1.1%**

**Concerning common land the result is the % of UAA*

In France **HNV farm systems are mainly grazing systems (63%) and mixed systems (29%); 84% of the grazing livestock type of farms is located in HNV areas (see Table 25).**

Grasslands cover most of these areas, more than 85% if common land is included. 86% of rough grazing fields, 81% of common pastures and 50% of permanent pastures are included in HNV areas.

Table 24 presents the main landraces and animal types by HNV zones.

Table 14 : First description of the selected HNV farmland zones

N°	HNV areas	Farm system type	Landraces
1	Normandie	Mainly grazing dairy cattle and specific grazing sheep on marshland ("Prés-salés") + horses	Normande-43%- (DC)
2	Monts d'Arrée - Bretagne	Grazing beef cattle on temporary grassland	
3	Sologne	Extensive grazing system with sheep. High level of land abandonment.	Solognote (S)
4	Nord Massif Central	Grazing system with cows and some sheep	Charolaise -86%-(MC)+ few numbers of Charollais – 32%-(S)
5	Vosges	Milk cows and other grazing animals	Vosgienne (DC)
6	Limousin	Grazing beef cattle	Limousine- 83%- (MC), Limousin (S)
7	Marais de l'Ouest	Grazing system with sheep or cows	Charolais -34%-
8	Sud Ouest Massif Central	Grazing system with cow and dairy cattle	no specific races
9	Auvergne Centre Est	Grazing dairy cattle and beef cattle	Montbéliarde -43%-(DC), Blanche du Massif central –57%-(S)
10	Franche-Comté et Pré-Alpes du Nord	Grazing dairy cattle system partly with transhumance	Montbéliarde-72%- (DC)
11	Cantal	Grazing dairy cattle and beef cattle with local transhumance	Salers-53%- (MC),
12	Alpes du Nord	Grazing dairy cattle system partly with transhumance	Abondance –51%- (DC), tarantaise –18%-(DC)
13	Provence-Alpes du sud	Grazing system with long distance transhumance of sheep, some extensive grain and aromatic plants	Mérinos d'Arles –35%-(S), Pré-Alpes du sud –32%-(S), Camarguaise (MC)
14	Grands Causses	Milk sheep	Lacaune -90%-(DS),
15	Aubrac	Grazing dairy cattle and beef cattle with transhumance	Aubrac -56%-(MC),
16	Cévennes	sheep, goats	Blanche du Massif central -46%-(S), Noir du Velay
17	Causse du Quercy	Grazing extensive system with sheep	Caussenarde du Lot –58%-(S)
18	Pyrénées centrales et Orientales	Transhumance of sheep and beef cattle	Gasconne (MC) + tarasconnaise -45%- (S)
19	Montagnes basques	Milk sheep with transhumance	Manech à tête rousse-87%-(MS)
20	Corse	Grazing extensive system with sheep, milk sheep, cow and goats	Corse –90%- (S)
21	Ardennes	No data	No data
0	Others	Mixed farms. Grazing system with sheep or cows	no specific races.

** : the percentage is the number of landraces in the HNV area*
DC (dairy cow), MC (meat cow), S (sheep), MS (milk sheep), H (horse)

Table 25 : Distribution of HNV Municipalities by Type of farming

Principal Type of Farming	Number of HNV Communes	% of HNV Communes	% of total French Communes	**% of UAA in HNV Area**
Fieldcrops	118	**1%**	26%	**3%**
Horticulture	77	**1%**	1%	**28%**
Wines	296	**3%**	8%	**13%**
Grazing livestock	6 367	**63%**	26%	**84%**
Granivores	299	**3%**	3%	**27%**
Mixed	2 982	**29%**	36%	**30%**
TOTAL	10 139	**100%**	100%	

Table 26 presents the HNV zones according to grassland types. Type 1 corresponds to the most productive grassland areas (good soils and sufficient rainfalls) excluding mountains areas, with a very low percentage of rough grassland and summer pastures and with arable lands. Types 6, 7, 8 include specific pasture types : "pré-

bois", "prés-vergers" and "pré-salés", all characterised by specific ecological values.

Table 26 : Classification of the HNV areas by type of grassland

Types	Description	% productive grassland and other fodder	% arable land	Common land	Rough grassland	HNV zones
Type 1	Mainly permanent productive grasslands, associated with hedges (bocage).+ arable land	50 to 86%	6 to 40%	2 to 9%	1 to 9 %	1,2,4,5, 6,7, 8, 9, others
Type 2	hay meadows with summer pastures, associated with a local transhumance	43 to 76%	4 to 22%	28% to 83%	1 to 53%	5, 10,11,12, 15, 18,19, 21
Type 3	winter pastures in Crau, associated with summer pastures located in the Alps, with a long distance transhumance	23%	18%	58%	56%	13
Type 4	Rough grazing land and pastoralism	17% to 23%	6 to 7%	12 to 94%	70 to 76%	16, 20
Type 5	Rough grazing on the Causse and productive pasture	46 to 49%	14 to 15%	0 to 1%	37 to 38%	14, 17
Type 6	hay meadows associated with summer pastures "pré-bois"	74%	16%	15%	8%	10
Type 7	grassland associated with a high percentage of permanent grassland and with traditional orchards	77%	21%	9%	1%	1
Type 8	grassland associated with salt marshes ("pré-salés") or wetlands.	72 to77%	21 to 23 %	9 to 12%	1 to 2%	1,7

** in Cantal (11) and Aubrac (15), Jura (10), 80% of common land surfaces are included under "grassland"*

Traditional landraces (see table 27) are the basis for most of the livestock in HNV areas. Some of these landraces are well adapted to transhumance or specific pastures (rough pastures, "pré-salés, "causses").

Table 27 : Number of animals in HNV zones by landrace

Bovine Races	**Total number of animals**	**% of the number of animals in the HNV areas**
Abondance	51,951	95%
Aubrac	95,420	90%
Bretonne pie noire	551	25%
Charolaise	812,866	44%
Gasconne	20,312	87%
Limousine	612,253	67%
Montbéliarde	426,892	62%
Normande	95,207	16%
Pie rouge de l'Est	22,662	37%
Salers	121,906	60%
Tarentaise	12,574	93%
Vosgienne	3,176	80%
Sheep races		
Aure et Campan	11,197	80%
Basco-Béarnaise	67,727	80%
Blanc du Massif Central	300,293	97%
Castillonnaise	3,195	31%
Causse du Lot	106,649	84%
Caussenarde des garrigues	16,693	86%
Charolais	179,685	64%
Corse	73,607	80%
Cotentin	3,121	20%
Lacaune	853,209	73%
Limousin	33,966	89%
Manech tête noire	113,167	94%
Manech tête rousse	241,388	87%
Mérinos d'Arles	225,776	80%
Mourerous	35,257	97%
Noir du Velay	16,325	70%
Préalpes du Sud	219,108	91%
Rava	29,811	89%
Rouge du Roussillon	4,310	64%
Solognote	991	73%
Tarasconnaise	26,797	83%
Thones et Marthod	7,040	94%

The importance of the grazing cattle system can be gauged with the compensatory payments on livestock allocated to HNV farms. HNV farms (26% of French farms and 25% of the UAA) receive 52 % of the total amounts of animal compensatory payments and 62% of the "Extensification Payment Scheme" (see table 28). Therefore it can be assumed that a large majority of the grazing cattle farms received the "Extensification Payment". This means their LU/ha is under 1,4 or between 1,4 and 1,8.

Extensification Payment Scheme for Cattle
Under 1.4 LU/ha : 74.5 €
Between 1.4 and 1.8 LU/ha : 37 €

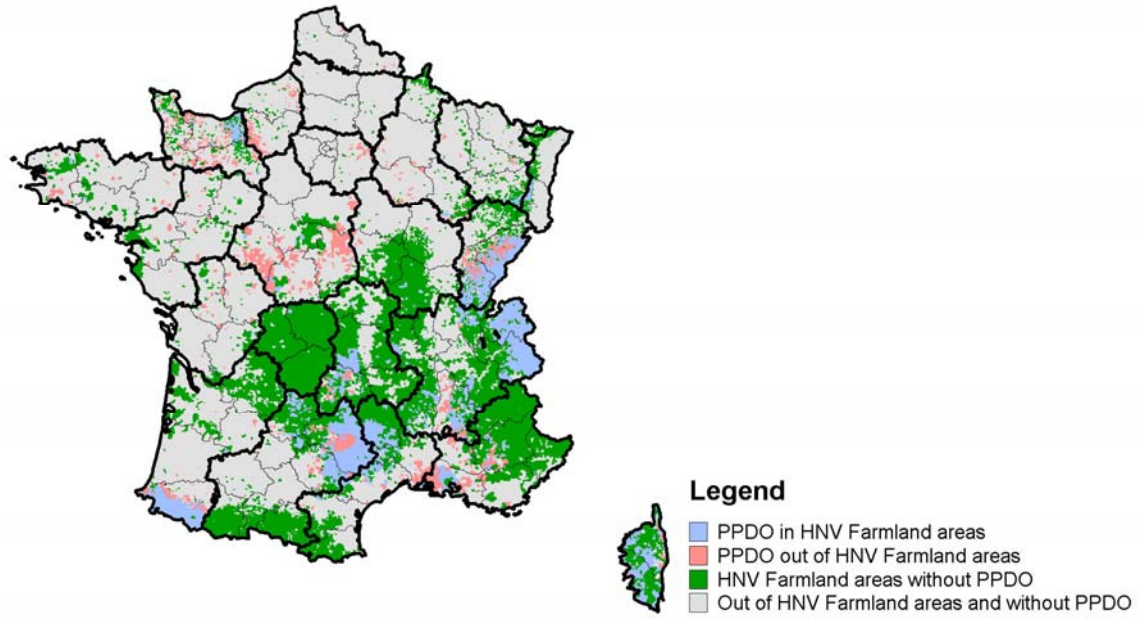
Table 28 : Extensification Payment Scheme for Cattle

	TOTAL FRANCE		TOTAL HNV areas			
	Number of farms	Amount in euros	Number of farms	Amount in euros	% of the farms	% of the amount
Beef Special Premium Scheme (BSPS)	108 341	1 108 143 423	51 723	588 257 124	48%	53%
Extensification Payment Scheme (EPS)	94 264	266 563 947	51 442	164 197 072	55%	62%
Sucker Cow Premium Scheme	96 004	450 643 247	35 128	179 438 835	37%	40%
Sheep Annual Premium Scheme	40 168	132 042 806	25 187	83 686 282	63%	63%
Ē PMR (prime au monde rural) Š to complete Sheep Annual Premium Scheme in LFAČ	31 835	38 655 650	23 449	27 800 133	74%	72%
TOTAL		**1 996 049 074**		**1 043 379 445**		**52%**
	HNV areas	outside HNV areas				
% of the ŅExtensification Payment SchemeÓ related BSPS and SCPC	21,4%	6,6%	3,26			

In some of these grazing systems specific products (cheese, meat, cider, and olive oil) are prepared, which are now recognised under the Protected Designation of Origin (PDO) label. 6% of HNV farms**, which correspond to 72% of the farms producing PDO, manufacture PDO products (excluding wine) (see map 7).**
A part of the PDO products specifications include :

- maintenance of landrace
- maintenance of a minimum of traditional orchards for cider
- ban on silage and maize to feed animals
- restriction of milk production per cow
- restriction of feedstuff per cow
- yield limitation on olive oil

therefore it can be assumed that the presence of PDO products limit in some ways the intensification of the farm system.



Map 7 : Farms with PDO products (wine excluded)

3.2.3 Environmental and nature value of HNV areas

a) Landscape Elements

HNV areas include approximately 50% of the landscape elements (see table 29). The proportion of landscape elements is 3 times higher in HNV areas. Landscape elements occupy 12% of UAA in HNV areas, compared to 3,6% outside HNV areas.

Table 29 : Percentage of landscape elements in HNV areas

	Hedges (in Ha)	Traditional orchards (in Ha)	Wood borders(in Ha)	Number of farms with ponds
Total France	704,965	51,267	694,025	1,345
Total HNV areas	313,260	24,194	362,174	491
% in HNV areas	44%	47%	52%	37%

FSS can also provide some information on natural vegetation (moors and fallow lands) owned by farmers but not included in UAA. HNV farms are characterised by a higher percentage of this type of natural vegetation (see table 30).

Table 30 : Surfaces of moors and fallow lands

	Surfaces of moors and fallow lands owned by farmers in 2000	
	en ha	%
Part of the UAA in HNV areas	203 517	**39%**
Part of the UAA out of HNV areas	313 150	61%
Total	**516 667**	

b) Extensive agricultural practices

These farming systems are extensively managed, and receive low input. The total input of mineral nitrogen is very low and pesticides use is limited to arable crops, vineyards and orchards:

- Rough grassland (17% of UAA), and common pastures (15% of UAA), generally do not receive any chemicals.
- Average N mineral fertilization of permanent productive grasslands is **30kg/ha,** compared to the national average (44 kg/ha)
- 60% of "extensive crops" (low yields) –as defined in 3.1.3 c) - are located in HNV areas
- HNV areas contain few irrigated and drained surfaces compared to non-HNV areas (see table 31). Nevertheless it should be considered that traditional flooding irrigation exists in mountain pastures, which use water streams with no environmental impact.
- 91% of HNV Farmland areas are located in areas outside the Nitrate Vulnerable Zones
- Low stocking density : the majority of the Premium Extensive Scheme Payments goes to HNV farms

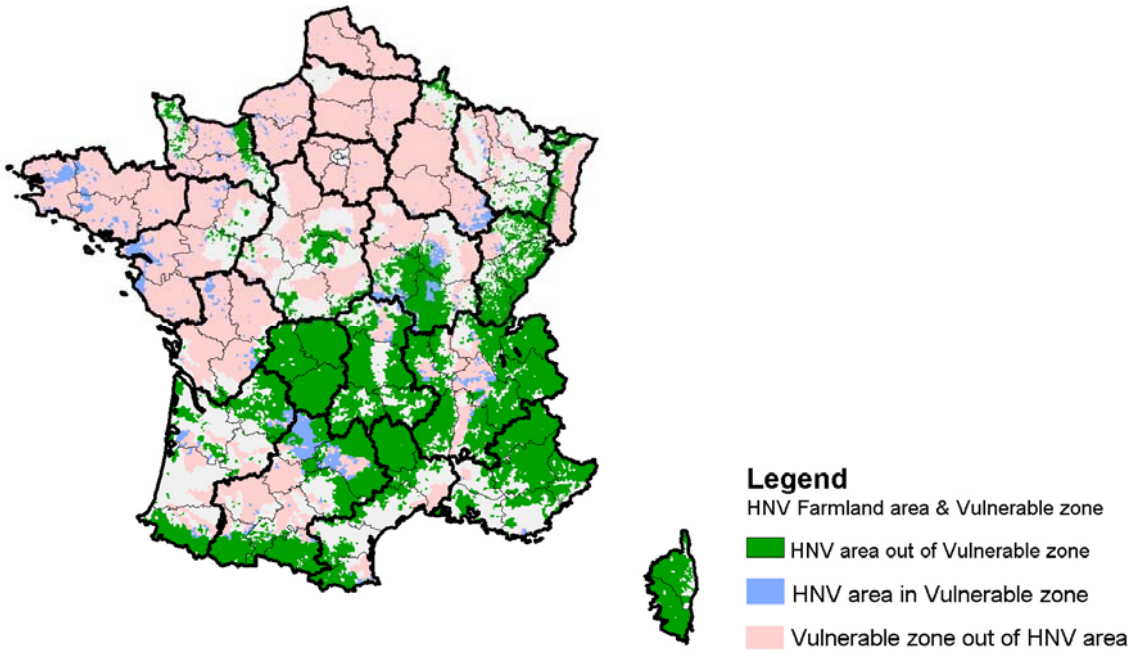
Low input level can also be crosschecked with FADN results (see chapter 3.2.5).

Table 31 : Drainage and irrigation of agricultural surfaces

	Irrigated surfaces		drained surfaces	
	in ha	%	in ha	%
Part of the UAA in HNV areas	127 790	**4%**	257 168	**9%**
Part of the UAA out of HNV areas	2 958 390	96%	2 542 037	91%
Total surface in France in 2000	**3 086 179**		**2 799 205**	

c) Low level of water pollution

Crossing data for HNV Farmland areas with Nitrate Vulnerable zone (see map 8) shows that **91% of HNV farmland areas are outside the vulnerable zones.**



Map 8 : HNV Farmland areas data crossed with Nitrate Vulnerable zones

d) Protected areas and Natura 2000

Table 32 : percentage of areas of natural interest, protected areas and HNV areas

	total surfaces in Km2	Continental surfaces in Km2	surfaces located in HNV areas in Km2	% of the natural area in HNV	coefficient of specificity	% of the HNV area
ZNIEEF 2	118 416	115 171	62 846	55%	1,56	33%
ZNIEEF 1	44 867	43 573	nc			
IBA	47 173	43 233	20 140	47%	1,33	10%
National Park 2003	12 554	12 519	12 415	99%	2,83	6%
Natural Regional Park 2005	68 743	67 922	41 134	61%	1,73	21%
RAMSAR 2004	7 108	6 421	1 433	22%	0,64	1%
Natural Reserves	2 341	1 379	1 117	81%	2,31	1%
Local protection (APB) 2005	1 204	1 187	670	56%	1,61	0%
Natura 2000 (Bird Directive)	45 220	41 884	20 916	50%	1,42	11%
Natura 200 (Habitat Directive)	48 760	42 679	26 205	61%	1,75	14%
France (Continental surfaces)		547 444	**191 845**	35%		

Table 32 shows that HNV areas concentrate between 50 and 60% of areas of natural interest (Natural Areas of Interest for Fauna and Flora - ZNIEFF, IBA, Ramsar) and nature-protected areas (National Parks, Natural Reserves and Natura 2000 areas).

e) Conclusions concerning farming systems in HNV areas

In conclusion, in France the characteristics of HNV farming systems are the following :
- mainly grazing systems
- mainly low input systems
- often include permanent pastures (and common lands)
- mostly located in mountains areas LFA and other LFA types
- use landraces (partially)
- manufacture products under the Protected Designation of Origin label (excluding wine)

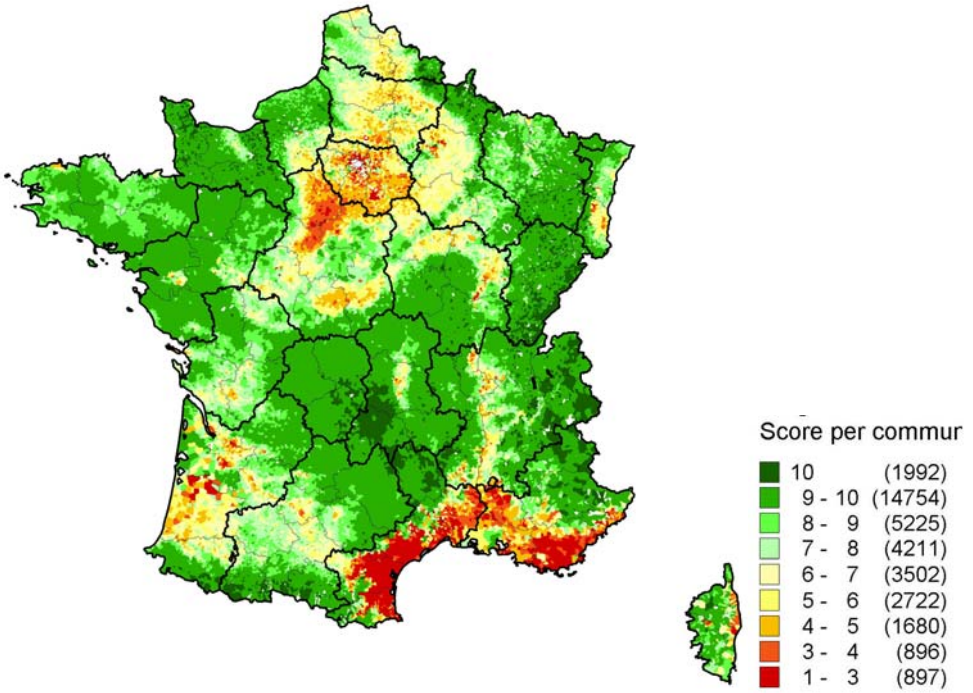
In these areas, ploughing and intensive practices are difficult or expensive. The development of grain and industrial crops isn't possible. Contrarily to the grazing systems of the west of France (except for some parts of Normandy), which have intensified their practices (high percentage of green maize, temporary and annual grass, cereals, high stocking density), the HNV areas have maintained and even increased the share of grasslands and pastures. A part of HNV farms tries to develop quality products (cheeses, meats) using landraces and specific farm systems to maintain their incomes.

Furthermore, it can be assumed that most of arable lands in the plains have been intensified and specialised through:
- fertiliser use
- pesticide use
- irrigation and drainage
- abandonment of mixed systems and implementation of short rotations

Presently, it can be considered that HNV cropping systems do not really exist in France. The main type of HNV farms is **permanent grassland systems with cattle and sheep**.

❖ **Development between 1970 and 2000**

The FSS data base is available starting from 1970, therefore it is possible to calculate and compare results for the indicator "Crop diversity and share of permanent grassland" for 1970 and 2000. Results show that the average HNV score of the municipalities has decreased by 13%.
At the national level, the trend of all the agri-environmental indicators is negative (see table 33). Permanent pastures have lost 4 millions ha.
At the same time, there is an increase of the yield of the main grain crops (+40%), linked to an increase of inputs and the development of irrigation and drainage. Landscape elements have seriously declined.
This evidence shows that HNV farmland areas must have seriously decreased, as shown by comparing map 9 and map 1.



Map 9 : Indicator 'Diversity of crops and share of permanent grassland' by municipality, France, 1970

Table 33 : Evolution of some agro-environmental indicators

	Data sources	Time scale	Year : 1970 or 1980	Year 2000	Evolution in %
Total UAA	Annual statistics	1970-2000	33,039,000 Ha	29,700,000 Ha	-10.1%
Permanent pastures	Annual statistics	1970-2000	13,934,000 Ha	10,086,000 Ha	-27.6%
Indicator "Crops Diversity" (average score by municipality)	FSS	1970-2000	8.03	7.02	-12.5%
Hedges	IFN	1971-1985	1,244,110 Km	707,605 Km	-43%
Traditional orchards	TERUTI	1982-2004	258,500 Ha	149,100 Ha	-42%
N mineral fertilizer	Annual statistics	1970-2000	43 Kg/Ha	78 Kg/Ha	+81%
Pesticides	Annual statistics	1971-2000	23,900 T	90,000 T	+277%
Irrigated surfaces	FSS	1970-2000	539,000 Ha	1,576,000 Ha	+292%
Wheat yield	Annual statistics	1980-2000	5.2 T/Ha	7.3 T/Ha	+39%
Maize yield	Annual statistics	1980-2000	5.3 T/Ha	9.1 T/Ha	+72%
Barley yield	Annual statistics	1980-2000	4.4 T/Ha	6.3 T/Ha	+43%

3.2.4 Using bird data to map HNV areas

This study was undertaken by the Natural History French Museum (F. Jiguet and Y. Bas)

a) Context

Recently, birds have been widely used as indicators of biodiversity loss in European farmland. Especially in France, an indicator constructed to track the abundance variation of 18 farmland bird species was nationally recognised. This indicator shows the strongest decline has happened since 1989 (Fig. 7). Although it seems that these trends are strongly informative, our study isn't based on these variations. Indeed, we only have over-arching and homogeneous bird data since 2001, and this doesn't allow us to obtain robust trends results across different farmland areas. Thus we chose to study the correlations over a specific surface of various static bird indicators and an HNVF indicator.

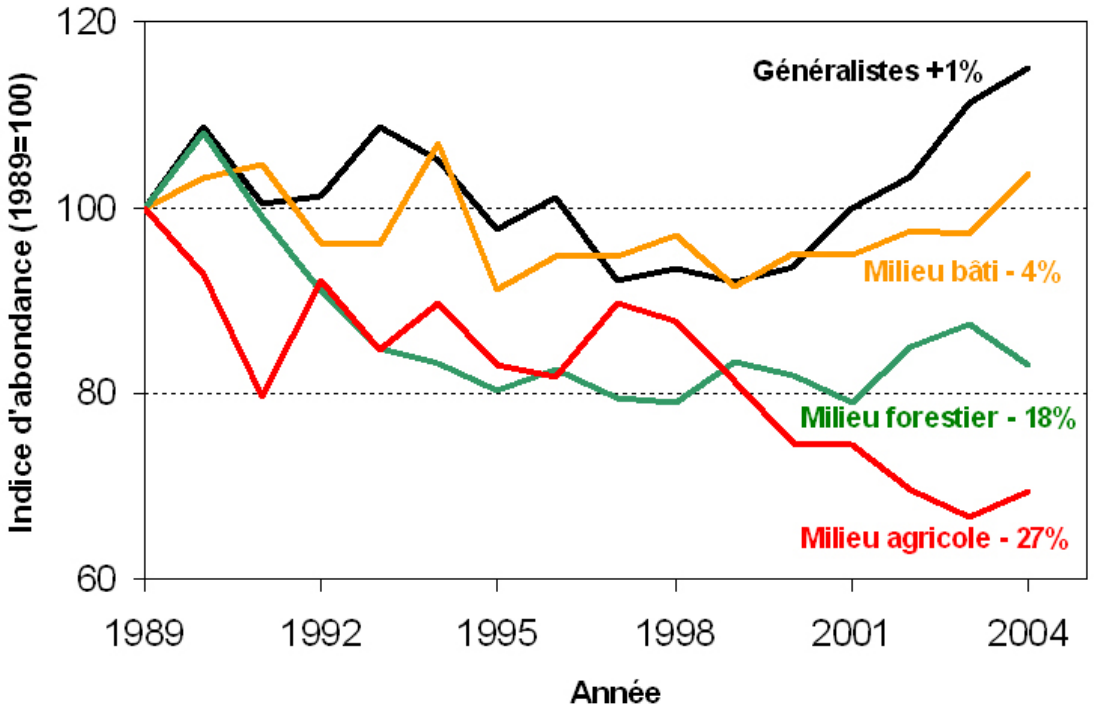


Figure 7 : The four French biodiversity indicators based on abundance variation of predetermined species. Farmland birds are shown in red.

b) Results & Discussion

The methodology of the STOC program is presented in Appendix 4.

Community Indicators

We summarised the results of the three community indicators in Table 34.

Table 34 : Analysis of Bird Community Indicators.

Indicator	HNVF vs. non-HNVF	Linear relationship	Other responses (see also Fig 8)
Total species richness	NS	NS	Optimum around 9
Specialist species richness	NS	Positive (+0.13 species per point)	Increase up to 11; uncertainty for higher values
Community Specialization Index	**+ 8%**	NS	Optimums for highest and lowest values

The second column shows differences between HNVF and non-HNVF squares, the third shows whether significant linear relationships were revealed, and the last describes other responses revealed by quadratic and smooth regressions (NS means non-significant).

Discussion :

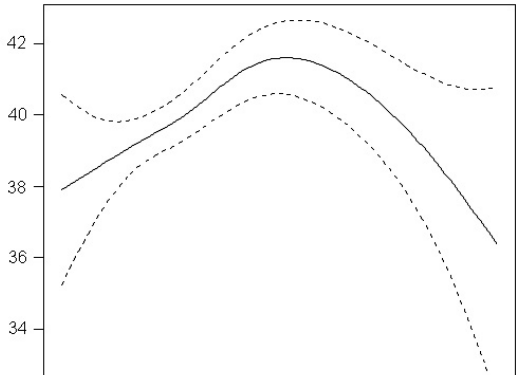
These results show that HNVF are not more species-rich than non-HNVF, but maintain a more particular community with numerous ecologically sensitive species (ex: *Lanius collurio, Emberiza hortulana, Lullula arborea*...). Regressions of bird indicators against the HNVF indicator reveal :

- no positive relationship between the HNVF indicator and total species richness, with particularly low richness for high HNVF indicator scores (Fig. 8a). These high-score sites correspond to extensive farmland mountain sites. Severe climatic conditions explain the low species richness.
- **a positive relationship between the HNVF indicator and specialists species richness** (Fig. 8b)
- a high level of community specialisation for low values of the HNVF indicator. These are explained by over domination of three open-area specialists (*Alauda arvensis, Miliaria calandra and Motacilla flava*) in open field intensive farmland with no trees.
- **high level of community originality** (measured by CSI) **for high HNVF indicator values**, explained by the presence of numerous sensitive species (ex : *Anthus campestris, Lanius colurio, Saxicola rubetra*, etc... see also Table 35)

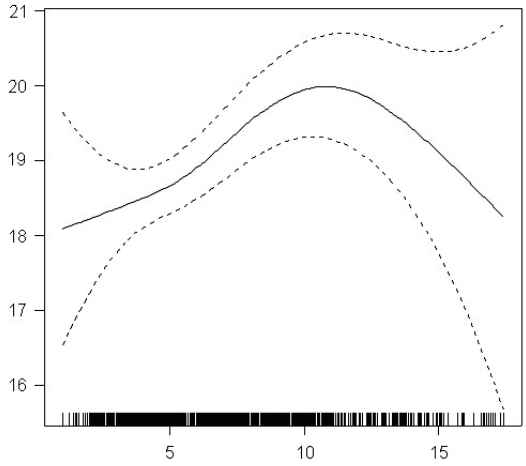
These elements are coherent with the replacement of specialist species by generalist species, in coincidence with agricultural intensification. Moreover, though community bird indicators don't show strong linear relationships with HNVF indicators, the latter seems to be efficient in determining farmlands with high values for bird community conservation.

Figure 8 : Smooth regression of the three community indicators (shown on the left) against the HNVF indicator

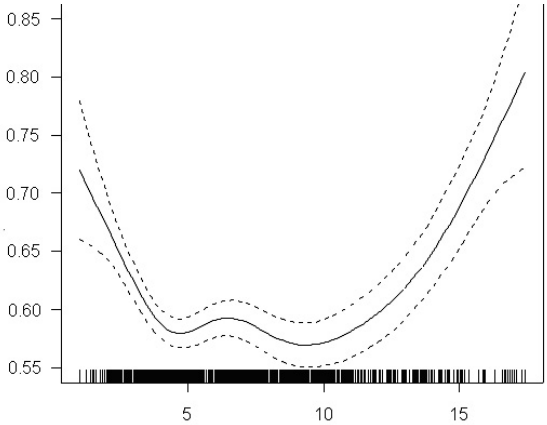
a) Total Species Richness



b) Specialist Species Richness



c) Community Specialization Index



c) Species-by-species evaluation

Table 35 : Assessment of the potential effect of HNVF on bird species conservation, by evaluating the proportion of the national population included in HNVF (HNVF ratio) for each farmland species.

species	HNVF ratio	European Conservation status	European Bird Directive status	Specialist or generalist
Anthus spinoletta	100%	non-SPEC		Specialist
Corvus corax	89%	non-SPEC		Specialist
Milvus milvus	84%	SPEC2	Annex I	Specialist
Oenanthe oenanthe	82%	SPEC3		Specialist
Saxicola rubetra	78%	non-SPEC		Specialist
Phylloscopus bonelli	71%	SPEC2		Specialist
Turdus pilaris	70%	non-SPEC		Specialist
Emberiza cia	62%	SPEC3		Specialist
Anthus campestris	61%	SPEC3	Annex I	Specialist
Lanius collurio	61%	SPEC3	Annex I	Specialist
Circaetus gallicus	56%	SPEC3	Annex I	Specialist
Jynx torquilla	56%	SPEC3		Specialist
Lullula arborea	54%	SPEC2	Annex I	Specialist
Pyrrhula pyrrhula	52%	non-SPEC		Specialist
Sylvia cantillans	51%	non-SPEC		Specialist
Tetrax tetrax	50%	SPEC1	Annex I	Specialist
Anthus trivialis	47%	non-SPEC		Specialist
Turdus viscivorus	47%	non-SPEC		Generalist
Emberiza hortulana	46%	SPEC2	Annex I	Specialist
Acrocephalus palustris	46%	non-SPEC		Specialist
Anthus pratensis	46%	non-SPEC		Specialist
Phoenicurus phoenicurus	45%	SPEC2		Specialist
Buteo buteo	45%	non-SPEC		Specialist
Muscicapa striata	43%	SPEC3		Specialist
Upupa epops	39%	SPEC3		Generalist
Parus major	39%	non-SPEC		Specialist
Falco subbuteo	38%	non-SPEC		Specialist
Sylvia curruca	37%	non-SPEC		Specialist
Motacilla alba	36%	non-SPEC		Specialist
Saxicola torquata	36%	non-SPEC		Specialist
Erithacus rubecula	35%	non-SPEC		Generalist
Fringilla coelebs	35%	non-SPEC		Generalist
Turdus philomelos	35%	non-SPEC		Generalist
Turdus merula	34%	non-SPEC		Generalist
Picus viridis	33%	SPEC2		Generalist
Emberiza citrinella	33%	non-SPEC		Specialist
Lanius senator	32%	SPEC2		Specialist
Coturnix coturnix	32%	SPEC3		Specialist
Sylvia borin	31%	non-SPEC		Specialist
Hirundo rustica	30%	SPEC3		Specialist
Milvus migrans	30%	SPEC3	Annex I	Specialist
Passer montanus	30%	SPEC3		Specialist
Sylvia communis	30%	non-SPEC		Specialist
Corvus corone	29%	non-SPEC		Generalist
Emberiza cirlus	28%	non-SPEC		Generalist
Carduelis carduelis	27%	non-SPEC		Specialist
Hippolais polyglotta	27%	non-SPEC		Specialist
Pica pica	27%	non-SPEC		Specialist
Sylvia undata	25%	SPEC2	Annex I	Specialist

Falco tinnunculus	25%	non-SPEC		Specialist
Sturnus vulgaris	25%	non-SPEC		Generalist
Alectoris rufa	24%	SPEC2		Specialist
Miliaria calandra	24%	SPEC2		Specialist
Burhinus oedicnemus	24%	SPEC3	Annex I	Specialist
Cisticola juncundis	24%	non-SPEC		Specialist
Numenius arquata	22%	SPEC2		Specialist
Streptopelia turtur	22%	SPEC3		Generalist
Circus aeruginosus	22%	non-SPEC	Annex I	Specialist
Circus pygargus	22%	non-SPEC	Annex I	Specialist
Merops apiaster	21%	SPEC3		Specialist
Carduelis chloris	20%	non-SPEC		Specialist
Columba palumbus	20%	non-SPEC		Specialist
Vanellus vanellus	18%	SPEC2		Specialist
Alauda arvensis	18%	SPEC3		Specialist
Corvus frugilegus	18%	non-SPEC		Specialist
Carduelis cannabina	17%	SPEC2		Specialist
Luscinia svecica	15%	non-SPEC	Annex I	Specialist
Galeridus cristatus	14%	SPEC3		Specialist
Motacilla flava	7%	non-SPEC		Specialist
Ciconia ciconia	6%	SPEC2	Annex I	Specialist
Circus cyaneus	6%	SPEC3	Annex I	Specialist
Perdix perdix	1%	SPEC3		Specialist
Mean Total	**37%**			

Table 36 : Number of species by class of relative abundance within HNVF

HNVF ratio	SPEC species	Annex I species	Total species
> 60 %	18%	20%	14%
40-60 %	21%	27%	19%
25-40 %	24%	13%	36%
Total > 25%	**62%**	**60%**	**69%**
15-25 %	26%	20%	22%
< 15 %	12%	20%	8%
Total < 25 %	**38%**	**40%**	**31%**

Discussion:

HNVF retain around 37 % of the national population of farmland species, for only 25 % of the national farmland area. We found particularly contrasting responses for species with unfavourable conservation status (SPEC), with 39% of them well represented in HNVF (> 40 % of national population) and 12 % strongly underrepresented. All of these underrepresented species meet one of the following two criteria: they are crop specialists (ex: *Perdix perdix*) and/or have low altitude preferences (ex: *Vanellus vanellus*).
The difficulty to predict the presence of these species by means of agricultural data is the result of the disappearance of extensive crop systems and the remainder situation of extensive pastures in lowlands.

d) Decomposing the HNVF indicator

Table 37 : Evaluation of the three components of the HNVF indicator

Species	Crop Rotation Diversity	Permanent Pasture Synthetic Fertilisation	Natural Elements	Nesting habits	Farmland habitat
Alauda arvensis	**8%**	10%	**-32%**	ground	annual crops
Carduelis cannabina	**12%**	-12%	**-32%**	ground	generalist
Emberiza citrinella	**19%**	-5%	**-30%**	bush	annual crops and pastures
Lanius collurio	8%	10%	**-24%**	bush	pastures
Lullula arborea	**-13%**	**26%**	14%	tree	pastures and vineyards
Passer montanus	14%	2%	**-67%**	bush	groves and orchards
Phoenicurus phoenicurus	11%	-6%	**107%**	tree	groves
Picus viridis	**-10%**	5%	9%	tree	generalist
Saxicola rubicola	10%	17%	**-64%**	ground	pastures
Upupa epops	-9%	9%	-13%	tree or rocks	pastures
Mean	**5%**	**6%**	**-13%**		

Mean variation of abundance per indicator points are computed in this table. Significant variations are in bold type. The two last columns show the ecological traits of the ten species.

Discussion :
Although there is no consistency of responses among the ten species, Crop Rotation Diversity and Permanent Pasture Inorganic Fertilization show a global positive response, which is independent from climate and habitat factors. On the other hand, the Natural Elements component shows a positive response only for tree nesters. It would be interesting to be able to include other elements apart from tree lines and ponds in this indicator, such as bushes and the non-cultivated land on field borders. We would then be able to predict a much more positive response of the farmland bird community. However, it is important to point out that a high density of trees allows forest birds to penetrate in farmlands, with strong implications for pest control (ex: tits predating pests in apple orchards). Thus, from the point of view of conservation, the Natural Elements component could play an important role.

e) Other data concerning birds

This bird assessment concerns only the farmland bird species. We must take into account other elements concerning other bird species:

- **Woodland birds**

One of the indicators used to select HNV areas concerns the percentage of landscape elements in the farmland. High densities of hedges, traditional orchards and wood borders in HNV areas allows the presence of specific wood species in farmland areas such as *Oriolus oriolus, Parus palustris, Aegithalos caudatus, Certhia brachydactyla, Dendrocopos major, Dendrocopos medius, or Cuculus canorus*.

- **Vultures**

Vultures depend for a large part on extensive breeding systems and transhumance, due to the presence of animal carcasses. Pyrenees, the south of the Massif Central, Provence and the Alps are the HNV areas where the 4 vulture species (*Gyps fulvus, Aegypius monachus, Neophron percnopterus and Gypaetus barbatus*) are living.

Globally, raptors are very well represented in HNV areas.

- **Some specialist birds that depend on farming practices**

Some rare species such as *Tetrao tetrax* and *Pyrrhocorax pyrrhocorax* depend partly on cattle transhumance and the maintenance of grazed summer pastures. Most of their living habitats are located in HNV areas (i.e. Yeatman D. and Jarry G., Nouvel atlas des oiseaux nicheurs de France – 1985-1989).

3.2.5 Using FADN data to map HNV areas

a) Introduction: Weaknesses and strengths of FADN

Every year, the Farm Accountancy Data Network (FADN) collects data from farms to establish incomes and perform a business analysis of the agricultural holdings.
The holdings in the survey are selected on the basis of sampling plans at the level of each region of the EU that guarantees their representativeness. The survey only covers the agricultural holdings that, due to their size, can be considered commercial (more than 8 ESU for France in 2004). The aim of the methodology is to provide representative data on three dimensions: region, economic size and type of farming.

For each holding in the sample, an individual weight is calculated (extrapolation factor), equal to the ratio between the number of holdings in the same classification cell (FADN region *type of farming * economic size), both in the population and in the sample. To calculate weighting factors it is necessary to have an accurate and up-to-date field of survey, which is represented by a FSS subset.

The sample size for France is 7710 farms, which stand for 393725 commercial farms. Due to the limited number of farms in the sample and their heterogeneity, the representativeness of each farm system is not achieved in each region.

The main interest in FADN data for the identification of HNV farms lies in the information on the input used by the farm, which allows the analysis of the intensity of management practices, while the typology of the farm is generally better described in the FSS.

The intensity of the practices has to be linked to the surface and not to the products (output). For example the input used per litre of milk can be equal both in an “extensive farming system” and in an “intensive farming system”. In the first case there is a lower milk production, but it is produced with low input (which can be converted into energy) and in the second case there is a high production of milk but with high input.

The exact amounts of input are not available in the FADN, which only provides the costs of inputs in euros. For inputs such as energy, the comparison among countries could be difficult, due to different energy taxation and to the different prices paid for each energy source. The threshold values have to be fixed every year due to the price evolution of the different inputs.

Three input parameters are of interest to define the intensity of farming :

- fertilisers
- crop protection
- animal feed (concentrate feedstuff)

Other parameters could be useful but hold constraints: seed and energy costs are not directly linked to the farming system, and the analysis of the results is difficult. Fuel consumption depends not only on the intensity of practices: the size of the parcels (in small parcels more litres of fuel per ha are consumed than in large parcels) and the distance to the farm need to be considered too. In dairy farms the consumption of energy is always higher than in beef cattle farms, due to the milk production.

b) Description of the input levels of the main farm systems and regions with large HNV areas (results for FADN 2001)

The analysis is limited to the main French regions (Limousin, Auvergne, Franche-Comté, Rhônes-Alpes, Corse, Midi-Pyrénées, Basse-Normandie, Bourgogne, Aquitaine) and the main farming systems, “Specialist grazing livestock”, considered as HNV farms in the farm system approach based on FSS.

The analysis shows that **63% of HNV municipalities are classified as Grazing livestock** (and 84% of the grazing livestock farms type is included in the HNV area). The other types of farms are mainly mixed farms (29%). Only 8% of the HNV municipalities is classified under other types of farming

Therefore only four types of Farming can be considered as representative:

- Specialist dairying (41)

- Specialist cattle-rearing and fattening (42)
- Cattle-dairying, rearing and fattening combined (43)
- Sheep, goats and other grazing livestock (44)

The other types of farming systems are not representative of HNV farms, and the number of farms in the group is too limited to be approached by the use of FADN (to be representative, the number of sample farms must be more than 30 at the regional level and 50 at the national level). Only in Brittany and Pays de Loire is the type "mixed livestock, mainly grazing livestock" (71) representative in France.

It can be assumed that HNV cropping systems and HNV permanent crops do not really exist in France. These types of farm are intensively managed.
The input levels for types 13 and 14 ("specialist grains, oilseed and protein crops" and "general field cropping") are very high: 139 €/ha for fertilisers and 134€/ha for crops protection. For type 32 ("specialist fruit and citrus fruit") the cost of input is: 152 €/ha for fertilisers and 366€/ha for crops protection, and for type 311 ("specialist vineyards quality wine") 130 €/ha for fertilisers and 432€/ha for crops protection

Table 38 : Specialist cattle rearing and fattening (type 42) farms of the main HNV regions

Region	Number of farms in the sample	Number of farms represented	UAA in ha	Green maize in % UAA	% permanent grassland in % UAA	LU*	fertilisers in €/ha	crop protection in €/ha	Animal feed in €/ha	Total input in €/ha	Represented surface in ha	% Regional UAA
Bourgogne	97	4,845	107	1%	76%	1,3	27	9	84	120	519,869	31%
Auvergne	95	5,306	87	2%	61%	1,1	39	7	62	108	462,683	33%
Midi-Pyrénées	52	4,363	69	3%	53%	1,2	44	11	68	123	299,302	14%
Limousin	129	7,356	70	3%	42%	1,2	50	10	81	141	516,391	66%
Aquitaine	31	2,173	48	6%	40%	1,4	81	23	126	230	104,521	8%

**LU: Stocking density is calculated for cattle, sheep and goats in grassland only.*

Type 42 is characterised by a low stocking density (generally under 1.4 LU/ha), a high percentage of permanent grassland (generally under 50%), a low surface of green maize (under 5% of UAA) and a low level of input (generally under 150 €/ha). These results (see table 38) confirm the identification of the HNV farmland by the presented Farm System Approach. Limousin is included in HNV areas as well as most of the specialist grazing livestock farms of Auvergne and Burgundy.

Type 41 (see table 39) is characterised by a higher consumption of animal feed due to milk production. The level of fertilisers and pesticides is still very low. The results of an extensive region such as the Franche-Comté (mainly included in HNV areas) can be compared to an intensive one such as Brittany (mainly excluded from HNV areas) whose indicators have a higher level. Normandy is a mixed region, with both intensive dairy farms based on green maize, as in Brittany, and less intensive dairy farms with a lower level of milk production and less green maize. Only the latter farms have been considered in HNV areas (Pays d'Auge and part of Contentin).

Table 39 : Specialist dairy farms (type 41) of the main HNV regions (FADN 2001)

Region	Number of farms in the sample	Number of farms represented	UAA in ha	Green maize in % UAA	% permanent grassland in % UAA	LU	Litres of milk/cow	fertilisers in €/ha	crop protection in €/ha	Animal feed in €/ha	Total input in €/ha	Represented surface in ha	% Regional UAA
Franche-Comté	122	4,526	80	3%	61%	1	5,250	48	12	160	220	360,722	58%
Auvergne	114	6,039	56	3%	66%	1,1	4,716	61	12	212	285	339,996	24%
Rhône-Alpes	108	6,943	60	7%	49%	1,2	5,048	63	18	194	274	413,803	31%
Midi-Pyrénées	42	2,628	48	18%	30%	1,5	5,399	91	28	230	349	125,093	6%
Basse-Normandie	145	9,965	60	23%	49%	1,6	5,302	100	39	255	394	594,911	53%
Bretagne	256	15,363	53	26%	6%	1,7	6,211	104	52	211	367	817,312	52%

The mixed cattle-dairy farms (table 40) are at an intermediate level between specialist dairy farms and specialist cattle rearing and fattening farms.

Table 40: Cattle-dairy farms (type 43) of the main HNV regions (FADN 2001)

Region	Number of farms in the sample	Number of farms represented	UAA in ha	Green maize in % UAA	% permanent grassland in % UAA	LU	Litre of milk/cow	fertilisers in €/ha	phyto in €/ha	Animal feed in €/ha	Total input in €/ha	Represented surface in ha	% Regional UAA
Auvergne	33	1,579	76	2%	70%	1,2	4,370	51	6	129	186	120,320	9%
Pays de Loire	47	2,437	79	18%	23%	1,8	5,595	88	44	200	332	191,305	9%

Concerning the sheep grazing system (see table 41), Corsica can be considered as a very extensive region, with a total input of 81 €/ha. Midi-Pyrénées has a higher input level due to the milk sheep production for the Roquefort cheese, which consumes a large quantity of concentrate feedstuff.

Table 41 : Sheep, goats and other grazing livestock (type 44) in the main HNV regions (FADN 2001)

Region	Number of farms in the sample	Number of farms represented	UAA in ha	Green maize in % UAA	% permanent grassland in % UAA	LU	fertilisers in €/ha	crop protection in €/ha	Animal feed in €/ha	Total input in €/ha	Represented surface in ha	% Regional UAA
Corse	79	541	71	0%	35%	1,1	6	0	74	81	38,195	32%
Midi-Pyrénées	34	5,167	63	0%	34%	1,4	66	13	164	244	323,141	16%
Aquitaine	0	3,107	38	0%	47%	1,7	80	18	242	340	117,134	9%

In order to analyse the FADN results and compare the different regions and farming systems, four categories of input level intensity for HNV farms are defined (Table 42 and figure 9):

Table 42 : Categories of input costs for HNV farms

Types of input	class 1	Class 2	Class 3	Class 4
	Extremely low	Very low	low	Semi-low
Crop protection	0 to 5	5 to 10	10 to 15	15 to 20
Fertilisers	0 to 20	20 to 30	30 to 40	40 to 50
Animal feed	0 to 60	60 to 100	100 to 140	140 to 180
Maximum input costs per ha	85€	140€	185€	250€

Table 43 presents a comparison, for 2004, of professional farms located in and outside HNV areas. The weighted average of input costs for HNV farms is 247€, only half the cost of non-HNV farms. The family farm income per FWU is 14% lower in HNV farms receiving the same amount of subsidies.

Table 43 : Comparison of the Family Farm Income and Input Costs for HNV farms and non HNV farms (FADN 2004)

	HNV Farms	Non-HNV Farms	Difference in %
Number of sample farms	1,555	5,777	
Number of sample farms	94,400	288,600	
UAA (in ha)	68	69	-2%
Livestock (in LU)	69	60	14%
Number of Family Work Units	1.62	1.94	-19%
Subsidies in €	25,761	24,701	4%
Family Farm Income by farm in €	25	34	-36%
Family Farm Income by FWU in €	15	18	-14%
Fertilisers in €/ha	59	112	-89%
Crop protection in €/ha	23	110	-381%
Animal feed in €/ha	165	285	-72%
Total input per ha in €	247	506	-105%

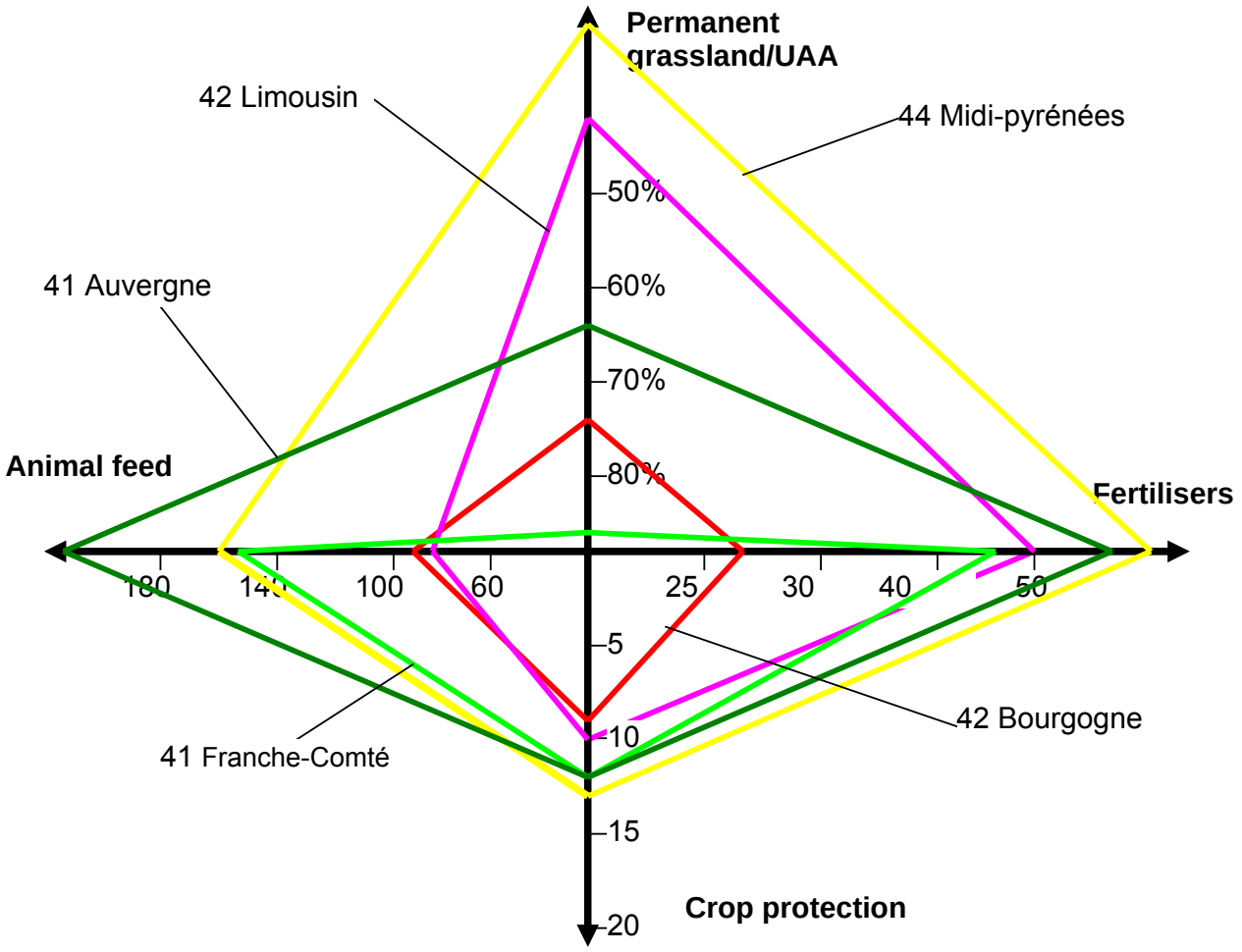


Figure 6 : Input costs of the main regional HNV types of farming (FADN 2001)

c) Conclusions for the FADN approach

The FADN 2004 results confirm the low input level of HNV farms, particularly the low level of fertilisers (under 60 €/ha) and crop protection (under 25 €/ha), compared to the national average (112 €/ha for fertilisers and 110 €/ha for crop protection).

Concerning the concentrate feedstuff costs, the level depends mainly on the productive choice: milk or meat. This indicator should also be analysed retrospectively. The decrease of cereal crops in grazing livestock systems and the intensification of milk production are the main reasons for the increase of concentrate feedstuff consumption.

The environmental impacts are:

- increase of organic nitrogen produced in grazing farms
- increase of specialist field crop farms
- higher level of soy imports with consequences on the environment in Argentina and Brazil

Mixed farms generally allow reducing feedstuff costs with a sometimes small increase in pesticide and fertiliser costs. The effect of the mixed farm system on the environment and nature value, compared to that of specialist grazing systems, though, is still under discussion.

The threshold of 150 €/ha proposed by Andersen (2003) for HNV permanent grassland systems and arable grazing livestock systems appears to be too low for specialist dairy farms and should be raised to 180 €/ha. The national average for all types of farms in France is 390 €/ha.

The percentage of permanent grassland is not directly linked to the input costs.

The LU threshold depends on the region and the productivity of the permanent grassland. The maximum threshold for HNV farms in France should be established based on the results for Normandy. A specific study should be done to discriminate HNV farms from others. In any case, the threshold of grazing pressure per hectare should be above 1.4.

3.3 Some issues on input data resolution

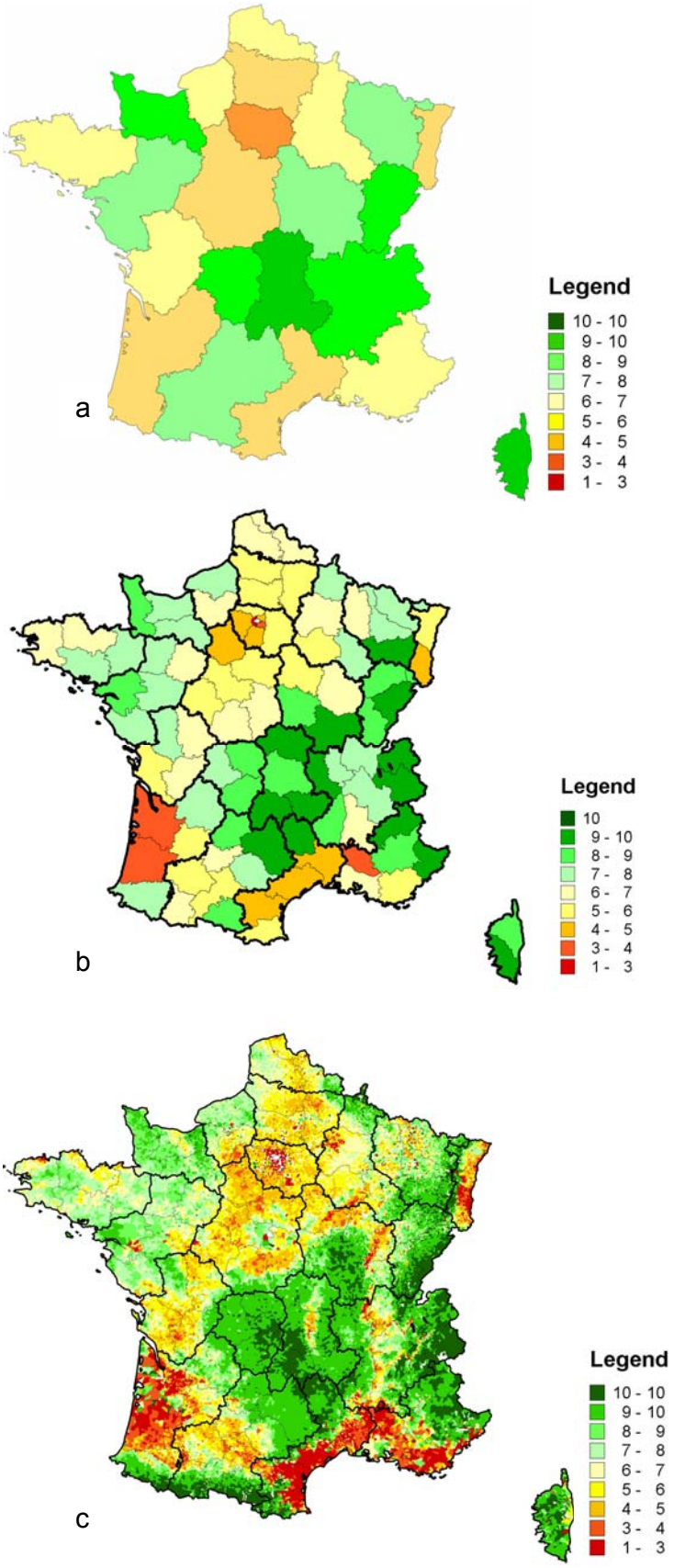
The scores of the indicator “Diversity of crops” have been compared with data produced at the municipality and regional scale. The results are presented in Table 44. The general trend shows an improvement of the index, merely due to the calculation of the index on a larger region (a well know statistical problem). Large differences can be observed in maps 10a, 10b and 10c (see next page).

In heterogeneous regions such Paca, Midi-Pyrénées, Aquitaine and Poitou-Charentes, the gap is large.

These results show that the regional level is not the best to study HNV farmland, and that it is necessary to work at the scale of the municipality or the canton to gain the proper detail.

Table 44 : Diversity of crops index using data for 2 scales (municipality and region)

Regions	weighted average of the farm score	score of the region	gap
Auvergne	9,28	10,00	0,72
Corse	9,09	10,00	0,91
Franche-Comtˇ	8,95	10,00	1,05
Limousin	8,42	10,00	1,58
Basse-Normandie	8,11	9,25	1,14
Rh™ne-Alpes	8,09	9,88	1,79
Bourgogne	7,50	9,16	1,65
Lorraine	7,47	8,86	1,39
Pays de la Loire	7,41	8,66	1,25
Midi-Pyrˇnˇes	7,35	9,64	2,28
Bretagne	6,98	7,99	1,00
Haute-Normandie	6,86	7,93	1,00
Provence-Alpes-C™te d'Azur	6,73	9,54	2,81
Champagne-Ardenne	6,58	8,01	1,42
Poitou-Charente	6,34	8,55	2,21
Nord-Pas-de-Calais	6,16	7,81	1,65
Languedoc-Roussillon	6,00	7,98	1,98
Aquitaine	5,84	8,13	2,29
Picardie	5,71	7,09	1,38
Centre	5,65	7,55	1,90
Alsace	5,28	6,58	1,66
Ile de France	4,92	6,58	1,66



Maps 10a, 10b and 10c : Comparison of the three maps (HNV index) provided for the regional (NUTS 2), department level (NUTS 3) and municipality levels (NUTS 5)

4 Up-scaling the results and methodology at the European level

4.1 Strengths and weaknesses of the Farm System Approach based on FSS

The farm system approach based on FSS can be up-scaled to the European level only if specific data on extensive agricultural practices and landscape elements are available. This type of data is specific to Member States.
It is recommended that a European grassland survey is developed in the future. Furthermore, the introduction of some specific questions in the next FSS questionnaire (or a specific module on farm practices) concerning N mineral farm consumption and % of grassland without N mineral fertilizer could provide information to better characterise HNV Farmland and low input farming systems.

Table 48 presents the strengths and weaknesses for developing a farm system approach at the European level.

Table 48 : Up-scaling results

indicator	strength	Weakness	Proposals
Map and scale	Producing a map at municipality scale (if NUTS 5 is available); possibility to calculate indicators and produce maps of ancient FSS survey	No possibility of locating agricultural parcels	Use the agricultural CLC classes or IACS data
Farm system	Information on the number of farms and their farm system (land use, livestock, landrace, type of grassland, use of common land…)	Risk of including some intensified Farms, which are a minority, and excluding isolated HNV farms in some intensified areas.	
Farm practices	Depending on the country; few data exist. Possibility of using the stocking density and parcel size indicators. Possibility to exclude some areas with intensified practices (irrigation, specific crops). Possibility to use FADN indicators to confirm the low intensity of some types of farm. Validation with LFA, the Extensification Premium Scheme and some specific AEM.	Relevant information on the management of grassland in general is needed. No relevant information on fallow land management. No data on permanent crops management.	Introduce a new European survey concerning grasslands. Introduce some question on agricultural practices in FSS (N mineral farm consumption, % of grassland without N mineral fertilizer). Use regional data (national or local surveys on high nature value grassland)
Landscape elements	Data are available, but at a large scale (nuts 3 and 4)	Difficulty to define thresholds for landscape elements	Carry out specific studies on landscape elements of high nature value. Elaborate a typology by country or geographic areas of landscape elements. Develop the "Size of arable parcels" indicator and adapt the thresholds.
Biodiversity	Validation of the identified areas by cross- analysis with other data (Bird data, quality of water resources, Fauna, flora and Habitats survey)	Biodiversity data other than birds are needed (Flora, fungi, insects etc.)	Find other indicators as riverine species, biotic indicators of river quality etc. Crosscheck with AEM data.

4.2 Recommendations for future work

Relevant work on validation can be done by crossing the results with other data sets, this also allows for an implementation of the methodology of analysis. In particular, the following points should be pursued:

- Cross results for HNV municipalities with the Agricultural CLC categories
- Cross results with AEM linked to grassland management and biodiversity
- Cross results with indicators of biodiversity and water quality (crayfish, river mussel, quality of ground water and rivers)
- Locate non-urban areas with very low percentage of UAA (less than 10%)

Concerning permanent crops, especially vineyards, specific indicators (terraces, organic farming, soil cover) have to be found and tested to assess the possibility of including this land use in HNV farmland areas.

5 Conclusion

The Farm System Approach, combined with national survey data, provides a relevant methodology to identify, characterise (surface, type of productions, grazing management, agricultural land use) and locate High Nature Farmland areas in France.

FSS seems to be the best data source available in the EU for applying a farm system approach at the European scale. This survey offers relevant data to estimate permanent pastures and calculate an indicator of « crop diversity and share of permanent grassland ». It appears, with reference to the French study case, that more data are available in the French FSS for the number of farms using common lands, the landrace population or the number of farms with fishing ponds or traditional orchards. But the greatest interest of FSS is the scale at which data were made available, it was in fact demonstrated that the municipality level (NUTS5) is essential to carry out a mapping exercise holding sufficient detail. This gives the possibility of producing refined maps and crossing these data with other data from sources available at larger scales (NUTS3 or regional scales).

But FSS is not sufficient to characterise extensive practices and landscape elements, which have a large impact on nature value. FSS only provides indicators of livestock density, irrigated land and organic farming. National surveys are necessary to provide information on permanent grassland management and eventually grain and permanent crops management, as well as assessing the density of landscape elements in the farmland.

In France, specific surveys such as the Grassland Survey and the National Forestry Survey provide relevant information on grassland management and densities of hedges and wood edges.

HNV maps were crossed with exogenous data (input cost levels from FADN, Bird indicators from STOC-EPS, Nitrate vulnerable zones, LFAs areas, Extensification Payment Scheme for cattle, Natural Zones, intensive practices, Products under Protected Designation of Origin). Very good results cross-validated the reliability of the proposed methodology.

In France the HNV farms are mainly extensive grazing cattle systems, with a high percentage of permanent grasslands corresponding to type 2 “Farmland with a mosaic of habitats and/or land uses” but also Type 3 “Farmland supporting rare species or a high proportion of European or world populations”. These farms are extensively managed with a low stocking density and low input use.

However, the methodology shows some weaknesses. For example, the methodology developed to take into account common lands has to be refined. More information on ponds and wetland areas is necessary.

Furthermore, it is important that the next FSS includes questions concerning agricultural practices, such as the total mineral nitrogen fertilization, permanent pastures without mineral fertilization and the use of common lands not included in UAA.

6 Bibliography

Agreste Cantal (2002). Les pâturages d'estive en 2000. SCESS, France.

Andersen E. (ed) (2003). Developing a high nature value farming area indicator. Final report. EEA, Copenhagen.

Andrzejewska L. (1965). Stratification and its dynamics in meadow communities of *Auchenrryncha* (Homoptera). Ekologia Polska, 321A, 685-714, Poland.

AFPF (2003). Mesures agri-environnementales, prime à l'herbe – Actes du séminaire de l'AFPF. Association francaise pour la production fourragère, France.

Bignal E. (1998). La nature de l'agriculture – les systèmes d'agriculture à grande valeur naturelle. Forum européen pour la conservation de la nature et du pastoralisme et IPEE, Royaume-Uni.

Birdlife International. 2004. Birds in Europe : population estimates, trends and conservation status. http://www.birdlife.net/action/science/species/birds_in_europe/species_search.html

Blab J. (1988). Sauvons les papillons. Editions Duculot, France

Boulinier T., J.D. Nichols, J.R. Sauer, J.E. Hines and K.H. Pollock (1998). Estimating species richness: the importance of heterogeneity in species detectability. Ecology **79** : 1018-1028

Brak B.H., L. Hilarides, B.S. Elbersen, W.K.R.E. van Wingerden (2004). Extensive livestock systems and biodiversity : the case of Islay. Alterra Rapport 1100, Wageningen.

Broyer, J. (2004). Observatoire national de l'écosystème Prairie de fauche" – Compte-rendu pour l'année 2004. ONCFS, France

Bunce R.G.H. (2004). Transhumance and biodiversity in European mountains. IALE-Alterra (Europe).

Coulon F. and Pointereau P. (2005). Le guide du pré-verger, Editions Solagro. France

Geroudet P. (1972). La vie des oiseau. Editions Delachaux et Niestlé. France

Hoogeveen Y. (2004). High nature value farmland – characteristics, trends and policy challenges. EAA, Copenhagen.

Huyghe C. (2005). Prairies et cultures fourragères en France. INRA Editions, France.

Institut de l'élevage (2002). L'élevage bovin, ovin, caprin – lait et viande – au recensement agricole de 2000. Le dossier Economie de l'élevage N°318. Institut de l'élevage, France.

Jacobsen C. (2004). High Nature Value Farmland. Proceedings of an expert Meeting. EEA. Copenhagen.

Janssens F., Peeters A., Tallowin J. R. B., Bakker J. P., Bekker R. M., Fillat F., Oomes M.J.M., (1998) "Relationship between soil chemical factors and grassland diversity", Plant and soil, 202: 69-78

Julliard, R. and F. Jiguet (2002). Un suivi intégré des populations d'oiseaux communs en France. Alauda **70** : 137-147, France.

Julliard, R., F. Jiguet, and D. Couvet (2003). Common birds facing global changes: what makes a species at risk? Global Change Biology **10** : 148-154.

Lépine C. (2002). Pâturage sur pelouses sèches, un guide d'aide à la mise en oeuvre. Espaces Naturels de France et INRA, France.

Ministry of Walloon Region (1993). Tableau de bord de l'environnement wallon 2005, CSWAAA, Etat de l'environnement en Wallonie

Ministry of Walloon Region (2000). Etat de l'environnement wallon 2000

Ministry of Walloon Region (1994). Plan d'environnement pour le développement durable en Région wallonne

Ministry of Walloon Region (2000). Evaluation des impacts de la PAC et de l'agenda 2000 sur le développement de la zone rurale

Paracchini, M.L., Terres, J.M., Petersen, J.E. and Hoogeveen, Y. (2006). Background document on the methodology for mapping High Nature Value farmland in EU27, European Commission Directorate General Joint Research Centre and the European Environment Agency.

Pervanchon F. (2004). Modélisation de l'effet de pratiques agricoles sur la diversité végétale et la valeur agronomique des prairies permanentes en vue de l'élaboration d'indicateurs agro-environnementaux, thèse, Institut polytechnique de Lorraine. France.

Phillips, S.J., R.P. Anderson RP, and R.E. Schapire (2006). Maximum entropy modeling of species geographic distributions. Ecological modelling 190 : 231-259.

Pointereau P. and Bazile D. (1995). L'arbre des champs : haies, alignements et prés-vergers ou l'art du bocage, Editions Solagro. France

Pointereau P., Herzog F. and Steiner C. (2002). Arbres et biodiversité, le rôle des arbres champêtres, Editions Solagro, France.

SCEES (2000). RGA. France.

SCEES (2001). RICA France. France.

SCEES (1998). Enquête Prairies, France.

Simoncini R., Milward S. and Terry A. 2004. How to Develop effective local Agri-Environmental Measures. AEMBAC project. IUCN

Solagro (2005). Ecovergers Degustez-les, Bilan du programme Interreg IIIB Ecovergers

Thiollay J-M. and Bretagnolle V. (2004). Rapaces nicheurs de France. Editions Delachaux et Niestlé. France

UNEP, 2003. Kyiv Resolution on Biodiversity, Kiev, Ukraine, 21-23 May 2003.

Yeatman D. and Jarry G., Nouvel (1985). Atlas des oiseaux nicheurs de France – 1985-1989, Société ornithologique de France

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Abstract
The Concept of High Nature Value (HNV) farmland has been evolving over the last fifteen years in Europe. In the European Union this has been closely linked to the aim of integrating environmental concerns in the Common Agricultural Policy. The idea that nature values, environmental qualities, even cultural heritage are linked to or dependent on farming, also underlies and supports the concept of a multifunctional 'European model of farming' which provides benefits other than food. The 'High Nature Value farming' idea thus ties the preservation of biodiversity and wildlife value of the countryside to the need of safeguarding the continuation of farming in specific areas, with maintenance of specific farming systems associated to the long-term management of these areas.
The report presents a method for mapping and characterising High Nature Value Farmland in France on the basis of statistical data and available surveys.

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