



Analysis

Economic analysis of scenarios for the sustainability of extensive livestock farming in Spain under the CAP

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ABSTRACT

This paper proposes a change in the conditions of cross-compliance of CAP payments. Specifically, the eligibility criterion considered is compliance with minimal requirements of long-term economic and agroenvironmental sustainability. To this end, 69 range farms were surveyed in Extremadura (SW Spain). In these farms, sustainability was studied using the MESMIS framework. MESMIS is based on the evaluation of basic attributes of sustainability (adaptability, self-reliance, equity, stability, and productivity) formed from different indicators. The original indicators are then synthesized by means of qualitative, quantitative, or mixed techniques into a single value measuring the sustainability of the system (sustainability index). Alternative scenarios were then defined in which the perception of CAP subsidies was to a greater or lesser extent linked to levels of sustainability. For each of these scenarios, the economic indicators of the farms were compared with those of the baseline (present) situation. The analysis was completed using a logistic model classification to study the relationship between the maximum levels attainable by the economic indicators in terms of the sustainability indices. The results showed that including sustainability as a condition for receiving aid under the CAP can contribute to improving the economic results of traditional extensive farms.

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1. Introduction

This paper analyzes a possible change in the conditions of cross-compliance of the Common Agricultural Policy (CAP) subsidies, with an application to extensive dehesa range-farming systems.¹ To this end, we consider the introduction of compliance with certain minimal sustainability requirements as a criterion of eligibility, after developing comprehensive indicators of sustainability which include the main aspects of this concept (environmental, social, and economic).

The term “sustainability” is difficult to define. One of the most widely accepted definitions in agriculture is that of Conway (1987): “Sustainability can be defined as the ability of a system to maintain productivity even though it is subject to ‘stresses’ or disturbances”. This was subsequently extended by Lynam and Herdt (1989) who defined it as: “The capacity of a system to maintain output at a level

approximately similar to or greater than its historical average, with the approximation determined by its historical level of variability”. At present, there is some consensus in defining it via a mosaic approach which involves three basic dimensions: environmental, economic, and social. In particular, a system is considered sustainable if it meets the following criteria: (i) improvement and maintenance of soil fertility and productivity; (ii) satisfaction of human needs; (iii) economic viability; (iv) social acceptability; (v) ecological adaptation; (vi) long-term durability of the system (Gaspar et al., 2009a, Gómez-Limón, 2010).

The perspective adopted in the study is that of public goods (goods and services that society values and would like to secure, but which are not delivered through the market) in the context of the CAP. Public goods oriented to sustainability represent a step beyond the multi-functionality of European agricultural systems. Future reforms of the CAP will therefore have to consider ever more explicitly a more efficient and equitable distribution of aid (Baldock et al., 2010; García, 2009).

In this sense, the dehesa in Extremadura (or *montado*, which is the name of these agricultural systems in Portugal) is an ecosystem of sufficient relevance (economic, social, and environmental) to be worthy of being regarded as a public good of general interest at the European level, not just limited to Spain or the Iberian Peninsula (Gaspar et al., 2009a, 2009b). Specifically, its sustainable management and economic incentives to strengthen its capacity contribute to rural development, prevent the abandonment of the land, and promote the

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¹ The dehesa is the most representative extensive farming system in the Iberian Peninsula. It is an agroforestry system (a combination of grazing, woodland, and crops) whose main production consists of extensive livestock production. The optimal use of this ecosystem involves efficient and complementary exploitation of the products offered by its principal components—holm and cork oaks, pasture, and livestock. The system commonly includes a mix of livestock species (beef cattle, sheep, and Iberian swine) raised extensively for meat and live animal production. Secondary uses include crop farming (oats, barley, and legumes, mainly for re-use as animal feed), hunting, and forestry (cork and firewood).

protection of natural ecosystems, biodiversity, and the better management of water resources. The dehesa system helps to combat climate change by controlling erosion, and increases the sustainability of production processes in the long term (Campos et al., 2008; Eichhorn et al., 2006; Firmino, 1999; Pinto-Correia and Mascarenhas, 1999; Schnabel and Ferreira, 2004).

Some recent papers have studied various scenarios of sustainability in agroforestry systems in Spain (Campos et al., 2008; Ibáñez et al., 2008), examining the interactions between socioeconomic factors and different types of rural landscape. In particular, Ibáñez et al. (2008) evaluated the relationship between sustainability and desertification in different agricultural systems in Spain according to various profit scenarios. Their results showed that high profit scenarios were able to determine final states of desertification, thus defining the specific threshold between sustainability and desertification in dehesas. Campos et al. (2008) examined different sustainability scenarios in the framework of the CAP for dehesas in SW Spain from the standpoint of private management, and observed that private landowner income was negatively affected when changes were made to achieve sustainable management of dehesas.

The analysis of sustainability in agricultural holdings must always consider the economic component. The difference between a sustainable scenario and another that is unsustainable is given by the greater revenue that could be obtained in the latter. This would, however, be at the cost of depleting the system's natural resources.

Unlike intensive farms, extensive holdings can innovate and diversify their productive activities so as to increase their revenue function without significantly reducing their level of sustainability. Dehesa farms, for example, which are basically extensive agricultural and livestock systems with different uses, can also integrate into their production educational and recreational activities such as "rural tourism".

Several studies have shown the negative influence that the EU's policy of subsidies has had on the sustainability of farms in general (Barreiro and Espinosa, 2007; Firmino, 1999; Roeder et al., 2010; Santos and Cabral, 2003), and of dehesa farms in particular (Campos et al., 2008; Eichhorn et al., 2006; Plieninger, 2006). A recent study is the SEO/BirdLife and WWF (2010) report which shows a positive correlation between higher payments and decreasing environmental status. This is because holdings based on intensive systems—in the sense of their use of natural resources (land and water), fertilizers, and pesticides—are those receiving the bulk of the aid. Systems such as dehesas and others of high natural value (for example, those included in the Natura 2000 network²) receive only a small fraction of the EU budget earmarked for CAP subsidies. Another noteworthy fact is the lesser dependence on farm subsidies of holdings with multiple use systems (Gaspar et al., 2009a, 2009b; Ronchi and Nardone, 2003).

The first CAP reforms (1992 and 2000) had a marked effect on dehesa farming systems. Their stocking rates increased steadily to maximize subsidies and grant revenues, and this led to a loss of sustainability (Gaspar et al., 2008). More recently, the 2003 CAP reform and its revision (the Health Check) were introduced due to problems of food safety and environmental protection. The 2003 reform was based on a single farm payment for EU farmers, decoupled from production. The 2008 Health Check deepened that reform, increasing the amount of subsidies decoupled from production. Both reforms have

had a negative effect on the model of dehesa management because the decoupling of the subsidies has caused some farms to cease activity. This is a serious setback for the environmental management of dehesas, since the use of appropriate stocking rates maintains the wooded layer, thus avoiding the invasion of scrub and reducing the risk of major wildfires.

Given this context, it has become increasingly important to conduct an in-depth study of farm sustainability based on the integration of environmental, social, and economic indicators. There is also a need to revise the cross-compliance system of CAP subsidies to include criteria that would take farm sustainability into account. This is particularly relevant for extensive farming systems which have often been neglected by government support and private sector investment, despite acknowledgement of the great potential benefits that would result from improving their economic contributions and strengthening their role in providing environmental services.

2. Materials and Methods

Fig. 1 is a schematic representation of the methodological approach to be described in the present section. First, the MESMIS framework is applied to evaluate farm sustainability based on fundamental attributes, which in turn are formed from different indicators for the environmental, social and economic dimensions of sustainability. The scores provided by those indicators are synthesized (by means of the AMOEBA method) into a specific sustainability index. These results, together with the economic indicators obtained from descriptive statistics, are used as inputs first for a scenario analysis, and then for a logistic analysis to study the relationship between the maximum levels attainable by the economic indicators in terms of the sustainability indices.

2.1. Selection of Farms and Data Collection

The data used in this work was obtained during 2004 and 2005 from a survey of the holders of dehesa farms larger than 100 ha in the region of Extremadura. Due to a lack of official statistics about figures and location of dehesa farms in Extremadura, the sampling was non-probabilistic by quotas. The number of farms surveyed was 73, and the final number of valid questionnaires was 69, in line with other similar studies (Nahed et al., 2006; Pérez et al., 2001; Serrano et al., 2004). Forestry, livestock production, and farm size criteria were used to select the farms with the aim of obtaining a representative sample of the various subsystems of dehesas.

2.1.1. Forestry Criterion

The forestry criterion was used to distribute the farms in Extremadura according to their predominant tree species and the fraction of wooded area (FWA). The data were taken from the Forestry Plan of Extremadura (CAYMA, 2003a), which considers an area of over 1.9 million hectares of dehesas.³ Table 1 gives the distribution of different types of dehesa in Extremadura and in the sample.

2.1.2. Production Livestock Criterion

The sample had to include farms with the principal dehesa livestock orientations. From the last survey data on the structure of agricultural holdings in Spain (INE, 2003), we calculated the weighting in livestock units (LU) of each of the species occurring on farms of over

² Natura 2000 is the centrepiece of EU nature & biodiversity policy. It is an EU-wide network of nature protection areas established under the 1992 Habitats Directive. The aim of the network is to assure the long-term survival of Europe's most valuable and threatened species and habitats. It is comprised of Special Areas of Conservation (SAC) and Protection (SPA) designated by Member States under the Habitats Directive and under the 1979 Birds Directive. Natura 2000 include nature reserves where human activities are restricted, but most of the land is likely to continue to be privately owned, with an emphasis on ensuring that future management is sustainable, both ecologically and economically.

³ The Forestry Plan of Extremadura distinguishes between dense dehesas (FWA greater than 30%, and predominant tree species *Quercus ilex*, *Quercus suber*, *Quercus ilex* + *Quercus suber*), normal dehesas (FWA between 5% and 30%, predominant tree species *Quercus ilex*, *Quercus suber*, *Quercus ilex* + *Quercus suber*, and other species), sparse dehesas (FWA <5% and *Quercus ilex*), grassland, scrub and pasture, and scrub with trees.

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