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# Adopting Environmentally Friendly Farming Practices and the Role of Quality Labels and Producer Organisations: A Qualitative Analysis Based on Two European Case Studies

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**Abstract:** Various drivers behind the adoption of environmentally friendly practices have been investigated at the farm level in the literature, e.g., farmers' motivations and attitudes, farms' structure, and management or policies. Yet, the way in which quality labels and producer organisations influence the adoption of environmentally friendly practices by farmers is still under-researched. We contribute to this topic and present the results of qualitative interviews with producer organisations, conducted in 2019 in two contrasting case studies: the pig sector in Brittany (western France), and the olive oil sector in Crete (Greece). Our study shows that economic actors of food supply chains in these two case studies use European quality labels, a couple of national schemes, and a proliferation of private quality labels (in Brittany's pig sector). Our interviews reveal that many quality labels, for which agricultural farming systems must comply with a set of rules, are not specifically aimed at improving environmental impacts. In the Cretan olive oil sector, we observe several European public labels. In the French pig sector, many quality labels do not include requirements for practices aiming at improving the environment, but instead focus on other practices that matter for society, namely improving animal welfare. However, advisory services provided by the producer organisations can play a key role in the adoption of environmentally friendly practices. They include research programmes and agronomic events. In Crete, producer organisations are able to offer technical assistance thanks to European support programmes.

**Keywords:** supply chain; producer organisation; quality label; environmentally friendly practices

## 1. Introduction

Consumers are increasingly looking for products that are environmentally friendly. In France for example, 70% of consumers have bought at least one organic product within the last six months, while in 1998 this percentage was only 44% [1]. In the European Union (EU), 68% of European citizens agree that their consumption habits adversely affect the environment [2]. Consumers' preferences and firms' strategies on product differentiation enable the development of quality labels that can be recognised by national and EU public authorities, private organisations, and supply chain stakeholders [3–5].

In the late 1990s, private and public labels were developed to take account of consumers' expectations regarding food safety following several crises (such as mad cow disease, *E. coli*, etc.).

These diverse food crises increased consumer awareness and forced public authorities to develop minimum quality standards and regulated food supply chains to ensure the safety of foodstuffs. Since 2006, at the European level, rules regulating the safety of foodstuffs have been developed and applied all along the food chain, from farming systems to consumption. The primary responsibility for food safety is borne by the food business operators, leading retailers to develop their own private quality labels such as the British Retail Consortium (BRC), International Food Standard (IFS), or Global Gap certifications. These private labels are designed to force suppliers to change their practices, and this increases retailers' market power [6,7]. These labels are often based on sets of practices that are more binding than the minimum public ones. Consequently, they play a dominant role in enhancing food quality [8] and managing risks. Contractual arrangements are also used to increase the quality level in the food supply chain and are now more frequently in place [9–11].

Furthermore, a European quality policy has been developed to ensure that food products with a geographical indication (GI), including protected geographical indication (PGI) or protected designation of origin (PDO), are linked to a geographical region and traditional know-how. Protecting the name of the product through a GI label helps farmers to enhance quality and better market their products [12]. Recently, the product specifications in the GIs have been reinforced and now include some environmentally friendly practices [13,14], since quality schemes are an opportunity to more stringently take into account environmental impacts [15].

The increasing awareness of consumers about the impacts of farming systems has led food operators to develop private labels with the aim of achieving higher quality products and encouraging environmentally friendly practices. Agricultural cooperatives, through their close relationships with farmers, may also play a role in enhancing quality in the supply chain. They can provide insurance against quality risks but face several challenges [16]. However, not only might agricultural cooperatives have an incentive to overproduce, but also a free-riding in quality may exist [17]. In addition, members producing high-quality products can be disadvantaged either by the equality principle [18] or when more than half of the membership is represented by members producing low-quality products [19]. Heterogeneous membership may have a downwards influence on the cooperative's efficiency. Furthermore, the organisational structures present in supply chains may have significant impacts on the adoption of environmental innovations [20] since, for instance, producer organisations (POs) and the food industry might provide technical support and enhance farmers' skills [21]. Other studies find that agricultural cooperatives can improve welfare when they help their members adopt innovations [22,23].

Hence, there is growing pressure on farms to adopt environmentally friendly practices; that is to say, farming practices that contribute to maintaining or improving the state of the environment. Various drivers behind the adoption of such practices have been investigated in the literature, for instance, farmers' motivations and attitudes, farms' structure and management, and policies (see a recent review in [24]). However, little attention has been given to the role of food supply chains, and in particular to the role of quality labels and of POs. The latter, because of their close relationship with farmers, may play a crucial role in encouraging farmers to adopt environmentally friendly practices. [25] (p. 4) indicates for example that "the cooperative business model creates an environment conducive to innovation". New farming techniques and technologies may spread more rapidly across farmers who are members of a PO than across individual farmers due to information exchange. The author also stresses that POs may bring intangible benefits such as social cohesion and trust, which can be crucial for implementing new environmentally friendly practices [26].

In general, economic actors in food supply chains (producer organisations, processing firms, retailers, etc.) may intervene to help to improve the environmental impacts of agricultural production through two types of action. Firstly, by differentiating food products according to environmentally friendly attributes, in order to meet consumers' preferences. Secondly, by providing advisory services which favour the adoption of environmentally friendly practices to improve farm performance and sustainability. In the case of differentiation, two strategies are possible. One approach is that firms

may differentiate their products using either existing labels that are recognised at European and national levels, or by using quality labels developed by private organisations. Another approach is that firms may build their own labels using their set of practices. The creation of the new label can be initiated by a unique stakeholder or by several stakeholders. There are also collective labels used by several stakeholders. Finally, firm brands exist which are the sole property of the stakeholders who develop them.

Our research aims to examine how specific instruments used by economic actors in food supply chains influence the adoption of environmentally friendly practices by farmers, namely through both the development of quality labels and various other incentives implemented by POs. We conducted qualitative interviews in two contrasting case studies in the EU, to identify quality labels with environmental requirements and to underline the role of POs in enhancing further adoption of environmentally friendly practices on farms. The paper is structured as follows: the next section sets out the case studies and the methodology; the third section describes the results; and the last section concludes.

## 2. Materials and Methods

In order to provide differentiated insights into the issue, we compare two different case studies in the EU: pig production in the western region of Brittany in France, and olive oil production in two regional units of Crete (Heraklion and Lasithi) in Greece. The productions are contrasting in the sense that they are: (i) animal versus crop; (ii) short-life (pig) versus long-life (olive oil); and (iii) a national driven market (pork) versus an export driven market (olive oil). In addition, the organisation of the supply chains is different, with a highly concentrated sector of pig production in Brittany where most of the production is sold through POs, and scattered olive producers but well-developed public quality labels in Crete.

In this article, POs denote all entities that gather agricultural producers, whether or not they are recognised by public institutions. They can take different legal forms, such as agricultural cooperatives, associations, or private companies. Whilst in the French pig sector, POs are formally recognised legal entities, in the Cretan case study a significant number of entities did not appear in the form of an officially recognized PO. However, for the purposes of simplicity, we use the term producer organization (PO) in both cases. The objective of POs is to perform a joint activity or several joint activities (e.g., joint production, joint sale) on behalf of their members [27]. By pooling their activities, farmers joining POs may increase their bargaining power, decrease risk, and reduce average fixed costs and transaction costs [26]. In recent years European public policies have supported POs governed by EU regulation. Article 152 of the European policy 1308/2013 specifies the objectives the POs should pursue. Two objectives are worth mentioning: “(i) promoting, and providing technical assistance for, the use of environmentally sound cultivation practices and production techniques, and sound animal welfare practices and techniques and (ii) promoting, and providing technical assistance for, the use of production standards, improving product quality and developing products with a protected designation of origin, with a protected geographical indication or covered by a national quality label.”

### 2.1. Background of French Pig Farming and Cretan Olive Production

Brittany is by far the main French region for pork production. In 2010, France counted 6456 farms specializing in pork production, among which 52% were in Brittany [28]. In 2016, 56% of the French fattening pigs were located in Brittany, and in 2015, there were 13 pig slaughterhouses in Brittany with an annual total capacity of 1000 tons [29].

In the French pig sector there were 32 recognised POs in 2019, representing almost 90% of the French production share. POs have a diversity of roles, such as providing technical and economic assistance, training their members, or providing input procurements. In addition, they achieve some horizontal market power by growing or merging with other POs. Finally, they can also incentivize their members in the adoption of quality schemes, some of which have environmental requirements.

Production under quality labels certified by public authorities represents less than 4% of French pig production (0.4% for organic farming under the EU legislation, and 3.5% for the national Label Rouge (red label) in 2015) [30]. The sector has set up ambitious objectives regarding public quality labels, with the aim of selling 10% of the production under organic farming and 12% under Label Rouge by 2027 [31].

Regarding the olive oil sector, the area of olive trees in Crete was about 188,118 hectares (ha) in 2017, with the respective figure for the whole of Greece being about 792,642 ha [32]. More specifically, the area of olive trees in the case study areas in Crete was around 89,645 ha in Heraklion and 27,086 ha in Lasithi. Crete accounted for 23.4% of the country's olive oil production in 2017, of which 71.7% was produced in Heraklion and Lasithi, the second-highest olive oil producing region in Greece after Peloponnese [32]. Currently in Crete, there are 61 POs involved in the olive oil sector, most of which are located in Heraklion and Lasithi (29 and 21, respectively) [33]. The most common quality schemes in the Greek olive oil sector are: organic certification according to the EU legislation on organic farming; the GI labels; and AGRO 2 (AGRO 2.1 & the specific olive-targeted AGRO 2.2/3) [34] which is the national quality label for the implementation and certification of the Integrated Management System in agricultural production.

The area of organic olive trees in Greece was 50,085 ha in 2017, including olive groves undergoing conversion [35]. In the Crete case study areas, there were nine organic certification bodies in 2017 and 736 and 280 organic producers in Heraklion and Lasithi, respectively, with organic olive areas of 3722 ha and 868 ha, respectively [36]. According to the EU's Database of Origin & Registration (DOOR), there are 30 registered GI labels for olive oil in Greece (19 PDOs and 11 PGIs), of which 11 cover the region of Crete (10 PDOs and 1 PGI). More specifically, in the case studies, six of the Cretan PDO olive oils are produced in Heraklion and Lasithi (five and one, respectively). Finally, in 2017, the number of AGRO 2 certified producers in the case study areas was 2508 in Heraklion and 2658 in Lasithi, covering an area of 6623 ha and 5422 ha, respectively [36].

## 2.2. Methodology

Existing information on the role of the supply chains in farmers' adoption of environmentally friendly practices is scarce. The existing databases that can be used to assess farmers' behaviour are accountancy databases. However, they do not contain information on the production outlets and other supply chain aspects. For these reasons, we decided to resort to an original survey consisting of qualitative interviews with supply chain stakeholders. We designed a semi-structured interview to explore how food supply chains influence the adoption of environmentally friendly practices on farms. In total, 9 stakeholders in Brittany and 11 in Crete were interviewed, with each respondent having a specific role in the organisation (such as manager, person in charge of environmental matters, person in charge of quality matters, etc.).

The questionnaire was divided into three parts. The first section collected the characteristics of the organisation represented by the respondent. The second section dealt with the role played by the supply chain stakeholders in encouraging the adoption of environmentally friendly farming practices. The last section asked the respondents to rate quality labels according to the changes in the production system that the adoption of these practices would generate.

In both Brittany and Crete, semi-directive interviews were conducted face-to-face in January–February 2019 with POs, agricultural cooperatives, and private enterprises. The interviews lasted between an hour and a half to two hours. In the French case study, all the POs taking part in the survey were officially recognised by the French public authorities, and most of them were agricultural cooperatives. These POs covered not only Brittany but western France in general, comprising of 6197 members and selling over 16 million pigs per year, representing 71% of the French pig production. In Crete, five interviews were conducted with private enterprises that produce, standardize, and trade olive oil, four interviews were conducted with agricultural cooperatives and two interviews were conducted with organisations with the specific legal status of agricultural partnerships

(formerly Unions of Agricultural Cooperatives). Overall, the private companies taking part in the survey had approximately 9800 producers, while the agricultural cooperatives and the agricultural partnerships were comprised of approximately 10,050 members.

Furthermore, across our case studies, we identified 25 quality schemes with environmental requirements: 21 in Brittany's pig sector and 4 in the Cretan olive oil sector. Among the 25 schemes, 4 of them are certified by public authorities, either recognised at the European level (PDO, organic farming, and GMO-free), or recognised at the national level: in France the Label Rouge and the Haute Valeur Environnementale (HVE (high environmental value)) 3rd level and in Greece the AGRO 2.1 & 2.2/3. The other quality labels are private labels, initiated by supply chain stakeholders or associations.

### 3. Results

As explained above, we investigate the role of supply chains in the farms' adoption of environmentally friendly practices in our two case studies, through two aspects: the quality labels integrating such practices; and the incentives provided by POs.

#### 3.1. Environmentally Friendly Practices in Quality Labels

##### 3.1.1. Identification of the Environmentally Friendly Practices Implemented in Quality Labels

In this section, in the two case studies considered we underline the environmentally friendly practices that are integrated into the set of practices required by quality labels (Table 1). We describe quality labels which are not identified as environmental labels (or eco-labels) as the latter labels—the European organic farming label, the Demeter (biodynamic farming), the Greek AGRO 2 and the French HVE 3rd level label—are relatively transparent and well-known.

In the pig sector, the environmental requirements are integrated in the labels through four main aspects: antibiotic use, feed management, manure management, and natural resources use. Firstly, numerous quality labels relate to the reduction of antibiotic use: La Nouvelle Agriculture (the new agriculture), Brocéliande, Porcristal, Label Rouge OPALÉ, Bien produire Bien consommer, and Filière J'aime/Engagé dans l'élevage. Some firms also use antibiotic-free claims, but those claims are not regulated. Secondly, feed management practices are included in most sets of practices. In the pig sector, modifying feed practices may reduce the environmental impacts of pig farms. Many labels use the claim GMO-free, such as Label Rouge porc fermier Cénomans (local red label for farm pig), La Nouvelle Agriculture, Brocéliande, Porcristal, Filière J'aime/Engagé dans l'élevage, and Engagement qualité Carrefour (quality commitment of the retailer branch Carrefour). Some use the collective brand Bleu Blanc Cœur (Blue White Heart), for which being GMO-free is obligatory and which also requires the introduction of alpha-linolenic acid into animal feed, mainly via extruded flax, e.g., Label Rouge OPALÉ, Filière Cosme, and Porc authentique élevé sur paille (traditional pig bred on straw). Furthermore, we observe that some sets of practices mention that inputs have to be locally supplied, e.g., La Nouvelle Agriculture. Thirdly, some sets of practices include manure management (Label Rouge porc fermier Cénomans, Filière Cosme, and Porc authentique) and some labels mention that the farming system must be tied to farmland (Label Rouge OPALÉ and Filière préférence Herta (Herta preference product)). However, requirements related to manure are not widespread. Finally, some quality labels refer to a reduction in water and energy consumption on farms (Filière J'aime/Engagé dans l'élevage and Filière Préférence Herta), and others consider the impact on the atmosphere. Some use scoring methods to obtain a carbon footprint (for example, the Indice Carbone Casino, carbon footprint index of the retailer branch Casino) and others use the index La Note Globale (the global mark), which is still under development. No respondent reported using life cycle analysis (LCA) to compute carbon footprints. Finally, it is worth noting that no waste management practices are included among the environmental requirements of the quality labels used in the pig sector.

**Table 1.** Environmentally friendly practices implemented in quality labels. <sup>1</sup>

Environmentally Friendly Practices	Pig Sector (Brittany)	Olive Oil Sector (Crete)
Constraints imposed by public policies	- Mainly require farmers to comply with regulations and do not enforce further environmentally friendly practices (2/19)	
Disease/pest management	- Antibiotic-free (6/19)	Control of <i>Dacus oleae</i> : <ul style="list-style-type: none"> <li>- With bait spray applications from the ground (6/6)</li> <li>- Without any treatment (4/6)</li> <li>- By using other biological control methods (3/6)</li> <li>- Machine weeding (1/6)</li> </ul>
Input management	<ul style="list-style-type: none"> <li>- GMO-free (10/19)</li> <li>- Introduction of alpha-linolenic acid in animal's feed (5/19)</li> <li>- Use of cereals produced locally in animal's feed (1/19)</li> <li>- Link to land (3/19)</li> </ul>	<ul style="list-style-type: none"> <li>- Rational use of fertilisers and use of animal manure (1/6)</li> <li>- Rational use of fertilisers based on soil analyses that have been conducted over the past years in the olive groves (1/6)</li> </ul>
By-product management	- Straw bedding for pigs (3/19)	
Water and energy consumption	- Reduction of water and energy consumption (2/19)	- Irrigation system: mainly drip irrigation system is used in the olive groves (1/6)
Waste management		<ul style="list-style-type: none"> <li>- Transportation of olives to the olive mill in open-mesh plastic crates (4/6)</li> <li>- Transportation of olives to the olive mill in sacks made of plant material (5/6)</li> <li>- Transportation of olives to the olive mill mainly in food grade loosely woven sacks (1/6)</li> </ul>

<sup>1</sup> Note: the figures in brackets relate to the number of labels integrating the type of practice, out of the total number of labels identified in the case study (19 in Brittany and 6 in Crete).

In the olive oil sector, as already mentioned, there is a wide range of PDO olive oil products. This label requires all the production steps of a product to be held within a certain geographical area and associates the quality or the characteristics of the product with the environment (natural and human) of the specific territory. GI labels are often considered to be quality-oriented labels rather than environment-oriented labels. However, GI's product specifications, although they do not explicitly indicate any specific environmental aspects, integrate the latter indirectly in the requirements laid down in order to ensure certain quality attributes of the product. Moreover, the authors find in their study that olive oil GIs have over the years been following a 'greener' direction, revealing a tendency towards a more sustainable set of goals which take into consideration not only quality characteristics but also the environmental and social aspects of production [37]. Table 1 presents the farming practices from the six PDO olive oils of the Heraklion and Lasithi regional units which can be related to potential environmental impacts, as described in the corresponding product specifications of the PDO

olive oils. It should be noted that among these six PDOs, those more recently registered have more environment-related references in their product specifications than the earlier ones. However, none of them indicates any by-product management.

### 3.1.2. Some Stakeholders in Food Supply Chains opt for Existing Quality Labels

In the olive oil and pig sectors, we identified three environmental labels certified by public authorities: the organic label, which is present in both sectors and recognised at the European level; the HVE 3rd level label recognised in France; and the AGRO 2 label recognised in Greece. Whereas the organic label is widely present in the Greek olive oil sector, it is rare in the French pig sector, where organic pig production represents only 0.4% of the total French agricultural production. Most organic producers in the pig sector sell their products directly to consumers. It is worth noting that at the date of the interviews, no pig producer in France had adopted the HVE 3rd level label, but several POs had shown interest in this label. In Crete, some interviewed organisations (mainly cooperatives) have created POs, in which the members follow AGRO 2.1 & 2.2/3 standards using the institutional framework of the EU regarding the support programmes for the olive oil sector (e.g., Reg. (EU) No 1308/2013, Reg. (EU) No 611/2014 and No 615/2014). In one Cretan cooperative interviewed, AGRO 2 certification is mandatory for a producer to become a member.

In the olive oil sector, the supply chain has created product differentiation mainly through labels of quality and origin, which include some environmentally friendly practices. PDO and PGI labels, with the place of origin and the high-quality attributes as their strong assets, may constitute an effective marketing tool for product differentiation [38]. The French Label Rouge, although an official French quality label, may contain several sets of product specifications for the same specified food product, some of them initiated by private firms. In the western French pig sector, we identified two types of Label Rouge, the Label Rouge OPALE and the Label Rouge porc fermier Cénomans. In comparison with the olive oil sector, the pig sector relies little on official quality labels, and the Label Rouge only represents 3.5% of the French pig production. It is worth mentioning that numerous labels developed by stakeholders in the pig sector rely on the claim GMO-free, which is regulated by French legislation.

However, the pig sector has a broader use of labels developed by private organisations. We identified five labels: Bleu Blanc Cœur; Certificats Conformité Produit (Certificate Conforming Product) (CCP) such as Le Cochon de Bretagne (Brittany pig); Le Porc Français (French pig); Porc authentique élevé sur paille; and La Note globale. For the olive oil sector, we only identified one international private label, Demeter, that is used for products from biodynamic agriculture, initiated locally by a producer who was interested in taking his organic cultivation even further.

### 3.1.3. Other Stakeholders Choose to Develop Their Own Quality Labels

Some stakeholders in the food supply chain have initiated their own quality labels when existing labels do not allow them to differentiate their products in the market. This strategy has been widely implemented in the pig sector in France, where POs have created several quality labels. Some of them have a private brand such as, for instance, La Nouvelle Agriculture, Terre de Breizh (land of Brittany), or Brocéliande. Others are collective brands, which have been developed in cooperation with other stakeholders. For example, Label Rouge Porc Fermier Cénomans has been developed by POs in cooperation with feed providers and slaughterhouses. Processors and retailers also play an important role in the creation of a private label, because they can then enforce specific requirements on upstream stakeholders. The retailer Carrefour has developed the label Engagement qualité Carrefour, and the processing firm Herta has created the Filière Préférence Herta label. We also identified cooperation between feed providers and processors in the labels Filière Cosme and Filière J'aime/Engagé dans l'élevage. POs, processing firms, and retailers use contracts to secure the development of products using private labels and increase their market shares.

Apart from quality labels, we identified in Crete a private initiative, "TUI Cares for Crete—Sustainable Food" founded by the TUI Care Foundation and Futouris, with environmental

requirements regarding sustainable tourism, aimed at establishing Crete as a sustainable food destination in the long term. Through this initiative, local producers in the olive oil and wine sector are trained and supported to produce in a sustainable way. The products are then promoted to local hotels who are also participating in the initiative. Among the olive oil producers which are part of this initiative, a cooperative and a private company took part in our interviews.

Furthermore, in the pig sector, we identified labels which are based on already existing labels. For instance, the standard La Nouvelle Agriculture includes in its specifications Bleu Blanc Cœur standards such as GMO-free and antibiotic-free. In conclusion, in both the Brittany and Crete case studies, several quality labels, even though they are not explicitly environmental labels, rely on more than one environmentally friendly practice.

#### 3.1.4. Changes Induced by Quality Labels in Farming Systems

Environmental impacts vary across farming systems (such as conventional agriculture, organic farming, agroecological farming systems, etc.), across food supply chains, and across space. The interviews allowed us to identify four categories of quality labels, dependant on the changes they generate in farming systems when they are used by farms. From the smallest changes to the most substantial changes, the four categories are: compliance with public policies; soft changes; incremental changes; and radical changes.

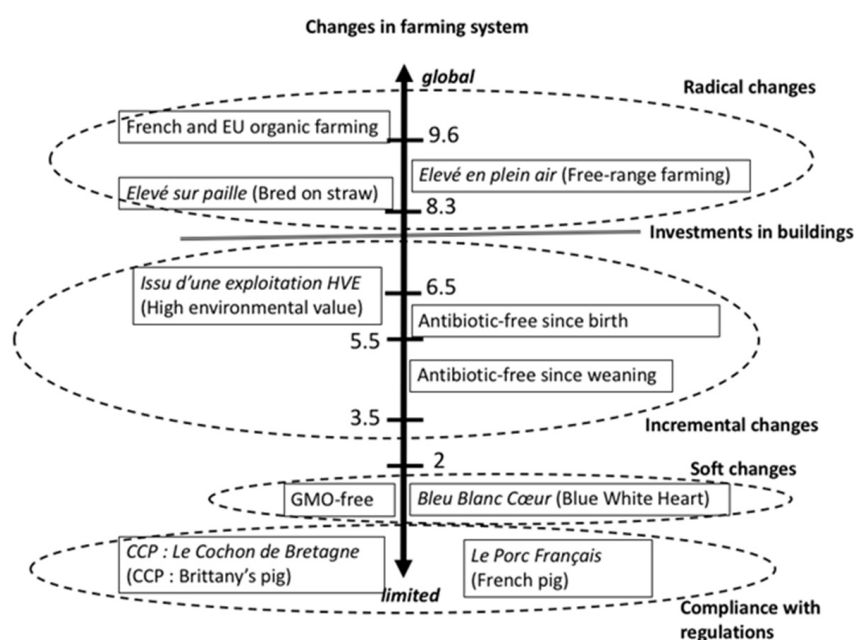
The first category of quality labels only requires farmers to comply with public policies and, consequently, these standards do not, or hardly, modify the farming system, since all farms are supposed to comply with the law. In the pig sector, this concerns the labels Certificats Conformité Produit (Certificate Conforming Product) (CCP) such as Le Cochon de Bretagne and Le Porc Français. These labels encourage environmentally friendly practices, but it is not mandatory for them to be certified. Since 2018, the CCP Le Cochon de Bretagne has built a progress plan, which is partially based on environmentally friendly practices. In the olive oil sector, PDO is a quality label that does not require any significant changes in the farming system and can thus be included in this first category of labels. According to [14], the olive farming practices implemented when adopting a PDO do not differ to any great extent from those used by non-PDO farmers. However, it is essential to mention that as a PDO is a GI, the label can only be used by farms located in the area.

The second category of labels induces soft changes in farming systems when they are used on farms. In the pig sector, the requirements inducing such changes are mainly about feed, and lead to input substitution. In conventional farming systems, labels like Bleu Blanc Coeur and the claim GMO-free only require the origin of input supply to be known. In the olive oil sector, we include AGRO 2 in this category of labels, since the requirements are mainly focused on the optimisation of the use of agricultural inputs and the minimisation of cultivation interventions, as well as on farm record-keeping.

The third category of labels generate incremental changes in farming systems upon their adoption. In the pig sector, these labels relate to raising pigs without antibiotics. Sometimes, the set of practices involves a change in buildings in order to consider biosafety and technical management. In the olive oil sector, this category of labels includes the European certification of organic farming. The changes needed to switch from conventional to organic farming systems concern mainly fertilisation and crop-protection practices. In addition, according to organic farmers, olive cultivation in an organic way is much more time consuming than conventional olive growing [39].

The fourth category of labels induces radical changes in farming systems, in the form of high investment in, for instance, new buildings to comply with the requirements. Adopting such labels implies system redesign. In the French pig sector, this category includes the following quality labels: Elevés en plein air (free-range farming) and Elevés sur paille (bred on straw), and the European certification organic farming. In the olive oil sector, the Demeter label induces radical changes in the farming system as it goes further than organic requirements.

It is of interest to highlight that the European organic label, which is present in both sectors, does not induce the same level of changes in the farming systems. Indeed, the conversion to organic farming for olive producers leads mainly to input substitution and requires modifications in the agricultural system management. In contrast, in pig production, it requires the farming system to be changed entirely. This is summarised in Figure 1 for the French pig sector. For this sector, because there exists a wide variety of quality labels, we were able to ask stakeholders to rank each one based on the changes in farming system induced by the environmental requirements, using a scale from 0 (no change) to 10 (radical changes).



**Figure 1.** Ranking of quality standards based on changes in the farming system in the French pig sector (from 0 (no change) to 10 (radical changes))—Authors' own.

### 3.2. Environmentally Friendly Practices Supported by Producer Organisations

#### 3.2.1. Environmentally Friendly Practices Developed in Producer Organisations

Table 2 summarises environmentally friendly practices supported by POs. It is worth repeating that here the term POs refers not only to formally recognised POs at the European level but also to informal farmer groups that may not be legally constituted. These environmentally friendly practices are not mandatory at the farm level but are supported by the POs taking part in the interviews in both case studies. The stakeholders interviewed mentioned disease, input, by-product, water, energy and waste management, and mechanisation as the main environmentally friendly practices they support in their organisations.

**Table 2.** Environmentally friendly practices supported by producer organisations according to the interviewed stakeholders.

Environmentally Friendly Practices	Pig Sector (Brittany)	Olive Oil Sector (Crete)
	(8/9 responses)	
Constraints imposed by public policies	<ul style="list-style-type: none"> <li>- Fertilising scheme within nitrate directive</li> <li>- Legal authorisation to produce for farms at risk from an environmental point of view (Installation classée pour la protection de l'environnement-ICPE)</li> </ul>	(1/11 responses) <ul style="list-style-type: none"> <li>- Avoiding using unauthorised pesticides</li> </ul>
		(4/11 responses)
Disease/pest management	(8/9 responses) <ul style="list-style-type: none"> <li>- Reduction in veterinary products (8/9)</li> <li>- Medication alternative (2/9)</li> </ul>	<ul style="list-style-type: none"> <li>- Adequate use of plant protection products (4/11)</li> <li>- Dacus oleae treatment via organic means (preparations) (1/11)</li> <li>- Cutting weeds instead of spraying herbicides (1/11)</li> <li>- Avoiding spraying close to beehives (1/11)</li> </ul>
	(9/9 responses)	(4/11 responses)
Input management	<ul style="list-style-type: none"> <li>- Achieving the best feed–conversion ratio (4/9)</li> <li>- Multiphase feeding (3/9)</li> <li>- Valuing the proteins in crop production (3/9)</li> <li>- Feed autonomy (3/9)</li> <li>- Own grown feed (2/9)</li> <li>- Reducing the use of imported soybeans (1/9)</li> <li>- Precision feeding (1/9)</li> </ul>	<ul style="list-style-type: none"> <li>- Adequate fertiliser management (4/11)</li> <li>- Planting of legumes (1/11)</li> <li>- Current trends of environmentally friendly fertilising (new forms of fertilisers, more friendly to the environment, e.g., non-chloride fertilisers) (1/11)</li> </ul>
	(7/9 responses)	
By-product management	<ul style="list-style-type: none"> <li>- Reduction in ammonia emissions (V-shaped scraper, covered ditch) (5/9)</li> <li>- Using manure on farm area—reducing chemical fertiliser use (3/9)</li> <li>- Precision technologies (soil and manure analyses, drones, etc.) (2/9)</li> <li>- Spreading slurry on cereal area (2/9)</li> </ul>	(8/11 responses) <ul style="list-style-type: none"> <li>- Shredding olive pruning residues (8/11)</li> </ul>
	(7/9 responses)	(3/11 responses)
Water and energy consumption	<ul style="list-style-type: none"> <li>- Investment in building to reduce energy consumption (7/9)</li> <li>- Investment in building to reduce water consumption (2/9)</li> </ul>	<ul style="list-style-type: none"> <li>- Adequate irrigation management (3/11)</li> <li>- Reducing carbon footprint (1/11)</li> </ul>
Energy production	(4/9 responses) Biogas plant, solar energy, and/or wind energy	
		(3/11 responses)
Waste management	(3/9 responses) Recycling, veterinary waste management	<ul style="list-style-type: none"> <li>- Appropriate disposal of empty packaging of plant protection products (2/11)</li> <li>- Delivering olives for milling not in plastic sacks (3/11)</li> <li>- Harvesting in pallet bins and not in nylon sacks (1/11)</li> </ul>

Note: the figures in brackets relate to the number of respondents mentioning the type of practices, out of the total number of respondents in the case study (9 in Brittany and 11 in Crete).

In France, POs support some environmentally friendly practices which are not embedded in quality labels. These environmentally friendly practices fall into several categories: input management, e.g., a low feed–conversion ratio which generates less polluting manure; by-product management, e.g., farmers reducing their use of chemical fertilisers; and energy production, e.g., biogas plants. These practices are usually not required in the quality labels because consumers often do not value them. However, they can be cost-reducing technologies and/or bring value to a by-product. In the French case study, eight out of nine people interviewed quoted compliance with public policies as an environmentally friendly practice. They consider that their organisation has a crucial role in helping farmers to adapt their farming system to new constraints set by public policies. Table 2 also shows that in Brittany's pig case study, the practices most mentioned by respondents were: one practice in the category of disease/pest management, namely the reduction in veterinary products (8/9 responses); and one practice in the category of water and energy management, namely investment in building to reduce energy consumption (7/9).

In Crete, the interviewed organisations support environmentally friendly practices that are not mandatory at the farm level. The organisations usually suggest these practices to producers who do not produce under a specific quality label. Only one practice, delivering olives for milling not in plastic sacks, is mandatory in three of the interviewed organisations. Interestingly, these three organisations are among the four interviewed organisations that do not produce PDO olive oil (since they are not in PDO regions). We believe that the interviewed organisations that produce PDO olive oils did not mention this practice during the interview either because it is already included in the PDO specifications, or because the respondents did not consider this practice to be environmentally friendly. Furthermore, Table 2 shows that the majority of the practices concern disease and input management. Finally, the practice supported by the majority of the interviewed organisations (8/11) is the shredding of olive pruning residues, in the category of by-product management.

### 3.2.2. Producer Organisations' Advice and Support

In Brittany's pig sector, POs develop technical advice and training to help farmers change their agricultural practices. All of the POs taking part in our survey provide farmers with advice on the following topics: technical and economic aspects; environment; animal health (one PO does not directly provide this service but has a partnership with a vet); animal nutrition; and building conception. The POs employ, on average, one adviser for every 13 to 30 producers. Regarding the environmental advice to comply with regulations, one PO has chosen not to develop this skill and relies on the extension services of the agricultural chamber. POs provide most advice free of charge; however, all members mutually support their costs in their membership fees. All of the POs also provide voluntary training to producers. To develop training, some of them mainly rely on their advisors' skills and invite external experts when offering training sessions about specific topics, whereas other POs rely solely on external training centres. Moreover, some of the POs carry out research and development programmes in their own experimental research units or conduct field experiments on their members' farms. Regarding environmentally friendly practices, the objectives of the POs are not only to develop new processes or decision tools, but also to provide scientific evidence about their efficiency.

In the Cretan olive oil sector, all organisations taking part in our survey provide technical advice to farmers on environmentally friendly practices. The provision of advice is mainly oriented towards farmers who are members of POs, while limited advice is given to the remaining farmers. Some of the interviewed organisations provide advice only to the members of the POs (four of them). More specifically, as many POs are involved in support programmes for the olive oil sector, advisory services are given to the members by agronomists (usually external contractors) during scheduled meetings and seminars, as well as on members' farms. These seminars are open to the public. It is worth mentioning that one of the agricultural partnerships taking part in the interviews in Crete participates in projects related to agroecological practices that are co-funded by the EU LIFE Programme.

Currently, it participates in the projects LIFE GAIA Sense and LIFE AgroClimaWater, where a small number of producers takes part in each project (20 producers per project). The farms selected for the projects should apply agroecological practices on one part of their area only, in order to compare results with the remaining part not under agroecological practices. For the rest of the producers, advice is provided through the scientific staff of the organisations mainly during the milling or payment periods. Furthermore, it was mentioned by respondents that agronomists who work in the agro-input stores of the cooperatives and agricultural partnerships provide advice to the producers on a daily basis.

To sum up, in the pig sector, technical advice is well organised, provided on a regular basis, and all members can benefit from it. The main reason is that pig farms have to comply with a strong regulation on nitrates. We observed a less organised advisory system in Crete. This reflects the current situation in Greece in general. Nowadays, agricultural advisory services in Greece are encountering several challenges, which in turn indicate an imperative necessity for their reformation, shifting in parallel to a systemic approach [40]. More specifically, we observe the absence of the national level organisations from any advisory activities, which mainly allows private agronomists to offer advisory activities. However, those advisory activities only include a relatively narrow spectrum of advice related to EU programmes and simple technical issues [41].

### 3.2.3. Reasons for Producer Organisations Supporting Environmentally Friendly Practices

Interviews in the Brittany pig case study showed that all POs support changes in agricultural practices for economic reasons rather than environmental reasons. Some environmentally friendly practices are indeed cost reducing at the farm level. It is worth mentioning that the quality labels described in Section 3.1 allow farmers to get a price premium. Moreover, the POs encourage environmentally friendly practices to secure their markets. They can increase their market shares in existing markets or create new market opportunities.

Similar findings are highlighted in the Cretan case of the olive oil sector, as 7 out of 11 respondents stated that their organisations support environmentally friendly practices in order to produce a higher quality product. Among the reasons for producing a higher quality product were to meet market demands, to be more competitive in the market (especially the export market), and to obtain higher prices, which is a strong incentive for the producers. Among these seven respondents, one highlighted that by encouraging environmentally friendly practices, the role of the agricultural partnership, which is to improve the quality of the product in order for the producers' product to gain added value, is fulfilled. In addition, one of these respondents underlined the importance of supporting environmentally friendly practices as the only way to promote Cretan products. Finally, a further reason indicated for supporting environmentally friendly practices was the reduction of quality risk. More specifically, the person interviewed stated that, as the cooperative produces olive oil from "common stack" (milling olives originating from various producers at the same time), a producer who has a bad quality crop can affect the quality of the common olive oil.

Furthermore, two respondents in Brittany's pig sector highlighted the need to favour environmentally friendly practices to ensure farm sustainability and viability. This is also found in the Crete olive oil sector as two respondents cited viability reasons. One explained that favouring environmentally friendly practices ensures the viability of the producers, and thereby the viability of the company, while the other person pointed out that it is important for the viability of the local community since its economy relies on olive oil production.

Finally, a few respondents mentioned social factors. In the pig sector, they indicated meeting society's demand and enhancing the acceptability of pig production. In Crete, the company's environmental consciousness was mentioned by a respondent as a reason for encouraging environmentally friendly practices, while another respondent pointed out, aside from having a good product in the market being an asset, their love for the specific job.

#### 4. Discussion and Conclusions

In this paper, we contributed to the scarce literature investigating how economic actors in food supply chains influence the adoption of environmentally friendly practices by farmers. Environmentally friendly practices are understood here to be farming practices that contribute to maintaining or improving the state of the environment. Two particular aspects of the supply chains were considered in our study: firstly, the quality labels, whether specifically targeted at improving the environment or indirectly integrating environmentally friendly practices; and secondly, the incentives provided by POs. The study was applied to two case studies: the pig sector in Brittany (western France), and the olive oil sector in Crete (Greece). Qualitative interviews with stakeholders in POs were carried out in 2019.

Our study highlighted the existence of European public labels in both case studies (in particular, organic farming or PDOs), a couple of national schemes in both case studies, and a proliferation of private quality labels in the pig sector in Brittany. However, many of the labels are not specifically aimed at improving the environmental impacts of farming through environmentally friendly practices, but rather focus on improving animal welfare or sanitary quality. It can also be underlined that an economic motive is the strongest reason for support of environmentally friendly practices in Brittany's pig sector. This is also a strong motive in the Cretan olive oil sector, with the aim of promoting Cretan products and gaining export shares. Furthermore, it is worth noting that the pig sector faces difficulties in putting a value on the labelling of environmentally friendly practices on all pig products. French consumers are mainly interested in labels when buying ham and do not take them into account for fresh meat.

Our study also confirmed the literature suggesting that POs are getting more involved in the adoption of environmentally friendly practices on farms, although this is not originally a core role of POs. For example, a review across the EU found that, among the 225 POs surveyed in the crop, beef and veal, and olive oil sector, more than 60% of the respondent POs provided their members with promotion and assistance in applying environmentally friendly practices, an almost similar level to those who indicated a role in the stabilisation of producer prices [42]. For the specific case of olive oil, the review found that promotion and assistance in applying more environmentally friendly production practices was present in 80% of the POs that participated in the survey. However, the review also found that management of by-products was implemented by 63% of the olive oil POs, while this is not something that was mentioned in the interviews that we conducted in Crete.

A clear finding from both our case studies is the role of advisory services. All organisations taking part in our survey provide technical advice to their members, whether through research programmes (research and development programmes on pig farms in Brittany), specific events (agronomic meetings in Crete), or on the spot, e.g., when producers come to deliver their olives to the mills. In Crete, it should however be underlined that the advisory services about technical issues are provided mainly to the members of POs that are recognised by public authorities, through their participation in EU support programmes, while only limited advice is extended to other farmers. Given the situation of the Greek agricultural cooperatives—a great number are still under structural reorganisation—the findings revealed that EU olive-oil support programmes are a valuable tool which enhance the role of cooperatives by providing some form of help (advice, equipment, AGRO 2 certification) to their members. Furthermore, AGRO 2 certification plays an important role as the POs' agronomists maintain close contact with the farmer members, supporting the latter in various tasks (such as frequent provision of advice, assistance in record keeping, and protection against the speculative intentions of some agro-input store owners) [41]. They constitute an exception to the previously mentioned situation of the advisory services in Greece.

Another issue for further discussion is the multidimensional aspects of quality labels. For example, PDO labels, through their strong linkage to geographical origin and the product attributes associated with the intrinsic environmental factors (natural and human), as stated in the European regulation 1151/2012, may play an essential role in working towards sustainable development goals. GI products

can be an important contributory factor in all three dimensions of sustainable development (economy, environment, and society) at a territorial level [43]. According to a study carried out in 120 olive groves in Greece, the application of a proposed set of simple environmentally friendly practices (e.g., no-tillage, mulching of pruning residuals, supply of organic material) can enhance agroecosystem resilience and help Mediterranean olive groves to adapt to climate change [44]. The authors of this study also suggest the incorporation of the results in the agri-environmental national policy framework of the Mediterranean countries, to strive towards a circular economy.

Overall, future policies should take into consideration quality labels in the design of financial instruments, as they might constitute a powerful tool in fostering sustainable development. For example, in Crete AGRO 2 may serve as a particularly useful environment-oriented instrument in the design of future agri-environmental policies at both the national and EU levels. Public support for POs might also be incorporated in the design of policies, even more so as farmers consider such experts to be an informed and trusted source of knowledge for making their decisions [26,45,46]. This may come in the form of the legal recognition and support for an association of POs, as recommended for the Irish beef industry [27]. Associations of POs may be a more efficient alternative to scattered POs in providing advisory services to farmers, as it may favour the exchange of knowledge between POs, increase the complementarities, and decrease the cost. The implementation of this may be even more possible in a small area like Crete. In France, as early as 2009 when implementing the EU Farm Advisory System regulation, the government supported the networks and interactions between existing organisations instead of creating new advisory services [47]. Government may also intervene in the capacity building of advisors and improve access to references from research or practitioners. This was, for example, assessed as lacking for the specific case of advisory services aimed at sustainable soil management practices in EU farms [48]. To sum up, governance of quality schemes with the appropriate information tools through POs will enhance the adoption of environmentally friendly practices, the agricultural sector's sustainability, and territories' development in the long term.

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