

Assessing the Sustainability of Typical Agro-Food Products: Insights from Apulia Region, Italy

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1. Introduction

The achievement of sustainable food security was pointed out at the 10th meeting of the Ministers of Agriculture of CIHEAM Member States, held in 2014, in Algiers, as a priority in the Mediterranean region. Such an exercise might involve projects on sustainable development in the rural areas, sustainable food systems, as well as valorisation of quality products or promotion of the Mediterranean diet (CIHEAM, 2014).

The unsustainability of the global food system is now well recognized (Godfray *et al.*, 2010; Foresight, 2011; FAO, 2012a). Unfortunately, the Mediterranean region is no exception. Current Mediterranean food consumption patterns are not sustainable and are putting increasing stress on Mediterranean ecosystems and social systems. They are important drivers of environmental degradation. The social and economic costs of diet-related illnesses are straining individuals, families and national healthcare budgets (Capone *et al.*, 2014). There are strong linkages between food security, responsible environmental stewardship and greater fairness in food management. They intersect in agricultural and food systems at global, national and local levels (HLPE, 2014a).

Abstract

Typical agro-food products are the cornerstone of the Mediterranean diet. For an effective valorisation of these products, it is important to combine tradition, innovation and sustainability. The paper aims to describe the methodological approach adopted and to list the sustainability criteria identified together with a preliminary set of indicators enabling to assess the environmental, economic, social and cultural, nutritional and health sustainability of Apulian agro-food products. These activities were carried out in the framework of "Agriculture & Quality" programme (2012-2015) of Regione Puglia, whose main objective was to qualify and enhance typical food products through the creation of the quality scheme "Quality Products of Apulia". The methodological approach, developed thanks to focus groups, will be validated on representative agro-food supply chains of Apulia region with a view to its upscaling to include other Mediterranean areas.

Keywords: quality typical products, sustainability, guidelines, indicators, Apulia region.

Résumé

Les produits typiques sont la pierre angulaire de la diète méditerranéenne. Pour une valorisation efficace de ces produits, il est important d'intégrer tradition, innovation et durabilité. Cet article a l'objectif de décrire l'approche méthodologique adoptée et d'énumérer les critères de durabilité identifiés avec un ensemble d'indicateurs préliminaires permettant d'évaluer la durabilité environnementale, économique, socio-culturelle et nutritionnelle des produits agro-alimentaires de la région des Pouilles. Ces activités ont été menées dans le cadre du programme «Agriculture & Qualité» (2012-2015) de la région des Pouilles, dont l'objectif principal était la qualification et la valorisation des produits typiques à travers la création du régime de qualité «Produits de qualité des Pouilles». L'approche méthodologique, développée grâce à des groupes de discussion, sera validée sur des filières représentatives de la région des Pouilles en vue de son adaptation et adoption dans d'autres territoires méditerranéens.

Mots-clés: produits typiques de qualité, durabilité, lignes directrices, indicateurs, région des Pouilles

Sustainable diets (FAO, 2012b) are the cornerstone of sustainable food systems. The notions of sustainable diets and sustainable food systems are receiving increasing interest in the on-going effort for addressing challenges with which food systems are confronted to ensure food and nutrition security. While differing in focus and scope, these two notions are closely linked. As a matter of fact, diets cannot be isolated from a food system; they drive it and are conditioned by it. Therefore, it is legitimate to state that sustainable diets are both an objective and a driver of sustainable food systems. That is why understanding the relationships between diets and food systems is key for assessing and improving food sustainability (Meybeck, 2015). According to

Gitz (2015), sustainable diets and sustainable food systems are closely linked. The strength of the diet contribution to sustainability of the food system is what characterizes the diet sustainability. Sustainable diets are not only an objective but an essential means, a key driver, to achieve the transformation of food systems towards sustainability.

Changes in both food consumption and food production are important to ensure more sustainable food systems and to achieve food security in the Mediterranean region. Diet sustainability is crucial for achieving food and nutrition security (Capone *et al.*, 2014b). According to the *Rome Declaration on Nutrition* - one of the main outcomes of the Second International Conference on Nutrition (ICN2), all components of food systems - including production, processing

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and distribution - should be sustainable, resilient and efficient in providing more diverse foods in an equitable manner, with due attention to environmental and health impacts (FAO and WHO, 2014).

Diets are based on a series of agro-food products that are consumed in a certain way so as to integrate not only nutritional aspects, i.e. meeting dietary needs, but also the socio-cultural ones which reflect personal and collective food preferences. The diet composition drives the demand for and production of specific foods, with environmental, economic and social impacts. Generally, these can be assessed only using generic indicators unless the product origin can be traced back and there are means to better assess specific impacts in the area of origin and along the food value chain (Meybeck, 2015). Typical and traditional products give the opportunity to carry out an accurate assessment of sustainability as their origin is well-known.

Typical and traditional high quality agro-food products of Apulia region (Regione Puglia, 2010), south-eastern Italy, play an important socio-economic role, because this region has a strong agricultural vocation counting on culture, tradition and biodiversity. The peculiarities of the regional area are essential for the product typicality. These peculiarities are related to different regional endogenous factors including climate, biodiversity, ecosystems, production and marketing techniques, knowledge, habits, customs and traditions. Sustainability provides a way to meet new consumer demands and it is also a means for enhancing agricultural and food products. An important challenge for agro-food products, in Apulia, and in Italy, is to combine tradition and innovation, so that consumers, the community and the whole chain are guaranteed high quality products which are also economically, environmentally and socially sustainable.

One of the main challenges impeding the development of sustainable food systems and diets is that related to the assessment of sustainability (e.g. Lacirignola *et al.*, 2012; Dernini *et al.*, 2013). Therefore, it is of paramount importance to develop a scientifically-sound and easily applicable methodology to analyse the sustainability of agro-food products on which diets and food systems are based. Meybeck (2015) recommends distinguishing between the characteristics of diet sustainability and a better clarification of their potential contribution to the sustainability of food systems in order to facilitate the assessment and improvement of sustainability of present diets and food systems.

There is a need to promote a broader assessment of the links between health, nutrition, local food products and sustainability, with traditional and typical foods at their epicentre (Trichopoulou, 2015, Ait Hou *et al.*, 2015). As Adinolfi *et al.* (2015) put it, sustainability assessment focus (diet, food supply chain, food system) and geographical coverage should be clearly defined for the selection of appropriate indicators.

The objective of this paper is to provide a preliminary set of indicators to assess the sustainability of Apulian agro-food products adhering to the regional quality scheme

“Quality Products of Apulia”. The paper describes also the methodological approach adopted and lists the sustainability criteria identified.

2. Materials and Methods

A pilot activity was carried out between 2012 and 2015 in the framework of the *Agriculture & Quality* programme of *Regione Puglia* (Regional Government of Apulia), to assess the sustainability of the typical food products of Apulia region, Italy, under the voluntary regional quality scheme “*Prodotti di Qualità Puglia*” (Apulia Quality Products, PdQP). The main objective of this programme is the qualification and enhancement of typical food products of Apulia region, through the creation of the PdQP regional quality scheme. The voluntary quality scheme aims to ensure origin and quality of agro-food products from Apulia region by complying with the reference product technical specifications approved by *Regione Puglia*.

The inter-sectoral and interdisciplinary approach applied in this study to assess the sustainability of Apulian high quality agri-food products takes into account the three dimensions of sustainable development (environmental, economic, social and cultural) and integrates the health-nutritional component, in view of the objective set. For each dimension, a working group was set up bringing together experts from different Italian institutions. The activities were coordinated by the staff of CIHEAM Bari.

The methodology adopted was particularly focused on the inter-sectoral relation between the four dimensions of sustainability. The working groups held a number of brainstorming sessions and conference calls to identify and refine the selection of indicators. Each working group identified indicators which were relevant, specific, easily measurable at farm level, appropriate and easy to understand and communicate to all stakeholders, including farmers, politicians and consumers.

In line with SAFA – the Sustainability Assessment of Food and Agriculture Systems approach (FAO, 2013) – different types of indicators were considered: *performance-based*, *practice-based* and *target-based* (Box 1).

Box 1. Types of used indicators

Performance-based (result-oriented or outcome) indicators: are focused on the results of compliance with an objective and can measure the performance of an operation, identify trends and communicate results.

Practice-based (prescriptive or process) indicators: prescribe the necessary tools and systems which have to be put in place to ensure best practices. The cause-effect relationship between a given practice and a result is however never precise. One can assume that a practice may yield a desired result but with a substantial margin of error.

Target-based indicators: these indicators focus on whether the company has plans, carries out policies or monitoring activities, with targets and ratings based on steps towards their implementation.

Source: FAO (2013).

Most of the developed indicators refer to the products (cf. product-based approach) but some of them refer to the producing farms/companies (cf. corporate-based approach) as they are not specific to single products and depend on the whole management of the agro-food company. The product-based approach was adopted to explore some sustainability issues regarding the environmental and nutrition-health dimension, while the corporate-based approach was used mainly to deal with some issues concerning the economic, socio-cultural and nutrition-health dimensions.

For each indicator, a data sheet was prepared including the following: *definition of indicator*; *calculation method* (in this field the data needed to calculate the indicator and the data collection method were also specified); *sustainability benchmark*; and *other useful information* (limits on the use of the indicator – for example validity only for fresh/non-processed products or only for plant origin products; link with other indicators; references; etc.).

A hierarchical approach was used for the definition of the indicators; from sustainability principles to criteria and from criteria to indicators. For each sustainability criterion, one or more indicators that refer either to the products or to the businesses producing them were identified. A rating and scoring system was developed for each indicator; from 0 (unsustainable) to 10 (very sustainable) with 5 corresponding to the sustainability benchmark value. The sustainability benchmark value, which was defined for each indicator and for each supply chain, expresses in a simple, objective and numerical way the threshold of sustainability based on which a product, and/or the company that produces it, can be considered sustainable or a specific sustainability dimension. This value was defined taking into account the average performance of the Apulian agro-food enterprises. A farm is considered sustainable if it has a minimum average score of 5/10 for each of the four sustainability dimensions.

3. Results and Discussion

A description of the guiding principles for the identification of sustainability criteria and issues is provided here for each dimension, along with the list of the preliminary indicators. The sustainability criteria have been defined for each of the four sustainability dimensions in relation to the characteristics that an agro-food product and/or production process should have in order to be considered “sustainable”.

3.1. Sustainability issues, criteria and indicators

a) Environmental dimension

Environmental sustainability is the ability to preserve the three following environmental functions over time: i) resource supplier, ii) waste receptor and iii) direct source of goods. Environmental sustainability is also meant to be the ability to add value to the environment of the community area, while ensuring the protection and renewal of natural resources and heritage. Considering sustainability in relation to the environment and the natural resources means taking into account the impacts that the production processes may cause, the use of low

impact cropping practices and tools, and the presence - within the businesses - of plans, policies or environmental monitoring systems involving the achievement of environmental objectives towards environmental sustainability.

Special emphasis is to be laid on agro-biodiversity, by applying an ecosystem-based approach which takes into account the preservation of the agricultural landscape as well. Biodiversity is considered from a genetic and natural point of view and it represents both an environmental sustainability index and a resource to preserve. Biodiversity is to be managed and preserved at various levels, from the field to the farm agro-ecosystem, throughout the ecological infrastructures which ensure the presence of on-farm associated biodiversity and contribute to the supply of environmental services.

The supply chain should commit itself to the implementation of an environmental management system aimed at reducing environmental impact and at preserving biodiversity. The main objectives are the improvement of resource use efficiency, above all as regards water and energy resources and chemical inputs (fertilizers, pesticides). Agriculture has inevitably a significant impact on soils; for this reason, all measures and techniques which can reduce soil degradation and impoverishment e.g. suitable growing and fertilization practices have to be adopted. Pollution should be minimised and by-products and wastes should be managed in an environmentally sound way and, where applicable, be recovered, re-used or re-cycled. It is also important to support a farm and chain organization keen to reduce losses throughout the agro-food production pathway.

The identified environmental indicators are reported in table 1.

An example is reported in box 2 to illustrate how the rating/scoring system was applied to the indicators.

b) Economic dimension

The economic sustainability is defined as the ability to generate durable growth of economic indicators, notably the ability to generate income and employment for the population livelihood. In a community-based system the economic sustainability entails the ability to produce and maintain the highest value added within the community area, by combining resources effectively, with a view to enhancing the specificity of products and community services.

The economic sustainability of a product or of an agro-food chain is the ability to continuously generate income and employment throughout the production, processing and distribution activities. This would result, on the one hand, from the capacity to improve production techniques so as to cut production costs and increase production efficiency and, on the other, from the ability to improve quality standards in commercial terms, while maintaining the intrinsic features of the original product.

One of the main sustainability criteria concerns labour profitability as well as the revenue-generating ability of other production factors (i.e. land, labour). Another important factor is productivity, meant as the effectiveness with which agriculture and the food industry convert the production factors. The rise in productivity means that a higher yield may be obtained using the same amount of inputs.

Table 1 - Preliminary list of environmental indicators.

| Topic | Indicator | Description of indicator |
|--|--|---|
| Land use and management | Application of soil conservation practices | Quantitative indicator aimed to evaluate the on-farm application of practices directed towards the conservation/improvement of the physical and chemical, and biological properties of the agricultural soil |
| | Soil erosion protection (SEP) | Quantitative indicator aimed to evaluate the on-farm application of practices directed towards the reduction of wind and water erosion risk |
| | Input of nitrogen fertilisers | It provides an estimate of the rate of application of nitrogen-based substances in the fertilisable UAA (Utilised Agricultural Area normally fertilised) |
| | Input of plant protection products | It provides an estimate of the rate of application of plant protection products in the treatable UAA |
| | Use of agricultural machinery | It provides an estimate of agricultural machines trafficking intensity in the normally mechanized UAA (Utilised Agricultural Area) for cultural operations (planting, main and complementary preparatory works, field works, weed control and plant protection treatments, harvest operations) and an indirect assessment of the deteriorating action caused on the soil physical properties. |
| Biodiversity | Crop diversity (DC) | This indicator is aimed to assess on-farm crop diversification practices, meant as a sustainable alternative to monocropping |
| | Number of farm animal species (NSAA) | This indicator is aimed to assess the diversification of on-farm bred species, which enables the optimisation of production processes, the upgrading of by-products, and the improvement of biodiversity associated with production processes |
| | Tree plant density (DCA) | Ratio of the number of fields grown with tree plants to the farm utilized agricultural area |
| | Herbaceous plant diversity (DCE) | Ratio of the number of fields grown with herbaceous plants within the farm to the utilized agricultural area |
| | Presence of cover crops (PCC) | Weighted average of the permanence of cover crops as against the agricultural area (UAA) excluding the set-aside |
| | Legume crop density (DCL) | Ratio of the number of fields with legumes to the farm utilized agricultural area |
| | Patch average area (GA) | Mean size of farm holdings |
| | Semi-natural habitat surface (SHS or EFAs) | Percentage of semi-natural habitat surface over the total farm area |
| | Duration of rotations (DAV) | Number of years relating to the rotations of existing farm crops |
| | Diversity of varieties and animal breeds (DVAB) | Number of on-farm plant varieties and animal breeds raised for production |
| | Varietal diversity (DV) | Number of on-farm plant varieties |
| | Number of plant varieties threatened by genetic erosion (NVVg) | Number of on-farm traditional, local plant varieties and varieties threatened by genetic erosion |
| | Number of animal races (varieties) (NRAA) | Number of races bred for strictly productive purposes |
| | Number of animal races (varieties) threatened by genetic erosion (NRAg) | Number of on-farm traditional, local animal breeds and races threatened by genetic erosion |
| | Energy | Energy Intensity (IE) |
| Climate change | Final Energy Consumption (FEC) | This indicator is aimed to monitor the use of direct energy at farm level and measures the energy spent for cultural operations, heating, irrigation and different agricultural activities (drying, milling, pressing, cheese-making, slaughtering, etc.) |
| | Mineral Fertilizers Consumption (MFC) | This indicator is aimed to monitor the consumption of the primary energy contained in mineral fertilisers used on the farm |
| | Pesticide Consumption (PC) | This indicator is aimed to monitor the consumption of fuel energy used to produce the plant chemicals or fossil energy sources belonging to the primary feedstock of the plant protection products used on the farm |
| | Lubricant Consumption (LC) | This indicator is aimed to monitor the consumption of fuel energy used to produce lubricants for agricultural machines (tractors and farm machines) |
| | Plastic Material Consumption (PMC) | This indicator is aimed to monitor the consumption of the energy used to produce the plastic materials used in the farms |
| | Use of off-farm animal feeds (FC) | This indicator is aimed to monitor the consumption of the fuel energy used to produce the animal feeds that are not produced within the farm but are purchased |
| Use of chemical inputs (fertilisers, soil amendments, conditioners, plant protection products) | Nitrogen consumption (N tot) | This indicator is aimed to assess the N inputs applied at farm level as against the regional means |
| | Use of total phosphorus pentoxide (P ₂ O ₅) (P tot) | Cf. Box 2 |
| | Use of fungicides (F tot) | This indicator is aimed to assess the inputs of fungicides applied at the farm level as related to the regional means |
| | Use of insecticides and acaricides (Ins tot) | This indicator is aimed to assess the inputs of insecticides and acaricides applied at farm level as against the regional means |
| | Use of herbicides (Herb tot) | This indicator is aimed to assess the inputs of herbicides applied at farm level as against the regional means |
| Environmentally sound management of production scraps, by-products and waste | Method for the management of production scraps, by-products and waste | Proposed qualitative indicator measuring the sustainability in the management of production scraps, by-products and waste at the level of agribusinesses. |

Another distinctive feature of sustainability is the appropriate and effective price transmission and distribution of the value created across the components of the agro-food chain with income-stabilising consequences for both the entrepreneurs and the workers. This allows for an equitable allocation of the added value amongst the operators, thus strengthening relational links within the community area and stability in trade.

Another important feature of economic sustainability is the willingness to invest in both corporate development and positive externalities for the local economy. The latter is crucial for sustainability because the durability of corporate activity may be ensured only through investments in technical and organisational innovations.

The list of economic indicators is included in table 2.

c) Sociocultural dimension

Social sustainability is defined as the ability to ensure equity in quality of life and human well-being conditions, regardless of class and gender. It regards workers, entrepreneurs, citizens-consumers and local community, in general. Within a community-based system, social sustainability is intended to be the community's ability to operate together, effectively, sharing the same concept, being mutually supported by joint efforts. The sociocultural dimension should be framed within the sociocultural context in which it is applied. Concerning the food-related cultural dimension, it is paramount to consider the community's own distinctive and traditional features which represent the product original identity. Food products and businesses may be considered sustainable from a sociocultural point of view provided that they meet the following requirements:

1. Access to resources, social services and human capital based on equity among social groups, actors and between men and women involved in the agro-food chain;

2. Cultural value recognized by the community (use of local resources, distinctiveness of production history and tradition, shared knowledge at local level, close link with the community-based area, etc.);

3. Product capability and potential to maintain its sociocultural peculiarities over time, to spread among present generations and be passed on future generations.

Sociocultural criteria concern, among others, worker protection (safety and health conditions at work, training and skills) and the world of relations (community, legality, family, transparency and communication due diligence) as well as animal welfare. In fact, actors should engage themselves in the implementation of an ethically sustainable management

Box 2. Scoring system applied to total phosphorus use indicator.

Phosphorus pentoxide (P₂O₅) use is an indicator aimed to assess phosphorus input at farm level. The indicator is calculated by dividing the total amount of phosphorus, expressed as total phosphorus pentoxide, used per ha of utilized agricultural area (UAA) on each farm. The sustainability benchmark value for phosphorus pentoxide use is 12 kg/ha, which represents the average phosphorus use by farms in Apulia region (ISTAT, 2014). Indicator values are converted into sustainability scores as follows:

| | | | | | | | | | | | | |
|---------------------------|---|---------|-------------|-------------|-------------|--------------------------|------------|-----------|-----------|-----------|-----|----|
| Indicator value intervals | Phosphorus fertilisation not based on soil analysis | P* > 24 | 24 > P > 21 | 21 > P > 18 | 18 > P > 15 | 15 > P > 12 (bench mark) | 12 > P > 9 | 9 > P > 6 | 6 > P > 3 | 3 > P > 0 | P=0 | |
| Sustainability Score | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

*P: Phosphorus input at farm level in Kg/ha.

system applied throughout the whole chain. At the same time, prevention of discrimination practices should be ensured.

Skills and knowledge of operators, including workers, should be improved by training. Of utmost importance is to encourage all initiatives aimed at supporting women's involvement in work and social inclusion of the most vulnerable groups of the local community.

Table 2 - List of preliminary economic indicators.

| Criterion | Indicator | Description of indicator |
|--|--|---|
| Income level and stability | Number of products and services produced by the farm | Number of farm products obtained within the farm. This indicator enables the evaluation of income source diversification. |
| | Distribution of the turnover among different products and services | Percent weight of the production value of the first product or non-agricultural activity. It is another indicator enabling the assessment of income source diversification. |
| | Heterogeneity or affinity of products and services supplied | It assesses the diversification of farm activities as a factor of resistance to commercial risks. This indicator also assesses the diversification of income sources at farm level. |
| | Index of commercial riskiness - suppliers | It assesses the diversification of suppliers as a factor of resistance to commercial risks. It expresses the level of concentration of suppliers, so that a probable commercial risk is associated in the purchase of the main raw material (none of the three suppliers holds a market share greater than 33%). |
| | Index of commercial riskiness - customers | It assesses the diversification of customers as a factor of resistance to commercial risks. It expresses the level of concentration of buyers/customers, so that a probable commercial risk is associated in the sale of its labelled products (none of the three first customers holds a market share greater than 33%). |
| Labour and employment | Index of localisation | Geographical index associated to the distance between producers and between producers and consumers that characterises the place-based links and the organisational forms of the <i>supply chain</i> of a given production activity A product is considered as local when at least 50% of the basic raw material comes from Apulia region or when the existing distance between the sites where the raw material is produced and the processing sites is less than 70 km |
| Investment | Specific investments for the improvement of sustainability performance | Investments or procedures adopted by the firm to reduce the negative externalities of the production activity (such as CO ₂ emissions, disposal of processing waste, low-carbon impact and energy saving production processes, etc...) and improve the product quality and organization efficiency. |
| Profitability and productivity of production factors | Index of gross profitability per labour unit | This indicator assesses the capacity to remunerate the firm's labour while highlighting the capacity to enhance production through the skills and efficiency of the employed labour. It is the ratio of gross sealable output to the total (on-farm plus off-farm) labour units employed in the firm. |
| | Rate of return on invested capital | Capacity to remunerate the firm's invested capital. It indicates the return and economic efficiency of the characteristic management, regardless of the sources used, so it stresses the capacity to maintain and refund the on-going activity in the long run. It is the ratio of the operational income to the net invested capital referred to the mean values of the two last years. |
| | Enhancement rate | Capacity of the firm or of a production system to enhance the product or rather the contribution of the production to create the transferred value to the chain downstream stakeholders. It is calculated as the ratio of the difference between the output value minus the cost of raw materials and of external services to the output value |
| | Rate of return of family labour | Capacity to properly remunerate the family labour employed in the firm, so as to ensure the continuity and development of the production activity. It is calculated as the ratio of the farm net income to the number of family labour units. |

The chain should put in place communication actions to involve the local community thus contributing to create channels for exchange and dialogue on production activities, their impacts and externalities. Incentive and encouragement measures should be taken to support the establishment of farmers' organizations or associations not only to improve the quality of local products and strengthen their competitiveness on the market, but also to stimulate social interaction between the different players of the chain.

Since sustainability also entails the preservation of culture and local traditions over time, typical and traditional products, with the related value and knowledge behind, should be regarded as an important source of identity and a legacy for the next generations.

The selected indicators for the social-cultural dimension are listed in table 3.

d) Nutrition-Health dimension

Agro-food products are sustainable from a nutritional-health point of view if they meet healthiness (safety and hygiene standards) and quality criteria (organoleptic, nutritional and dietary characteristics). The actors of the certified chain should undertake to reduce addition of saturated fats, trans fats, sodium and sugars during processing. Moreover, they should report on the label information and nutritional advice about the optimum frequency of consumption and the recommended intake for each typical product, for the purpose of transparency and traceability.

Food quality and safety within a business are not merely a technical issue but an organization and management concern for the whole business. Quality should involve a corporate choice in order to achieve regularly and not sporadically the quality level requested by the customer. Sustainability nutritional and

Table 3 - Preliminary list of socio-cultural indicators.

| Criterion | Indicator | Description of indicator |
|--|--|---|
| Life quality and human wellbeing of chain actors & corporate social and ethical responsibility | Companies' voluntary inclusion of social concerns in their activities | Companies' supply of tools to implement social responsibility principles |
| Women's participation in business production and management | Presence of women in business production and management | Percent of women on the farm |
| Social inclusion | Presence of disadvantaged groups in agribusinesses | Percent of disadvantaged groups in the agribusiness |
| Good relations with the local community | Collaboration with the local community, local authorities and civil society | Presence of activities other than the production/supply of farm products in collaboration with the local community, local authorities and civil society |
| | Social capital of agribusinesses | Social capital of Apulian agribusinesses and their link with the local community based on parameters such as the membership of cooperatives, organizations and professional and/or civil society associations |
| Promotion of local identity and transmission of traditional knowledge to the new generations | Activities other than agricultural production as a means for promoting the cultural identity | Number of these activities aimed to promote cultural identity (agri-tourism, direct sale of typical products, territorial development services, etc.) |
| | Preservation of traditions and local culture | Number of traditional products to which specifications are applied |
| | Inter-generation transmission of traditional knowledge | Presence of training-educational facilities (such as educational farms, nature and farmhouse kindergarten, etc.) |
| Workers' training planning throughout the chain | Workers' training throughout the chain | Presence of workers' training programmes in the production chain or inclusion of workers' training strategies in business planning. |
| Implementation of training and foreign labour inclusion programmes | Inclusion and training of foreign workers | Number of training courses planned by the business for the employment and social inclusion of foreign workers |
| Respect for animal welfare | Application of measures of animal welfare | Compliance with the provisions on the respect of breeding animals via the application of animal welfare measures |

health criteria range from the expected compliance with current regulations and mandatory prerequisites (e.g. HACCP system, traceability, labelling) to a number of certification and voluntary requirements – the business conform to – which enhance its value added.

The macro-indicators identified for the nutrition-health dimension are described in table 4.



3.2. Towards a Sustainability Certification System: Sustainability Guidelines

In the last phase of the pilot project the guidelines for the sustainability of Apulian quality agro-food products were drawn up, also including the criteria/issues related to the indicators. The guidelines for the application of the optional “sustainability” certification system under the Regional Quality Scheme (RQS) or other regulatory quality schemes comply with art. 16 of EU Reg. No. 1305/2013. The guidelines apply to whoever requests the authorisation to use the *Region's* “sustainability logo” (Fig. 1), and is applicable to both single businesses and groups of businesses joining a Quality Scheme and organized in chains. The guidelines define:

- the *Apulia region* sustainability approach concerning agriculture and agro-food products;
- the sustainability criteria for each dimension;
- the control system for the “Sustainability” standard;
- the procedures for authorizing the use of the “sustainability logo”.

The “additional sustainability logo” includes the symbols of all four sustainability dimensions referred to in the guidelines. It can be considered as an innovation aimed at protecting high quality typical local products – expression of the community and of the Mediterranean diet – via an interdisciplinary approach which takes into account not only environmental issues but also various aspects pertaining to food, habits, customs and traditions, healthiness and the community's economic benefits.

In order to use the “additional sustainability logo”, an agro-food business which applies to join the optional “sustainability” standard scheme must adhere to the additional inspection system, implemented by the same inspection bodies (IB) responsible for checking the compliance with the regional quality scheme (RQS) or other Quality Schemes recognised at Community level (i.e. PDO, PGI, TSG...). Inspections are based on criteria and methods defined in the control plans drawn up by the IB and approved by *Regione Puglia*.

Since *Regione Puglia* intends to avoid unnecessary repetition of inspections, businesses which have already been certified for one or more sustainability criteria can use their certification to prove their compliance with the present guidelines. First of all, the chain leader must apply for the use of the “additional sustainability logo”. The previously held certification will be assessed to determine whether it complies with the provisions of the present guidelines. *Regione Puglia* will then issue a written decision to recognise or not the equivalence of these certificates with the guidelines provisions.

Since the application for a sustainability management system in the agro-food chain is just a starting point, further steps must be taken to promote a virtuous process. Hence, an over-

Table 4 - Preliminary list of nutrition-health indicators.

| Criterion | Macro-indicator | Description of macro-indicator |
|--|---|---|
| - Healthiness and food safety - Quality - Tracking - Transparency as regards the information shown on the label | <i>Farm Distinctiveness</i> | This indicator takes into account the application of different regulations and standards as well as the origin of raw materials: - Regulation (EC) 852/2004 on the hygiene of foodstuffs - ISO 9001 quality management systems - ISO 14001 environmental management systems - UNI EN ISO 22000 food safety management systems - ISO 22005 Certification of traceability in the food and/or feed chain - ISO Technical specification 22002-2009 – Prerequisite programmes on food safety for food manufacturing - ISO Technical specification 22002-2011 - Prerequisite programmes on food safety at farming level - Product specifications: use of PDO, PGI and TSG-labelled food and raw materials Use of raw materials/products grown and/or reared in Apulia: Products of exclusively Apulian origin |
| | Nutritional quality of solid agro-food materials | This indicator takes into account the content of total fats, saturated fats, total sugars, sodium (salt). |
| | Nutritional quality of liquid agro-food materials | |
| | Nutritional quality by food ² groups | Cereals and cereal-based products: proteins; carotenoids (lutein plus zeaxanthin); vitamins (vitamin B1); minerals (potassium, phosphorus); beta-glucans Vegetable seasoning fats: total fats; monounsaturated fats (“oleic acid”); essential polyunsaturated fatty acids “omega 3 and omega 6 essentials”; vitamin E “tocopherols”; total polyphenols; hydroxytyrosol or free or bound tyrosols Animal seasoning fats: total saturated fatty acids; total monounsaturated fatty acids; total polyunsaturated fatty acids; fatty acids (stearic acid, oleic acid, linoleic acid a-linolenic) Milk and dairy products: proteins; fatty acids (short-chain, stearic acid, conjugate linoleic acid); vitamins (vitamin A, vitamin B2); minerals (calcium); taurine; microorganisms Fish: proteins; fatty acids (saturated, monounsaturated and polyunsaturated “omega 3” fats); minerals (potassium, phosphorus) Meat: proteins; (saturated, monounsaturated and polyunsaturated) fatty acids; mineral salts (iron, potassium and phosphorus); water-soluble vitamins (vitamin B12) Eggs: proteins; provitamins (carotenoids); water-soluble vitamins (vitamin A and vitamin D); mineral salts (calcium and phosphorus) Legumes: proteins; fibers; minerals (potassium, phosphorus, calcium and iron) Tubers: fiber; vitamins (vitamin C “ascorbic acid”); minerals (potassium, phosphorus, magnesium and calcium) Fruit White-coloured fruits: fiber; carotenoids (lutein and zeaxanthin); vitamins (vitamin C); mineral salts (potassium) Red fruits: carotenoids (lutein plus zeaxanthin, lycopene, β-carotene); vitamins (vitamin C); minerals (potassium, phosphorus, magnesium and calcium) Orange and yellow fruits: carotenoids (lutein plus zeaxanthin, cryptoxanthin and β-carotene); vitamin A “retinol”, vitamin C “ascorbic acid”; minerals (potassium, phosphorus and magnesium) Blue and purple fruits: carotenoids (lutein, β-carotene); vitamins (vitamin A “retinol”, vitamin C “ascorbic acid”); flavonoids (total anthocyanins); minerals (potassium, phosphorus and calcium) Green fruits: fibres; carotenoids (lutein plus zeaxanthin, β-carotene); vitamin C; minerals (sodium, potassium, calcium, iron, magnesium, phosphorus); flavonoids (anthocyanins) Vegetables White vegetables: fibre; vitamin C; minerals (potassium, phosphorus and calcium) Red vegetables: carotenoids (lutein plus zeaxanthin, cryptoxanthin, lycopene, β-carotene); vitamins (vitamin A “retinol”, vitamin C “ascorbic acid”); carbohydrates; fibre; minerals (potassium, phosphorus, magnesium and calcium) Yellow and orange vegetables: carotenoids (lutein plus zeaxanthin, β-carotene); vitamins (vitamin A “retinol”, vitamin C “ascorbic acid”); minerals (potassium, phosphorus, magnesium and calcium) Blue and purple vegetables: carotenoids (lutein and β-carotene); vitamins (vitamin C “ascorbic acid”); minerals (potassium, phosphorus, magnesium and calcium) Green vegetables: carotenoids (lutein plus zeaxanthin, cryptoxanthin, β-carotene); vitamins (vitamin A “retinol”, vitamin C “ascorbic acid”); minerals (potassium, calcium, magnesium, phosphorus and iron). |

² Critical nutrients, whose concentrations are taken into account for calculating the macro-indicator on the nutritional quality for each group of foods.

all sustainability approach has to be developed aiming at agro-food businesses which apply for the use of an “*additional sustainability logo*”. The defined sustainability criteria will be monitored to assess the initial conditions (to define *baseline* values) and the subsequent improvements needed. Therefore, the chain operators shall all be engaged in a continuing improvement process.

4. Conclusions

Traditional and typical quality foods can be at the epicentre of the Mediterranean food systems sustainability. They can also contribute indirectly to improve the sustainability of the Mediterranean diet in the Mediterranean region. The quality promotion of typical Mediterranean diet foods along with the use of a sustainability logo can contribute to an effective sustainable development of Mediterranean rural territories such as Apulia region.

Voluntary sustainability standards, as the ones developed through this pilot project, can help create value for small producers. Communities and cultures which maintain their own traditional food systems manage to better preserve local food specialties and enhance crop and animal diversity. The Mediterranean diet with its food diversity and quality offers a clear example.

The current pilot project represents a further milestone in the framework of the joint CIHEAM-Bari/FAO collaboration on the Mediterranean diet sustainability assessment, in the context of the Mediterranean sustainable food systems. The improvement of sustainable food consumption can be a driver towards a more sustainable food production with the final aim of fostering sustainable food systems in the Mediterranean area.

Therefore, the Apulian pilot project is of paramount importance to develop a scientifically sound and easily applicable methodology to analyse of the sustainability of agro-food products upon which the Mediterranean diet and the Mediterranean food systems rely.

Since this is a pilot experience, the methodological approach must be furthered by addressing the following pending issues:

- Better defining the weight to assign to each sustainability issue within each dimension;
- Refining the calculation of contextualized sustainability benchmark values for all indicators;
- Improving rating/scoring system to ease the indicator aggregation within sustainability dimensions;
- Developing a tool to visualize and communicate

the overall sustainability level of each product.

However, the most important challenge ahead is to complete the validation of the methodological approach on spe-

cific typical quality products representing the different agro-food chains in Apulia region.

That being said, it is also crucial to upscale the methodological approach and set of indicators including other Mediterranean areas and integrate them in the ongoing activities to assess the sustainability of Mediterranean diets and food consumption patterns.

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