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Review

The Role of Legumes in the Sustainable Mediterranean Diet: Analysis of the Consumption of Legumes in the Mediterranean Population over the Last Ten Years a PRISMA Statement Methodology

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Abstract: The Mediterranean model, introduced by Ancel Keys, has gained significant importance from the perspective of sustainability. This is why the Mediterranean diet is now called a sustainable diet. This study focuses on legumes, protein-rich foods of vegetable origin, cultivated in the area, as their production and use in cooking are highly sustainable. The analysis covers their consumption over the last 10 years in the entire Mediterranean area, looking specifically at Spain. The objectives of this work are to analyze the production of legumes in the Mediterranean area, taking into account the fact that they are an important environmental as well as food resource, and to analyze how the consumption of legumes has changed in certain countries bordering the Mediterranean in relation to social and cultural changes, with particular attention to the pandemic. The study shows how, in Spain, since 2020, the consumption of legumes has increased, demonstrating that in emergency situations, different dietary choices are made. In addition, it shows how legumes are an excellent source of vegetable protein and an important environmental resource from the perspective of sustainability.

Keywords: Mediterranean diet; legumes; sustainability; Spanish population; pandemia

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1. Introduction

Food represents the primary source of sustenance and is the means through which culture and society develop [1]. The concept of diet in the classical vision, as a lifestyle, takes into consideration the person holistically, both from a strictly biological point of view and from a cultural and social point of view [2].

The Mediterranean diet refers mainly to the geographical context of the Mediterranean basin and is defined precisely as the diet of the countries bordering the basin of the same name [3]. It involves significant consumption of cereal products both in the form of whole grains and processed products, such as bread and pasta, fruit and vegetables, and moderate consumption of pulses, fish, and red wine. The basic condiment is extra-virgin olive oil [4]. Therefore, when referring to the Mediterranean diet, we can include everything related to the eating style based on the balanced consumption of foods rich in fiber [5], antioxidants, unsaturated fats, and low in animal fats and cholesterol [6]. An important factor is the link between food, culture, traditions, conviviality, and health [7].

The Mediterranean diet has been distinguished as an UNESCO Intangible Cultural Heritage as a result of international collaboration between Italy and Spain [8], with the dual objective of: (1) effectively defending the Mediterranean diet and the quality of its production; and (2) ensuring the Mediterranean agriculture and market is as strong and competitive as possible [9].

That bureaucratic framework has helped to establish the fundamental points on which the Mediterranean diet must be based: the cultural element, the lifestyle, the sharing of meals (family, community, etc.), the strong connection of the local communities with the territory, the geographical diffusion within each country (markets, ports, villages, cities, roads, etc.), local traditions, and finally the nutritional and health value of this type of diet [10].

In 2010, FAO and Bioversity International organized, in collaboration with CIHEAM-Bari and INRAN, an international scientific symposium on "biodiversity and sustainable diets", in which a consensus position was reached on a definition of "sustainable diets", as follows: "Sustainable diets are those diets with low environmental impacts that contribute to food and nutrition security and to healthy life for present and future generations. Sustainable diets are protective and respectful of biodiversity and ecosystems, culturally acceptable, accessible, economically fair and affordable; nutritionally adequate, safe and healthy; while optimizing natural and human resources" [11]. Within this definition, on this occasion, the Mediterranean diet was acknowledged as a sustainable diet example.

Specifically, we have focused on legumes, as they are foods commonly present in the Mediterranean diet. They provide proteins of vegetal origin that, when combined with the proteins of low biological value of cereals, satisfy daily protein requirements [12]. Additionally, legumes enrich the soil with nitrogenous substances essential for the growth of all agricultural products. The Mediterranean diet and sustainable diet converge in the consumption and production of legumes. Hence the idea of a synthesis of these concepts, taking into consideration some of the countries on the Mediterranean and specifically the Spanish population. Spain has a significant production of legumes and a high consumption rate, given the fact that legumes are key ingredients in many typical Spanish dishes [13].

This paper, taking legumes into consideration, aims to analyze the production and consumption of a highly sustainable food product typical of the Mediterranean diet. The paper also looks at what is being done today to increase consumer awareness of food choices and reduce the consumption of those products that have a high environmental impact in favor of those, such as legumes, that have a low environmental impact [14].

2. Materials and Methods

The systematic search using the PRISMA methodology [15] conducted on the Web of Science and on the Scopus and Google Scholar databases, made it possible to retrieve the most relevant articles related to the topic addressed. The search was conducted with the Boolean operator "AND" and a set of keywords, specifically: "Mediterranean diet" and "legumes" and "sustainability".

For the selection of the articles, we have followed the PRISMA Statement methodology. The articles cover a time period from 2013 to 2023, returning a total of 17,615 articles, all related to the keywords used in the search, excluding articles present in duplicate. We made the choice to analyze only the relevant articles, i.e., 6330, thus excluding 11,285 articles that concerned analyses carried out in a geographical context different from the one chosen. Subsequently, the titles and abstracts of the articles were assessed to determine their relevance to the study before being downloaded. Thus, 530 texts were analyzed in their entirety, excluding 5800 texts because they dealt with topics not covered in this review. Therefore, 200 scientific articles were considered for this review because of their approach to the concept of sustainability of the Mediterranean model of living in Europe.

The full texts of these 200 articles were downloaded for further screening by reading the abstracts and the full text, with an in-depth analysis of their objectives. Specifically, the study of legumes as a key protein source in the Mediterranean diet and as a sustainable food resource was reviewed. The final screening produced 89 articles.

Material from the internet was added to the articles as recent statistical data and tables on food composition were taken into consideration. Specifically, the data on the consumption of legumes by the Spanish population were retrieved from the annual reference tables of the Ministry of Agriculture, Fisheries and Food (MAPA) and from the official data

collection system called STATISTICA. The data in the food composition table comes from the Spanish Food Composition Database, BEDCA.

The search methodology, analysis, and selection processes of the relevant articles used in the publication are shown in a schematic diagram in Figure 1.

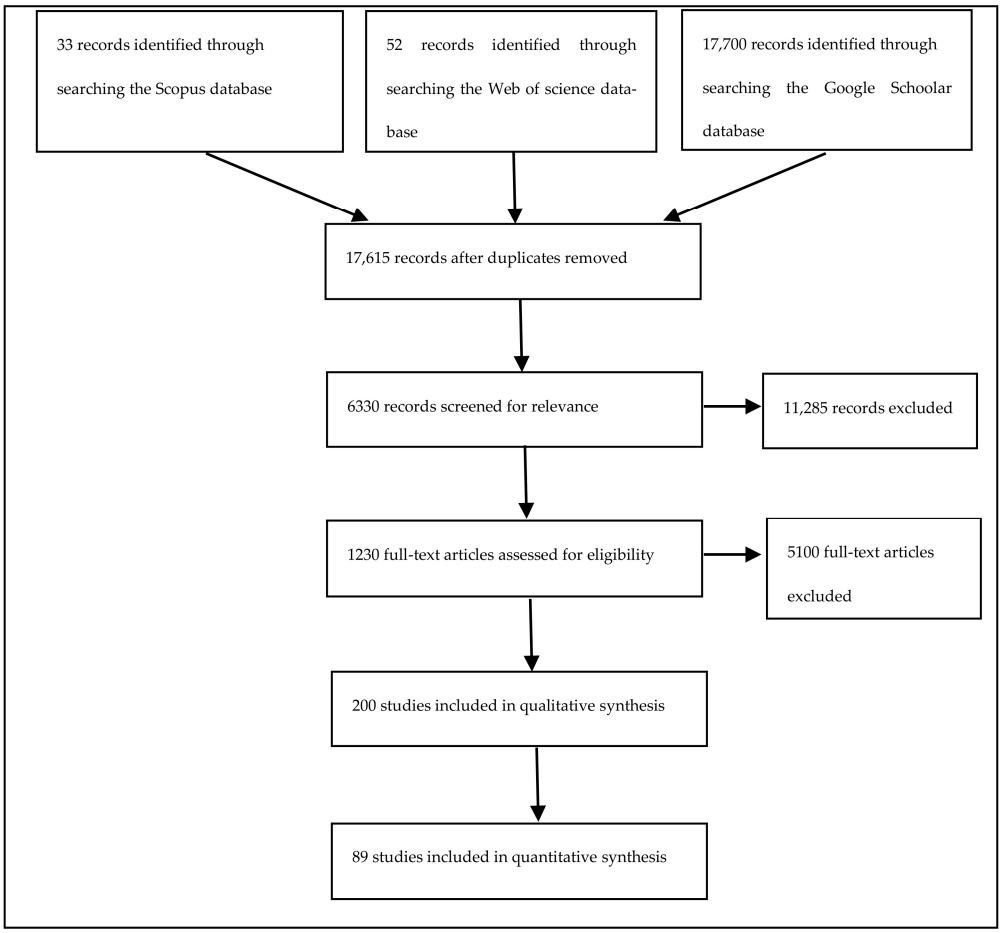

Figure 1. Schematic diagram of the selection process.

The analysis of all the documentation and selected material made it possible to organize the concepts present in the articles and the research conducted on the Spanish population in various parts. In the first part, Section 3 The Mediterranean Diet as a Model of Sustainability, we undertake a summary analysis of all the material considered, and in the second part, Section 3.1 Legumes in the Mediterranean Diet, we include an in-depth section on intercropping. Finally, in Section 3.2 Legume Consumption in Spain, we present a summary of the statistical data regarding the consumption of legumes by the Spanish population based on information from the Ministry of Agriculture, Fisheries and Food of Spain.

3. Mediterranean Diet as a Model of Sustainability

Once the bibliographic review process about Mediterranean diet and sustainability has been conducted, the main topics analyzed are presented further.

The Mediterranean model of living represents one of the examples that most respects the environment. The term used is "sustainable" [16], and it indicates that a production process in all its phases causes little or no damage to the environment [17]. The univocal definition of a sustainable diet was coined in 2010 during the International Scientific Symposium on Biodiversity and Sustainable Diets [18]. The terms that describe it are as follows: "Sustainable diets are diets with low environmental impact that contribute to food and nutritional security, as well as healthy lives for present and future generations.

They contribute to the protection and respect of biodiversity and ecosystems, are culturally acceptable, economically fair and accessible, adequate, safe and healthy from a nutritional point of view and, at the same time, optimize natural and human resources" [19]. The concept of a sustainable diet was further established in 2015 by the International Panel of Experts on Sustainable Food Systems [20], confirming the close link between the environment and human lifestyle, and how the Mediterranean diet is the maximum expression of it [21].

3.1. Legumes in the Mediterranean Diet

In the Mediterranean diet, legumes are a fundamental food and are consumed regularly [22]. Legume cultivation is one of the oldest and dates back over 7000 years. This is demonstrated by archaeological data, which indicate an early cultivation of the bean in some regions of Mexico and Peru, where they became an essential part of the diet, despite the different cultural and religious contexts [7]. Legumes had a significant impact during the agricultural revolution, contributing to greater food security and enabling the growth of larger populations [23]. In Ancient Rome, they were a staple food and were part of many recipes. The Romans cultivated and consumed different varieties of beans, lentils, and chickpeas [24].

A noteworthy proof of the importance of legumes in the ancient world is the fact that the four main groups of legumes known in ancient Rome were named after an important Roman family: Fabius from the broad bean, Lentulus from the lentil, Piso from the pea, and the most illustrious of all, Cicero, from the chickpea. No other food group has ever had such an honor [25].

Over time, human societies have recognized the nutritional benefits of legumes as their composition is rich in proteins, starch, fiber, B vitamins, and minerals, which has made them a valuable component of a balanced diet [26].

Today, legumes continue to be an important component of many diets around the world, not only for their nutritional benefits but also for their environmental sustainability [27].

The consumption of legumes is included in all food-based dietary guidelines. In Spain, for example, they are based on the model of "la rueda de los alimentos" designed in the 1970–1980s and updated to a new version in 2008 by the SEDCA (Sociedad Española de Dietética y Ciencias de la Alimentación), which states that in order to achieve a balanced and healthy diet, one must consume a variety of foods, divided into 6 groups, and legumes are included in the 4th group as a protein-providing food [28].

In France, the dietary guidelines for a healthy diet are based on the publication "Guide des ressources en information et éducation" of the INPES (Institut national de prévention et d'éducation pour la santé), which contains an up-to-date list of documents on nutrition education. In particular, the guide "La santé vient en mangeant" (health comes by eating) is a food guide for everyone, with practical advice on how to achieve everyone's nutritional and health goals. Specifically, it recommends the increased consumption of starch sources, including cereals and cereal products (especially whole grains that provide fiber), potatoes, and legumes in every meal [29].

The Greek population has a dietary practice based on the model of the Mediterranean diet, which promotes the consumption of fresh and cooked vegetables, legumes, and cereals in a model that is the Greek food pyramid devised by the LOGODIATROFIS group, which shows the 12 food groups [30].

In Italy, the guidelines for a healthy diet devised by CREA (Council for Research in Agriculture and Analysis of Agricultural Economics) in point 3 recommend consuming more whole grains and legumes. Specifically, to consume more legumes and to alternate vegetable and animal proteins [31].

It is, therefore, well established that legumes should be regularly included in the diet and especially incorporated into the traditional dishes of a given country [32].

Beans, chickpeas, lentils, and peas are, in fact, often used in soups, salads, stews, and main dishes [33]. They are also often consumed alongside a variety of fresh foods, such as fruits, vegetables, nuts, whole grains, and extra-virgin olive oil [34]. They constitute an important source of vegetable proteins, 2–3 times higher than those of wheat and rice [35], and provide a healthy alternative to animal proteins such as meat and fish, which are less sustainable and more expensive [36,37].

Legumes are in fact rich in dietary fiber, essential elements for the health of the digestive system, and can therefore contribute to weight control and blood sugar levels [38].

Moreover, significant quantities of vitamins, mineral salts, simple sugars, and seed pigments, i.e., nutrients, flavors, color, and antioxidants, are eliminated [39].

The low content of saturated fats and the presence of healthy fats such as polyunsaturated and monounsaturated fatty acids [40] promote heart health [41]. Legumes also contain antioxidants, vitamins, and minerals that contribute to a balanced diet and promote health [41].

They are rich in plant sterols and stanols, which work by blocking the absorption of cholesterol in the small intestine and decreasing blood levels of low-density lipoprotein (LDL), often called "bad cholesterol" [42]. They also contain phenolic compounds [43], the isoflavones, which, once activated by our intestinal bacteria, appear to have effects similar to the human hormone estrogen but with a significantly reduced effect on tissue receptors, which are called phytoestrogens [44].

The cultivation of legumes is sustainable from an environmental point of view because it enriches the soil with nitrogen through a symbiosis with nitrogen-fixing bacteria, reducing the need for nitrogen fertilizers [45].

Legumes are products of plant origin and belong to the Fabaceae family. They comprise around 700 genera and 18,000 species. There are two groups of legumes in relation to their ability to grow in different seasons: Those of the cold season and those of the warm or tropical season [46]. Cold-season food legumes include broad bean (*Vicia faba*), lentil (*Lens culinaris*), lupin (*Lupinus* spp.), dried pea (*Pisum sativum*), chickpea (*Cicer arietinum*), grass pea (*Lathyrus sativus*), and common vetch (*Vicia sativa*) [47]. Warm-season ones include pigeon pea (*Cajanus cajan*), cowpea (*Vigna unguiculata*), green bean (*Vigna radiata* var. *radiata*), and common bean (*Phaseolus* spp.) [48].

The species from which oil is obtained, i.e., soya and peanuts, contains approximately 25% and 50% fat, respectively. Their production far exceeds that of legumes consumed more or less whole [49]. These oils are used both industrially and in cooking [50].

The world's agricultural production of legumes ranks third after cereals and oilseeds [51]. These crops are an important source of food for both humans and animals, as legumes are used to produce feed and fodder. The advantage is also that they can be cultivated on a large scale, even in semi-arid territories [52]. Leguminous crops alone contribute 33% of human protein nutrition and have the capacity to capture atmospheric nitrogen, which is essential for meeting atmospheric nitrogen requirements in the next cultivation [53]. The process occurs in symbiotic association with Rhizobium bacteria, also defined as nitrogen fixers, as they are capable of absorbing atmospheric nitrogen and chemically binding it with hydrogen to form nitrates, important for soil fertilization [54]. In fact, nitrogen-fixing organisms are able to convert atmospheric nitrogen (N_2) into ammonia (NH_3) or other more easily usable nitrogen compounds [55]. Since ancient times, in fact, legumes have been recognized as having the ability to make the soil fertile, but the phenomenon has only been studied in depth since the 19th century [56]. It has been established that bacteria of the Rhizobium genus establish themselves in the roots of legumes, forming tubercles visible to the naked eye, in which, in favorable environmental conditions, nitrogenous compounds are produced [57]. Symbiosis is an association between living beings from which each one benefits: In the case in question, the bacterium absorbs carbohydrates from the plant and produces nitrates, which can be partly used by it, and partly these compounds will return to the soil with the degeneration of the root tubercles [52]. This is the reason why, after the cultivation and harvesting of cereals, legumes are sown (for example, the so-called

"alfalfa"—*Medicago sativa* L. [58] or the lupine—*Lupinus albus* L.int [59]): the soil depleted of nitrates from previous cultivations, thanks to the nitrogen fixation reaction carried out by the bacteria of the roots of legumes, is enriched with the same [60].

Nitrogen is, in fact, an essential element for plant growth, and its unavailability in the soil is often a limiting factor for plant growth [61]. In addition to Rhizobium, there are other nitrogen-fixing bacteria such as Azotobacter and Clostridium, which can be present in the soil and carry out free nitrogen fixation without a specific symbiosis with plants [62]. The presence of nitrogen-fixing bacteria in the root nodules of legume plants can reduce the need for synthetic nitrogen fertilizers in agriculture [63]. This contributes to environmental sustainability by reducing nitrogen pollution and energy consumption associated with fertilizer production [64]. The practice of growing legume plants together with other crops, such as cereals, is called intercropping or crop rotation, an agricultural strategy used throughout the world, especially in the Mediterranean areas thanks to the favorable climatic conditions [65].

From a nutritional point of view, legumes represent the second-most important plant family after cereals [52]. Their importance derives from their protein content, which is approximately double that of cereals [66]. Nitrogen, widely available thanks to the symbiosis with Rhizobium, constitutes an indispensable element for the production of amino acids, which in turn are used in the synthesis of proteins, which are made up of numerous amino acids linked together [67]. Due to this peculiar characteristic, legumes constitute an alternative to meat. The profile of the amino acids constituting legume proteins is, however, poor in sulphur-containing amino acids (methionine, cystine, cysteine) but rich in lysine and tryptophan, which are lacking in cereal proteins [68]. It follows that the amino acid profile of legumes is completed by also consuming cereals. The association of legume seeds with cereal seeds provides a balanced diet both in terms of macro and micronutrients [69]. No food taken individually is in fact able to cover the entire nutritional requirement so much so that, for our well-being, it is necessary to consume a varied diet rich in all nutrients. Legumes are undoubtedly important foods in all diets and assume considerable relevance in vegetarian and vegan diets, as dietary styles are deficient in animal protein, so they make up for this deficiency with the vegetable proteins of legumes [70].

Sustainability and Intercalated Culture

Intercropping is an agricultural practice that consists of the simultaneous cultivation of two or more different products in the same field, during the same season [71]. This approach contrasts with monoculture, in which a single variety is grown over a large area. This strategy promotes the diversity of agricultural species and can contribute to the greater resilience of the agricultural system. In fact, different products can meet different nutritional needs and reduce the risk of losses due to diseases or unfavorable climatic conditions [7]. Such diversity allows us to more efficiently exploit available nutrients, water, and sunlight [72]. The consequences are a more sustainable use of resources and greater efficiency in agricultural production. An agricultural technique of this type can reduce the presence of weeds and the risk of spreading diseases, since different crops can act as natural barriers [73]. This approach promotes greater environmental sustainability, reducing dependence on pesticides and chemical fertilizers [74]. Biodiversity promotes ecological balance in the agricultural system so as to improve soil fertility and reduce the depletion of specific nutrients [75]. This dynamic provides richer and more varied habitats for beneficial insects and other beneficial organisms. Growing different species in the same field can lead to a greater variety of food products, giving farmers the opportunity to diversify their income [76]. Intercropped cultivation, therefore, helps to preserve the genetic diversity of crops, especially if traditional local varieties are used [77]. This can increase the adaptability of agricultural systems to climate variations and unpredictable weather conditions [78].

3.2. Consumption of Legumes in Spain

This study looks at the production and consumption of legumes in Spain. Specifically, this graph shows the quantity of the four main legumes produced in Spain (Figure 2). This statistical analysis was carried out by the STATISTA body [79].

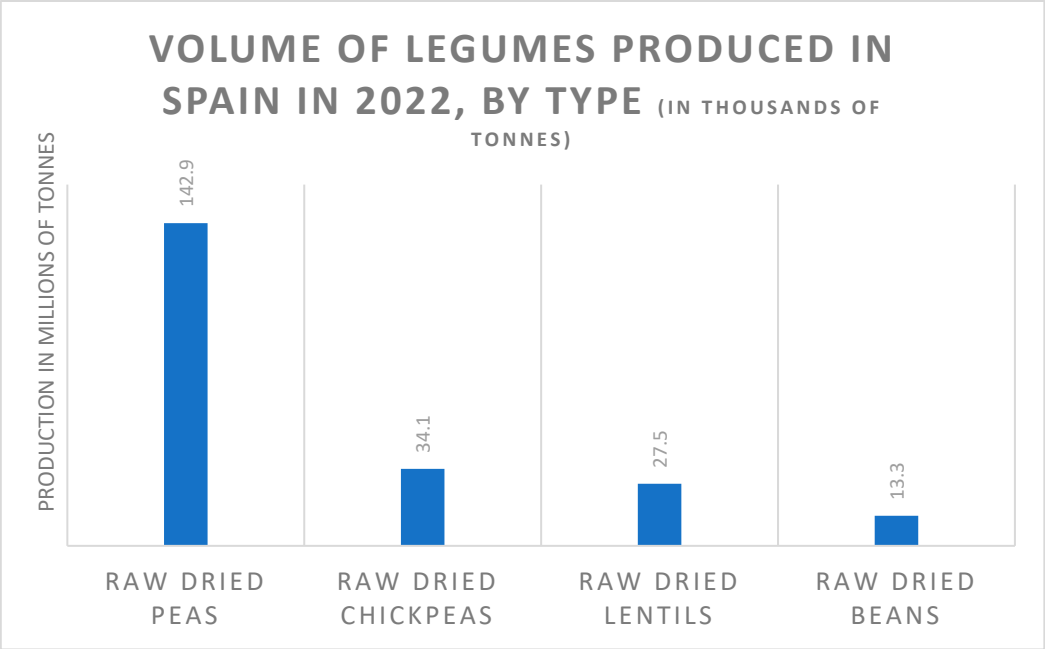

Figure 2. Volume of legumes produced in Spain in 2022 by type—expressed in thousands of tons [80].

Table 1 below looks at the nutritional values of the same legumes. The data were retrieved from the Spanish food composition database, BEDCA [81].

Table 1. Table of the chemical composition of the four main legumes produced in Spain [82].

		Raw Dried Peas	Raw Dried Chickpeas	Raw Dried Lentils	Raw Dried Beans
Component	**Unit**	**Value**	**Value**	**Value**	**Value**
Proximal					
Alcohol (ethanol)	G	0	0	0	0
Energy, total	kJ (kcal)	1404 (337)	1398 (336)	1292 (310)	115 (28)
Fat, total (total lipids)	G	2.3	6.3	11.729	0.4
Protein, total	G	21.6	19,305	247.674	2.2
Water (moisture)	G	3.4	7275	8.845	90.1
Carbohydrates					
Fiber, total dietetics	G	16.7	149,667	96.975	2.8
Carbohydrates	G	56	492,463	486.954	3.7
Fats					
Fatty acid 22:6 n-3 (docosahexaenoic acid)	G	0	0	-	-
Fatty acids, total monounsaturated	G	0.66	1.8	0.2167	0.03
Fatty acids, total monounsaturated	G	0.23	28,125	0.5494	0.2
Total saturated fatty acids	G	0.77	0.4275	0.1721	0.09
Total saturated fatty acids	G	0	0	-	-
Fatty acid 14:0 (myristic Acid)	G	0	0.009	-	-
Fatty acid 16:0 (palmitic acid)	G	0.064	0.508	-	-
Fatty acid 18:0 (stearic acid)	G	0.007	0.086	-	-

Table 1. *Cont.*

		Raw Dried Peas	Raw Dried Chickpeas	Raw Dried Lentils	Raw Dried Beans
Component	**Unit**	**Value**	**Value**	**Value**	**Value**
Fatty acid 18:1 N-9 CIS (oleic acid)	G	0.035	1365	-	-
Cholesterol	Mg	0	0	0	0
Fatty acid 18:2	G	0.152	2629	-	-
Fatty acid 18:3	G	0.035	0.102	-	-
Fatty acid 20:4 N-6 (arachidonic acid)	G	0	0	-	-
Fatty acid 20:5 (eicosapentaenoic acid)	G	0	0	-	-
Vitamins					
Vitamin A equivalents of retinol activities of retinol and carotenoids	Ug	42	21.5	133.333	47
Vitamin D	Ug	0	0	0	0
Vitamin E alpha tocopherol equivalents of vitamer E activities	Mg	0.3	3.1	0.9	0.26
Folate, total	Ug	42	185	117.1	66
Niacin equivalents, total	Mg	5.2	1.7	3	0.85
Riboflavin	Mg	0.2	0.14	0.39	0.1
Thiamine	Mg	0.7	0.45	0.62	0.07
Vitamin B-12	Ug	0	0	0	0
Vitamin B-6, total	Mg	0.13	0.15	0.65	0.2
Vitamin C (ascorbic acid)	Mg	2	4.1	1.7	20
Minerals					
Calcium	Mg	72	143	57.291	39
Iron, total	Mg	5.3	6.8	68.737	1
Potassium	Mg	900	1000	463.05	243
Magnesium	Mg	123	122	743.168	25
Sodium	Mg	40	30	226.78	4
Phosphorus	Mg	330	310	256.04	38
Iodide	Ug	2	1.5	1.6	3.6
Selenium, total	Ug	1.6	2	9.9	1.4
Zinc	Mg	3.5	2	3.9	0.2

Spain has a long tradition of consuming legumes, and these are often a fundamental element in Spanish cuisine, so much so that beans, chickpeas, lentils, and peas are common in many traditional recipes. These are representative examples [83]:

- "cocido", a Spanish meat and vegetable stew that often includes chickpeas;
- "lentejas con chorizo", a lentil soup to be served piping hot. It is one of the so-called "platos de cuchara", lentils cooked with stewed vegetables and chorizo;
- "espinacas con garbanzos", an Andalusian dish of spinach with chickpeas;
- "puchero", an Andalusian soup of meat, chickpeas, and vegetables.

To increase awareness, Spain, like many other European countries, has awarded certain legume varieties the protected designation of origin (PDO) or protected geographical indication (PGI) [84]: Faba Asturiana (PGI), Alubia de la Bañeza-León (PGI), Garbanzo de Fuentesaúco (PGI), Jewish from El Barco de Ávila (PGI), Lentil from La Armuña (PGI), Lentil Pardina de la Tierra de Campos (PGI), Faba de Lourenzá (PGI), Mongeta del Ganxet (PDO), Garbanzo de Escacena (PGI), Fesols de Santa Pau (PDO).

In recent years, there has been a growing interest in promoting healthier and more sustainable diets, which may have contributed to an increased focus on legumes [85]. Changes in eating habits, however, can vary over time and depend on several factors, including emergency situations [86], global dietary trends [87], public health issues, and individual preferences [88].

To better understand the importance of this food in the Mediterranean context, we have assessed data collected by the Spanish Ministry of Agricultural Policies [89], looking

at per capita consumption as a national average and in the various Spanish regions and analyzing how consumption has changed over the previous two decades (Figure 3).

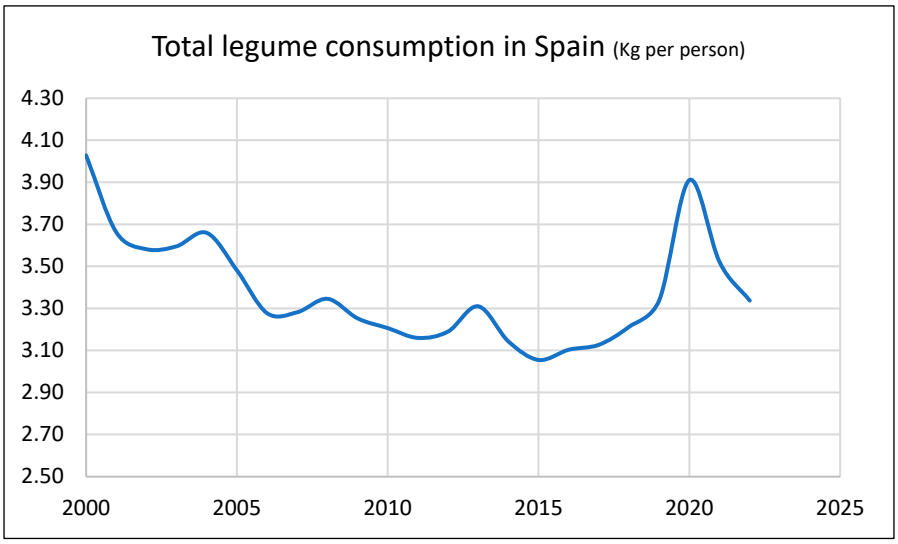

Figure 3. Trend of consumption of legumes per person in Spain from 2000 to 2022.

With the analyzed data, a graph was constructed showing the quantity of legumes consumed on average throughout Spain from 2000 to 2022 [90].

It is clear from the graph that there was an increase in the consumption of legumes, and therefore in their purchase, in the year 2020. However, considering the data from the year 2000 to today, there is a slight decrease. Taking this representative data into consideration, it is clear how the pandemic situation has played a fundamental role in the resurgence of this food product.

In 2020, characterized by pandemic restrictions, Spaniards increased their consumption of legumes. This highlights how, due to the changing circumstances, different food choices were made [91]. Purchases favored products with a longer shelf life, especially if purchased dry, at a very low price and rich in nutrients such as proteins, which are fundamental for human nutrition [92]. Further important characteristics of these foods are their high versatility in the kitchen and the possibility of using them for the production of baking products [93]. A period of exceptional complexity, such as that generated by the COVID-19 pandemic, has led individuals to delve deeper into the issues of sustainability and food health [94]. This information has raised awareness to the point of inducing consumers to make more informed food choices, both from a food and environmental point of view. The notable impact of mass media, such as social networks, has significantly contributed to influencing food choices, increasingly orienting towards a greater consumption of legumes [95].

Another aspect to focus on is the production process. An ever-increasing consumption of legumes leads to an increase in their production, which, thanks to their ability to supply nitrogen to the soil, enriches it and therefore favors the growth of other crops [92]. The conscious choice to consume more legumes, dictated by the pandemic situation, has given Spaniards the opportunity to actively experiment with this type of food and make it even more versatile in the kitchen. In this regard, the Spanish food safety and nutrition agency, AESAN [96], in 2022, drew up new recommendations on sustainable nutrition and physical activity with the aim of promoting a paradigm shift [97]. This evolution, also supported by the World Health Organization, WHO, represents a new perspective defined as the One Health approach by the Centers for Disease Control and Prevention [98,99]. This new point of view links human health and environmental sustainability. It is therefore necessary to update consumption models so that, in addition to protecting our health, we also protect the natural environment, reducing its impact [100]. The report also highlights the effect

that socioeconomic conditions have on obesity, particularly childhood obesity, and also highlights the need to establish economically accessible and fair standards for the entire society [101].

To develop these recommendations, the AESAN Scientific Committee took into account the suggestions of the European Food Safety Authority (EFSA) regarding the criteria that define a healthy and environmentally sustainable diet, the Sustainable Development Goals (SDGs) of the United Nations [102], and the Mediterranean diet model, prevalent in Spain [103].

These dietary guidelines are aimed at the general population, although the specific needs of older people and situations in which it is necessary to reduce calorie intake have also been taken into account [104].

The AESAN Scientific Committee believes that the adoption of a varied and balanced diet, with a greater predominance of foods of plant origin and a lower presence of those of animal origin, can improve the state of health and well-being, reducing at the same time the environmental impact [102]. On the basis of these premises, the daily consumption of at least three portions of vegetables, 2–3 portions of fruit, a moderate consumption of potatoes and other tubers, and 3–6 portions of cereals, preferably whole grains, up to a maximum of three are also recommended. Furthermore, at least four portions of legumes should be consumed weekly, three or more portions of dried fruit without added salt, fat, or sugar, three or more portions of fish, favoring oily fish and species with a lower environmental impact, up to four eggs, and a maximum of three weekly portions of meat, favoring the consumption of poultry and rabbit and reducing processed meat to a minimum. We recommend olive oil as the fat of choice for the culinary preparation of foods and drinking an adequate quantity of water, considering it the main drink in a healthy diet [105].

The report includes an update of the recommendations on physical activity published by AESAN in 2015, also in line with environmental sustainability criteria aimed at achieving the SDGs of the UN 2030 agenda [106]. The recommendations relate to different age groups and, consequently, different stages of life. Increasing the number of daily steps, in combination with a reduced energy intake, is also a good way to improve the health of all people [107].

It is important to emphasize the necessity of working towards sustainable diets, which aim to minimize environmental impact. This involves a growing number of countries incorporating sustainability criteria into their dietary recommendations [98].

4. Conclusions

A sustainable diet is a dietary pattern that focuses on reducing environmental impact and promoting human health and animal welfare. This type of diet aims to balance human nutritional needs with the need to preserve natural resources, reduce pollution, and address the challenges of climate change. Proteins from sustainable sources, such as legumes, which require less water and energy resources than animal proteins, represent a valid alternative in this sense. You can also consume local and seasonal products to reduce the impact of transport and support local agriculture. In fact, the latter can implement sustainable and functional agricultural practices to reduce food waste through conscious purchasing, adequate conservation of food, and the use of leftovers.

The cultivation and processing process of this product does not damage the environment and enriches the soil with nitrogen, thanks to the nitrogen-fixing bacteria present in the roots of the plants.

Nitrogen-rich soil reduces the need for chemical fertilizers. The ancient practice of crop rotation, which we today call intercropping, is an excellent way to produce foods with high protein content while respecting sustainability criteria.

A sustainable diet can not only promote individual and collective health but can also contribute to greater environmental sustainability. This awareness highlights the importance of sustainable food choices, an indispensable element in tackling global challenges such as food security, climate change, and the loss of biodiversity.

The link between the production of legumes and the practice of traditional agricultural systems represents a bulwark for achieving bio-sustainable agriculture, unlike the cultivation of cereals, which involves the use of industrialized systems highly dependent on fossil fuels.

The analysis of data from the Ministry of Agriculture highlighted a constant decline in the consumption of legumes and a slight countertrend in 2020, the year the pandemic began. This allows us to conclude that the emergency situation has influenced the food choices of the Spanish population, and, as regards the consumption of legumes, the growth is linked to the typical characteristics of the product in question: The low cost, the shelf life, both in the form of dried legumes stored in the box, and its versatility in the kitchen. And above all, it highlighted the fact that consumer choices are changing in relation to the fact that there is greater awareness regarding the issues of food and, consequently, environmental sustainability.

It is important in the future to educate young people regarding the consumption of legumes. In doing so, it would be interesting to create an awareness campaign and a conscience pathway, starting in schools. The school is the environment that most lends itself to constructive dialogue with young people and can educate future generations as to the concept of sustainability and the conscious consumption of food products that are an important source of nutrients while respecting the environment.

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