



D.5.1 Report with results of meta-analysis (literature) and sustainability labelling

Deliverable:	Report with results of meta-analysis (literature) and sustainability labelling
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Abbreviations

ANOVA = Anlysis Of Variance

B2B = Business-to-business

B2C = Business-to-consumer

C = Carbon

CI = Confidence Interval

Coef. = Coefficient

DOI = Digital Object Identifier

ELI = Environmental labelling and information.

ES = Effect size

GHG = GreenHouse Gas

GMO = Genetically Modified Organism

N = Nitrogen

n = Number

obs = observations

P = Percentage

PRISMA = Preferred Reporting Items for Systematic Reviews and Meta-Analyses

Prob = Probability

QUOROM = Quality Of Reporting Of Meta-analysis

s.e = Standard Error

SF = Sustainable Food

Std. Err. = Standard Error

Std_Eff = Standard effect

t = Student Distribution

WP = Work Package

WTP = Willingness to pay

Executive Summary

Purpose & methodologies

An important objective of the Nutri2Cycle project is to evaluate on how agro-products obtained via more sustainable processes can aim for ecolabelling, and how this could affect consumer behaviour. To achieve this objective, techniques of meta-analysis have been applied to studies on the relationship between product familiarity and consumers' external search activity. Besides a review of the ecolabelling landscape that involves both private and EU ecolabeling schemes, also the European ecolabelling regulation framework has been provided. Additionally, the potential use of Nutri2Cycle's products in food products bearing European ecolabels has been evaluated. This has made it possible to provide an accurate overview of the current status of the ecolabelling landscape, thus providing valuable insights on the scope of ecolabels, trends and applications, in particular for the food and feed sector.

Key findings & Conclusions

The literature review for the meta-analysis showed that the "willingness to pay" (WTP) intention of depended significantly on the region where the product is obtained as well as the food categories to which the product belongs to, whereas the presence of different sustainable claims such as ecolabels or animal welfare standards were not significant factors.

Thanks to the article screening carried out within this deliverable, it was apparent that a high percentage of consumers had knowledge about sustainable products but should become more familiar with them to distinguish between the different sustainable claims and their meanings. To bridge this informational gap, more detailed information on current environmental labels is required, which was further developed in section 2 of this deliverable.

The dynamic evolution of the organic sector and the great range of environmental labelling schemes in the current market affect the overall effectivity of ecolabels. As a result, we conclude that the European ecolabelling landscape needs a continuous updating and unification process that would allow an easy decision-making process for consumers and other stakeholders involved.

Due to the increasing awareness on sustainability issues and according to the new Circular Economy Action Plan adopted by the European Commission, the ecolabelling landscape needs progressive updating regarding the processes and products involved in the EU regulations. In the current market there are a wide range of ecolabels, with significant differences in scope, indicators or verification processes. Unification of the ecolabelling schemes is therefore required for maximum benefits for the environment.

1. Meta-analysis study regarding the Consumers' Preferences

1.1 Introduction

Meta-analysis can be defined as "*the statistical analysis of a large collection of results from individual works with the purpose of integrating the findings obtained*" (Glass, 1976), or also as "*the statistical synthesis of data from different but similar studies, that is, comparable studies, which provides a numerical summary of the overall results*" (Chalmers, Hedges, & Cooper, 2002).

Systematic reviews and, in particular, meta-analyses are a kind of scientific research aimed to objectively and systematically integrate the results of a set of empirical studies about a given research problem, with the purpose of determining the 'state of the art' in that research field.

The performance of a meta-analysis or a systematic review necessarily goes through the same stages as those required to carry out an empirical study. In general terms, a meta-analysis can be conducted by following these six steps:

1. Formulation of the problem.
2. Definition of the inclusion criteria and search for the studies.
3. Coding the study characteristics that can moderate the results.
4. Calculation of an effect size index.
5. Definition of the statistical analysis techniques and interpretation their results.
6. Publication of the meta-analysis.

As in any empirical research, the initial phase was to define the problem to be investigated. First, the question to be answered must be clearly formulated, and the constructs and concepts involved must be defined. From the formulation of the question, the objectives to be achieved with the meta-analysis and, where appropriate, the hypotheses to be contrasted, then emerge (Cooper, Kuh, & Hardy, 2010).

The aim of this meta-analysis study (Task 5.3 in the Nutri2Cycle project) has been to consolidate the state of academic research regarding the **consumer's preferences** and **willingness to pay** for **environmental friendly** and **sustainable** food products at **European level**. This systematic review of studies on this field, coupled with a quantitative analysis of data on the variables which determine the relevance of sustainable food for consumers, has allowed researchers to conclude on potential factors that contribute to increase or decrease the consumers' willingness to pay for sustainable food (products).

Consequently, the question to be answered through the meta-analysis was defined as **are consumers willing to pay a premium price for sustainable food (products)?**.

The PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines were used during all stages of design, implementation and reporting.

In July 2009 the PRISMA statement was published as an update and extension of QUOROM (Quality Of Reporting Of Meta-analysis). Unlike QUOROM, the PRISMA statement (<http://www.prisma-statement.org>, 2020) is accompanied by an extensive document detailing the explanation or rationale for each of the 27 proposed items to be used for systemic reviews and meta-analyses, as well as the process for developing these guidelines.

The PRISMA flowchart (Figure 1) starts from the very beginning of the process (the records or citations identified in the searches performed in each of the different databases or other sources used), continues through the total number of unique records or citations once the duplicates have been eliminated, and ends with the individual studies included in the qualitative (systematic review) and quantitative (meta-analysis) synthesis.

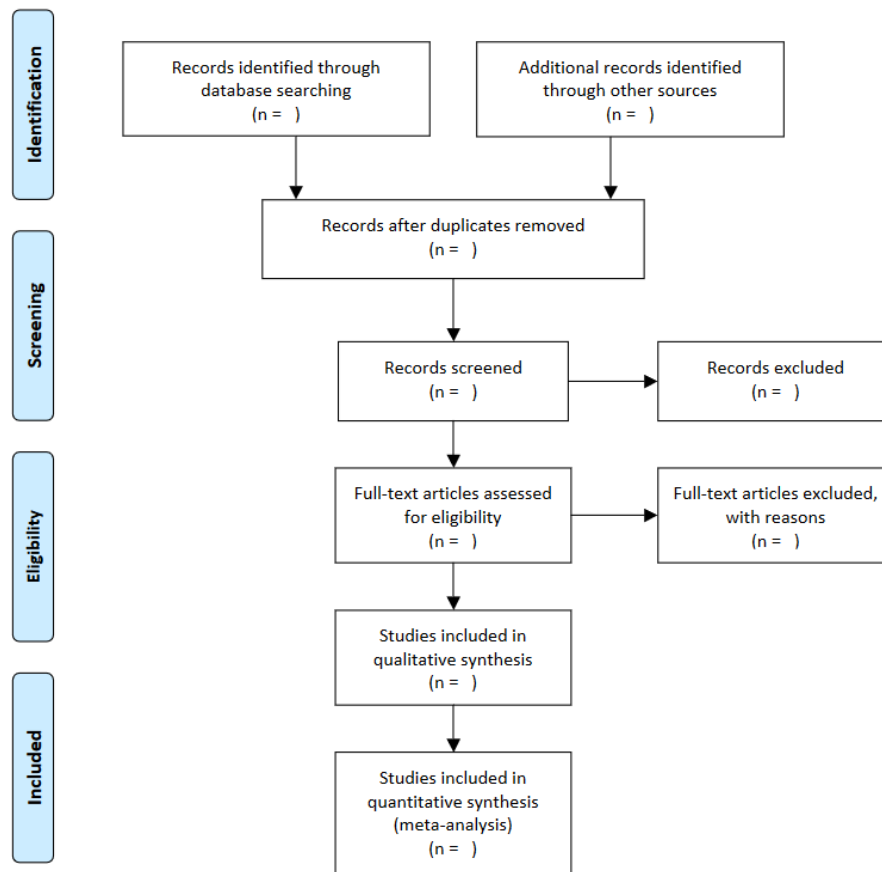


Figure 1. Flow chart of information through the different steps of a systematic review (Moher, Liberati, Tetzlaff, & Altman, 2009)

1.2 Methodological Approach

1.2.1 Search and Inclusion/Exclusion Strategies

The aim of this step was to define a robust protocol (Santeramo & Lamonaca, 2020) to find studies that complied with the objective of the meta-analysis described in section 1.1 to be able to answer whether consumers are willing to pay a premium price for sustainable food.

The reception of consumers to food coming from raw materials obtained through sustainable techniques was here evaluated, according to the postulates of the Circular Economy. Not only was the kind of fertilizers taken into account in the case of crops, but also the origin of animal feed or other food vectors that generate products from animals (meat and dairy products among others).

Following this rationale studies of preferences in sustainable products of the food industry were sought which evaluated the relationship between the origin of different sustainable products or techniques employed to obtain them and which provided an estimation and a measure of uncertainty or sufficient data to calculate them. This meta-analysis attempted to include, as far as possible, research aimed at assessing the independent effect of consumer acceptance of this kind of food products considering different variables.

As such, the analysis started by delimiting the type of products to be studied, selecting as focus sectors pig meat production together with milk/dairy and bread/cereal products firstly. The significance of these sectors in the EU landscape was evaluated as follows:

- ◆ The EU is the world's second biggest producer of pork (European Commission, 2020).
- ◆ The EU's dairy sector is its second biggest agricultural sector in terms of output value (European Parliament Think Tank, 2020).
- ◆ The harvested production of cereals (including rice) in the EU was 295.1 million tonnes in 2018, about 11.3 % of global production (Eurostat Statics Explained, 2020),

In a second phase of the study selection, the search was extended to food products in general.

Once the objectives of the meta-analysis were set the next step was to identify the empirical studies that addressed the question under investigation. This phase involved defining the criteria for inclusion and exclusion of studies and these criteria depended on the objective of the meta-analysis.

Multiple consumers' studies on sustainable food products were systematically reviewed during the period between April and July 2020 using the online English database, Web Of Science. This database was chosen because it offers a compilation of other high-impact databases ensuring a wide range of results from high-impact sources which were also taken into account in the selection of qualitatively eligible articles. Next to this selected source, also consultation of electronic bibliographic databases such as ScieneDirect and Springer was performed, considering ISI indexed journals only.

For sake of reproducibility, the search requirements were defined as the language in which the study must be written (English) and the time range to be examined (published during the last 5 years).

Articles published in countries around the world were considered due to the specific inclusion/exclusion criteria chosen (more information in section 1.2.1) to find as many articles as possible. Also articles' impact factor was considered to ensure that only reliable information on the results in terms of consumer preferences for sustainable food products was being considered (e.g. conference proceedings were excluded).

Studies had to satisfy two general criteria to be included in the sample: (i) first, they included information on consumers' intention to pay for sustainable agri-food or food in general products; (ii) second, they reported comparisons between sustainability and other attributes of the same product. The first criterion allowed the identification of studies focused on consumers' willingness to pay (WTP). The second criterion allowed the selection of articles from which it was possible to obtain valuations of the relevance of sustainability in food (either directly or as a function of reported parameters) with respect to other attributes of the product (country of origin, consumers gender etc).

In short, the studies had to satisfy the criteria of including clear information on consumers' **willingness to pay (WTP)**, attitudes, and / or preferences for **sustainable food** to be considered valid.

Regarding exclusion criteria, studies were rejected for analysis if they did not provide specific data about a WTP estimation, defined as essential in the selection of studies for the quantitative synthesis.

1.2.2 Study Selection

Based on inclusion and exclusion criteria, a literature search was carried out as widely as possible to identify studies that met these selection criteria.

Several combinations of related **keywords** were used to select the studies of interest. Sector-related terms allowed to select studies that were focused on agricultural and food sectors (specially pork, milk and cereal); consumer-related terms identified studies analysing consumer intentions; sustainability-related terms allowed to restrict the search to studies pertaining to environmentally, friendly and sustainable food products as well as related to GHG emissions and finally label-related terms allowed to select studies focused on the relevance of ecolabels for consumers' decisions.

The literature search across the databases identified **10,472** articles that could be potentially included in the meta-analysis. In total, **66** separate searches were run to identify this initial set of studies and the following strings were used:

Sector-: [agri food* OR food* OR pork* OR pig* OR meat* OR dairy* OR cereal* OR bread*]
AND

Consumer-: [attitude* OR behaviour* OR consumer* OR preference* OR willingness to pay*
OR buy* OR pay*] AND

Sustainable-: [sustainable* OR sustainability* OR organic* OR environmental* OR
ecological* OR friendly* OR greenhouse* OR emissions*] AND/OR

Label-: [ecolabel*]

After removing duplicates (the same paper could appear as a result of two different strings) and several keywords combinations which resulted in such a high number of articles that it was impossible to evaluate them (for instance [cereal* AND consumer*] indicated 1,716 articles found), the analysis relied on **1,334** observations of which **1,044** were screened based on the information contained in titles, abstracts and full texts. **907** of them were excluded (e.g. they were focused on consumers' preferences, sustainability or products marketing but without including consumers' surveys specifically). By this way, **137** papers were assessed for eligibility and, bearing in mind inclusion and exclusion criteria, the selected studies for qualitative synthesis were further reduced to **21** papers. Finally, as explained in section 1.2.4, **19** items were chosen to represent the pool of studies that provided information required for the quantitative analysis (Figure 2).

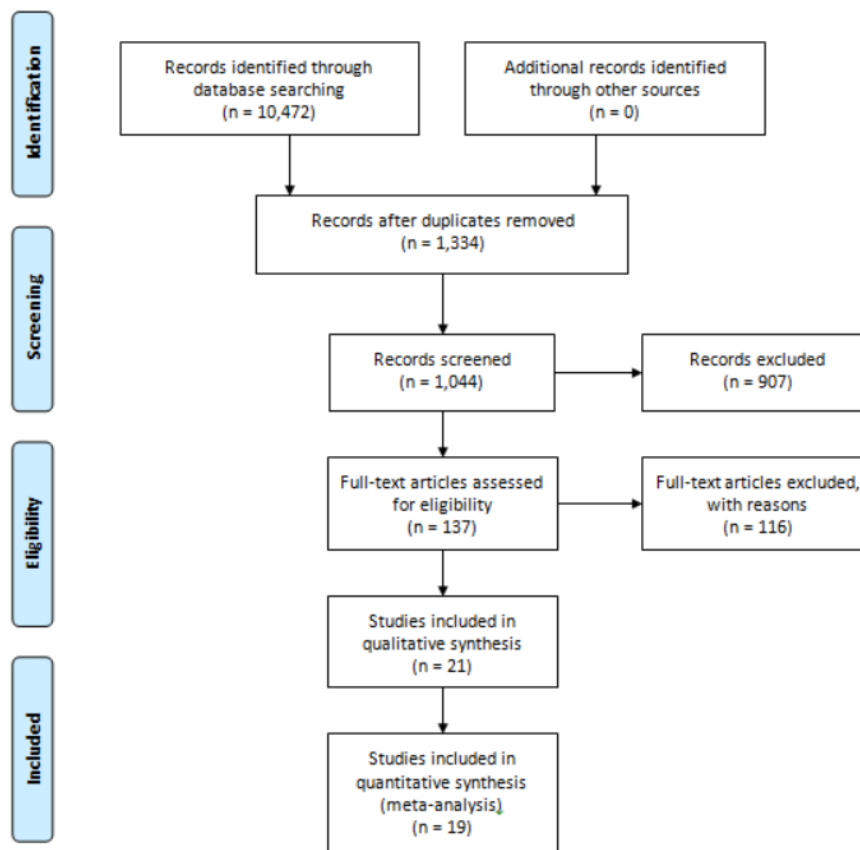


Figure 2. Flowchart of the meta-analysis

1.2.3 Data Extraction

The aim of this phase was to establish the **explanatory variable that described the consumers' participation decision** and, for the meta-analysis here developed, the participation decision was defined as having shown a willingness to pay a premium for a sustainable product.

Three researchers independently extracted the data using a standardized excel format.

Firstly, several common data were extracted from each study, including:

1. **General information about the paper:** authors, year of publication, journal, impact of the journal and DOI referred to the paper.
2. **Information related to methodological issues and decision characteristics:** Year of the data collection, country and city where the study was carried out, sample size, product type and statistical data that the study provided in order to calculate effect sizes (e.g. means, standard deviations, ratios, t-tests, ANOVA, F-tests, etc).
3. **Outcome data:** sustainable claims, price/WTP of conventional food product in national currency, price/WTP of sustainable food product in national currency, Price/WTP of sustainable food product in %.

Summarizing, different general datapoints from the papers (see annex) were gathered to account for geographical and cultural differences in the relevance of paying a premium for sustainable food.

Secondly, several explanatory variables were defined to be able to characterize what influenced the consumers' participation decision in function of key attributes (Santeramo & Lamonaca, 2020). How environmental friendly and sustainable food products were considered by consumers and what characteristics these consumers had was the key question to be solved within the variables identification.

All of them were defined to make it possible to identify clearly if the presence of the different attributes represented by the group of variables influenced positively or negatively in the consumers' purchase decision and their willingness to pay a premium for sustainable food.

The same **variables** were analysed and weighted in all papers, divided into four groups:

1. **Socio-economic characteristics of sample:** Questions related to whether the purchase decision was affected by **gender** and by **age**, how and how much the **income** affects and if the level of **education** or the type of **family** were a decisive factor in the decision by consumers to buy sustainable food.
2. **Extrinsic characteristics of products:** The influence of variables such as **price** and **packaging** was evaluated. Besides these variables, also the variable "**Brand**" was included to define if a well-known brand had an impact in choosing sustainable food products as well as the variable "**label**" that showed whether the impact of visual labels regarding sustainability (eco-labels, organic) or specific certifications (local, origin and protected geographical indications) affected to consumers' WTP. Finally, a variable which referred to the importance attached to buy meat that has been produced with good standards of **animal welfare** was considered too.

3. **Consumers' perception:** Some variables were grouped related to the level of consumer's knowledge of (and involvement with) the product. Within the variable "**Health concerns**", aspects like the importance attached by customers to the naturalness parameter and/or the interest in eating foods that do not contain additives or are unprocessed were analysed in respect to their willingness to pay. Within the variable "**Environmental concerns**", the influence of having positive **attitudes** towards the environment (referred mainly to carbon emissions and climate change concerns) or following environmentalism as an ideology was evaluated, as well as concerns about the transport distances implied for consuming these products.
4. **Consumption habits:** Within the variable named "**Familiarity with the type of product**", aspects like the influence of the frequency of consumption as well as the product information that the consumer had before purchasing were analysed. Within the variable "**Familiarity with the sustainable claim**", unlike "environmental concerns" where personal habits, ideologies or the people lifestyle were evaluated, the influence of having adequate **knowledge** about sustainability (green or local consumption, sustainable or organic production or sustainable cultivation methods such as less fertilizer, less pesticides, etc) were assessed. Consumer can have knowledge about what is a carbon footprint but not consider this factor when he/she buys a product.
Finally, the variable "Food quality concerns" was pondered within this group, to assess the importance attached to the food appearance, safety, taste and/or the content of sulphites.

As a result, **16 variables / group of variables** were scored qualitatively.

The reason for examining these variables was none other than to check which characteristics of the studies may be moderating or affecting the results (the decision to pay a premium, in this case). The coding of the study characteristics is therefore an essential task if meta-analysis wants to explain why studies on the same subject achieve different, and sometimes even contradictory, results and to eliminate bias caused by researchers' influence on the choice of items.

Once the studies that met the criteria established in the meta-analysis were selected (section 1.2.2) and the variables to be evaluated were defined (explained before), the next step was to draw up a code to assess 1) if these variables were available in each paper and 2) their significance level.

Reading the result, discussion and conclusions sections carefully in each paper, all of the variables and group of variables were analysed by the researchers searching for the information about their influence on the WTP and, for this purpose, a scoring system was defined.

In each paper, different attributes related to consumers' WTP had been evaluated by the authors and these attributes were classified within the variables to be assessed in this meta-analysis consequently. Their significance was considered as positive (+) or negative (-) for consumers' willingness to pay and quantified with asterisks, ***, **, and *, that represented significances at 1%, 5% and 10% levels respectively. This scored information was translated and grouped to the explanatory variables (as detailed in the points 1 to 4 before) to be used in the data extraction.

In short, each author of the selected papers had evaluated different variables and calculated their significance, and this information was afterwards translated to Nutri2Cycle criteria.

The criteria by which the attributes were located into the explanatory variables and pondered consequently for the data extraction are explained below:

- ★ For the variables gender, age, income, level of education and type of family:
 - A (+) sign in the results section of the selected papers indicated that consumers who were concerned about health were willing to pay more for sustainable food products.
 - A (-) sign indicated that consumers who were concerned about health were not willing to pay more for sustainable food products.
- ★ For the "Familiarity with the type of product" group of variables:
 - A (+) sign in the results section of the selected papers for any of the aspects included in this group (as detailed above) indicated that consumers who were familiar with the product were willing to pay more for sustainable food products.
 - A (-) sign indicated that consumers who were not familiar with the product were not willing to pay more for sustainable food products.
- ★ For the "Familiarity with the sustainable claim" group of variables:
 - A (+) sign in the results section of the selected papers for any of the aspects included in this group (as detailed above) indicated that the knowledge of these aspects positively influenced consumers' WTP.
 - A (-) sign indicated the lack of knowledge in these aspects negatively influenced consumers' WTP.
- ★ For the "Health concerns" group of variables:
 - A (+) sign in the results section of the selected papers for any of the aspects included in this group (as detailed above) indicated that consumers who are concerned about health were willing to pay more for sustainable food products.
 - A (-) sign indicated that consumers who were concerned about health were not willing to pay more for sustainable food products.
- ★ For "Environmental concerns" group of variables:
 - A (+) sign in the results section of the selected papers for any of the aspects included in this group (as detailed above) indicated that consumers who were concerned about environment were willing to pay more for sustainable food products.
 - A (-) sign indicated that consumers who were concerned about environment were not willing to pay more for sustainable food products.
- ★ For "Food quality concerns" group of variables:
 - A (+) sign in the results section of the selected papers for any of the aspects included in this group (as detailed above) indicated that consumers who were concerned about food quality were willing to pay more for sustainable food products.
 - A (-) sign indicated that consumers who were concerned about food quality were not willing to pay more for sustainable food products.

- ★ For the “label” variable:
 - A (+) sign for this variable in the results section of the selected papers indicated that labels had a positive effect on WTP more for sustainable food products.
 - A (-) sign indicated that labels had a negative effect on WTP more for sustainable food products.
- ★ For the “Packaging” variable:
 - A (+) sign for this variable in the results section of the selected papers indicated that the packaging had a positive effect on WTP more for sustainable food products.
 - A (-) sign indicated that the packaging had a negative effect on WTP more for sustainable food products.
- ★ For the “Animal welfare” variable:
 - A (+) sign for this variable in the results section of the selected papers indicated that meat with good standards of animal welfare had a positive effect on WTP more for sustainable food products.
 - A (-) sign indicated that that meat with good standards of animal welfare had a negative effect on WTP more for sustainable food products.
- ★ For the “Brand” variable:
 - A (+) sign for this variable in the results section of the selected papers indicated that consumers were willing to pay more for sustainable food products with a well-known brand.
 - A (-) sign indicated that consumers were not willing to pay more for sustainable food products with a well-known brand.

Likewise if any of the variables or the aspects considered in the group of variables appeared mentioned in the papers but it was not considered as significant within the results, the variable was coded as “no significance”, and as “not available” if they were neither mentioned nor evaluated. An example of one of the papers selected and coded can be observed In Figure 3.

Variables affecting consumers' willingness-to-pay a premium price for sustainable food (Milk&Dairy)				
	Significance			Sample size
	Yes	No	Not Available	
Product: FRESH MILK				
Gender				178
Male	- ***			
Female				
Age		x		
Education		x		
Income	+ **			
Household size			x	
Family with children under 18			x	
Price	- ***			
Familiarity with type of product		x		
Familiarity with the sustainable claim		x		
Health concerns			x	
Environmental concerns	+ ***			
Food quality concerns		x		
Label	+ ***			
Packaging		x		
Animal welfare		x		
Brand		x		

***P<0.01; **P<0.05; *P< 0.10



ARTICLE: Green marketing strategies in the dairy sector: Consumer - stated preferences for carbon footprint labels (2019) (Canavari, M; Coderoni, S)

Figure 3. Example of paper pondered

This table was used and completed, in the same format, for each of the 21 selected papers (included in the annex).

1.2.4 Quantitative Analysis of Data

In order to investigate drivers of the relevance of these selected variables on WTP, a meta-regression analysis was run from the data extraction.

The standardized WTP values identified from the structured literature review were included in this research as effect size following the same approach as Xia & Zeng (2008). All WTP found were presented as a percentage in order to tackle with the issues of currencies difference and different WTPs formats (i.e., the weight unit, product unit and product type). Thus the percentage transformation allowed researchers to include heterogeneous studies from different regional and geographical scales and make them easy to be compared and analysed.

As mentioned in section 1.2.3, 21 research papers were taken into account to begin the analysis. However, once the analysis process had started, it was found that 2 papers reported the WTP values neither in percentage nor in monetary forms. Due to the fact that including quantitative information on consumers' willingness to pay (WTP) was defined as an inclusion criteria (section 1.2.1), these papers were consequently rejected and 19 papers were included in this meta-analysis estimation.

Descriptive statistics

The data obtained from the 19 papers included are described below. The percentage difference in the WTP estimated across studies ranged from 2% to 92%. Over half of studies were conducted in Europe (58%) whereas studies conducted in America reached 21% as well as in Asia (also 21%). A range of sustainable food products were studied, with a major share of pork meat products (42%), followed by milk & dairy (21%).

Several sustainable claims were included such as organic, animal welfare, food safety and environmentally friendly. In this last claim, products with environmental labels (carbon and water footprints mainly) or obtained with sustainable agricultural practices or environmentally friendly production techniques were included.

The main characteristics of the included studies are presented in Table 1:

Table 1. Characteristics of the included studies

Study	Sample	Sustainable claim	Categories	Methods	Region
Jiumpanyarach (2017)	557	Organic	Pork & meat	DCE	Asia
Latacz and Schreiner (2019)	554	Animal welfare	Pork & meat	DCE	Europe
Lai et al. (2018)	480	Food safety	Pork & meat	BDM	Asia
Ortega and Wolf (2018)	218	Animal welfare	Pork & meat	BDM	America
Wang et al. (2017)	844	Organic	Pork & meat	DCE	Asia
Wageli et al. (2015)	597	Organic	Pork & meat	DCE	Europe
Akaichi et al. (2019)	120	Organic	Pork & meat	Auction	Europe
Torquati et al. (2018)	252	Organic	Pork & meat	DCE	Europe
Canavari and Coderoni (2019)	178	Environmental	Milk & dairy		Europe

Table 1. Characteristics of the included studies

Study	Sample	Sustainable claim	Categories	Methods	Region
Grebitus et al. (2016)	1579	Environmental	Milk & dairy		Europe
Menapace and Raffaelli (2017)	9865	Environmental	Milk & dairy		Europe
Spain et al. (2017)	1000	Animal welfare	Milk & dairy		America
Wongprawmas et al. (2016)	270	Environmental	Cereal & bread		Europe
Tong et al. (2017)	622	Environmental	Cereal & bread	CVM	Asia
D'Amico et al. (2020)	201	Organic	Drinks		Europe
Chen et al. (2019)	1510	Environmental	Fruit & vegetable	CVM	America
Chen et al. (2018)	2525	Environmental	Fruit & vegetable	CVM	America
Migliore et al. (2020)	613	Environmental	Drinks		Europe
De-Magistris and Gracia (2016)	171	Organic	Almonds	NH-DCE	Europe

Overall result

The results obtained by this quantitative analysis were represented in a forest plot (Figure 4). A forest plot is able to demonstrate the degree to which data from multiple studies observing the same effect overlap with one another. The diamond at the bottom of the forest plot shows the result when all the individual studies were combined together and averaged. The vertical points of the diamond (red line) represent the point estimate of the averaged studies (the WTP mean value in this case). The horizontal points of the diamond are the limits of the 95% confidence intervals. In this study, none of the studies intersected the black vertical line, meaning that the data from all included papers were valid.

In this case, the forest plot indicates the overall presence of a positive WTP estimated in all papers and the overall WTP valuation (the blue diamond) was 33%, which was in line Vecchio & Azzurra (2013), who indicates that consumers' WTP is between 23% and 57% for sustainable attributes in food products.

In addition to the effect size, it is important to consider the level of heterogeneity in a meta-analysis, which is evaluated with a statistic called I^2 . A heterogeneity of less than 50% is termed low, and indicates a greater degree of similarity between study data than an I^2 value above 50%, which indicates more dissimilarity.

Results that fail to overlap well are termed heterogeneous and such data is therefore less conclusive. In this case, and as demonstrated by the high value of I^2 obtained, a significant heterogeneity was present amongst the studies.

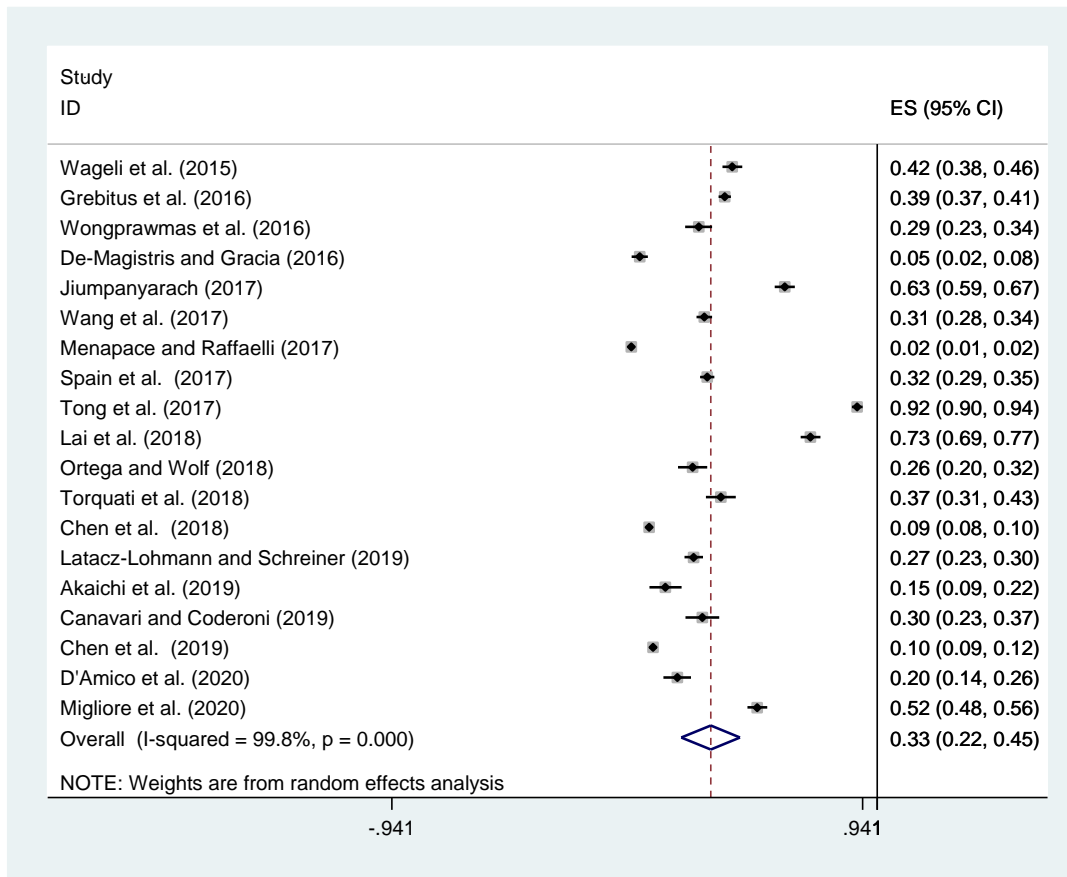


Figure 4. Forest plot displaying WTPs estimated

In this context, the high heterogeneity identified requested to test for publication selection bias, which may occur when studies with positive results tend to be published more often than studies with negative or inconclusive results (Dolgopolova & Teuber, 2017). Accordingly, Egger' test and the funnel plot method were employed to test for publication bias. The funnel plot is a graphical representation of the size of trials plotted against the effect size they report.

Results in Figure 5 confirm the presence of a publication selection bias since they are not funnel-shaped, that is, the plot is skewed. Moreover, the significance result ($p = 0.001$) of the Egger' test presented in Table 2 also confirms its presence.

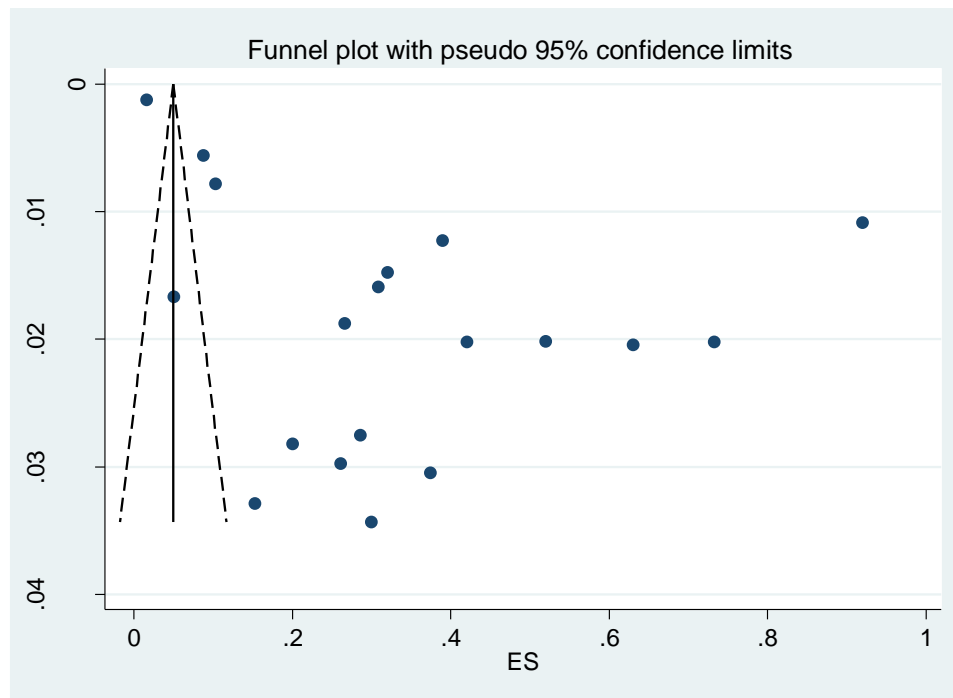


Figure 5. The funnel plot test for publication bias

Table 2. The result of Egger's test (N = 19)

Std_Eff	Coef.	Std. Err.	t	P> t	Lower 95% CI	Upper 95% CI
Slope	-0.005	0.026	-0.190	0.853	-0.059	0.050
Bias	20.57	5.020	4.100	0.001***	9.983	31.153

Note: *** Significance level: 0.01. $P = 0.001 < 0.01$, denoting that there is a significant difference, which means significant existence of publication bias.

Subgroup analysis results

Three subgroups were established for the meta-analysis: region, product categories and sustainable claims. The analysis was conducted in Stata software.

The analysis results for these three identified subgroups are presented in Table 3. As mentioned before, the overall WTP estimated was 33.4% (CI 0.216-0.451) and I^2 was 99.8%, indicating that a large amount of variability across studies exists.

With respect to the region subgroup, there were only 4 papers conducted in America and 4 in Asia, 8 in total. Most of the identified studies following the selection criteria were found in Europe. The highest WTP estimated was located in Asia, followed by Europe and America, with 64.8%, 27.0% and 19.1%, respectively. However, the small numbers of studies conducted in Asia and America indicates that the result of this subgroup analysis should be interpreted with caution.

A possible explanation for the high WTP detected in Asia is its consumers' perception as sustainable products being safe and healthy food. Previous studies of consumer anxiety about food have focused mainly on specific events such as the contamination of infant formula in China or illegal additives and contamination of the food grain supply by toxic industrial wastes (Zhu, Jackson, & Wang, 2016). For these reasons, they appear to be more willing to pay higher premiums for sustainable food products in percentage terms.

Focusing on the results from the subgroup of food categories, most papers (8) studied pork meat, followed by milk & dairy (4). As for WTP estimation, cereal & bread presented the highest value with 60.4%, followed by pork meat, drinks, milk & dairy and fruit & vegetables products, with 39.4%, 36.1%, 25.6% and 9.4%, respectively. One reason could be that cereal & bread products were much cheaper compared to other categories. The I^2 of fruit & vegetables was the lowest value (61.4%), which meant a low heterogeneity level.

Last but not least, for the subgroup of sustainable claims, the highest WTP estimated was for the claim named "environmentally friendly" (32.8%), followed by organic (30.5%) and animal welfare (28.6%). These results showed dissimilarities with the results obtained by Loo & Verbeke (2015), who showed that organic food presented the highest WTP estimated compared with other claims.

Table 3. Summary of results from the subgroup analysis (excluding outlier)

Subgroups	Variables	Study numbers	p-value	I^2	Lower 95% CI	Upper 95% CI	WTP estimate
region	America	4	0.000	98.8%	0.101	0.280	0.191
	Europe	11	0.005	99.6%	0.134	0.407	0.270
	Asia	4	0.002	99.7%	0.355	0.941	0.648
food categories	Pork & meat	8	0.000	98.7%	0.258	0.529	0.394
	Milk & dairy	4	0.030	99.8%	0.019	0.494	0.256
	Cereal & bread	2	0.204	99.8%	-0.018	1.225	0.604
	Drinks	2	0.000	98.8%	0.047	0.674	0.361
	Fruit & vegetables	2	0.108	61.4%	0.079	0.109	0.094
sustainable claims	Animal welfare	3	0.038	69.5%	0.245	0.328	0.286
	Environmental ¹	8	0.000	99.9%	0.147	0.508	0.328
	Organic	7	0.022	98.9%	0.151	0.460	0.305
	Food safety	1	-	-	-	-	-
	overall	19	0.000	99.8%	0.216	0.451	0.334

¹ Environmental: environmentally friendly

Meta-regression result

Table 4 presents the results of the meta-regression. Residual variation due to the heterogeneity was measured by I^2 and this parameter was equal to 99.57%, while 45.98% of the between-study variance was explained by the included covariates. Monte-Carlo permutations tests were also conducted to avoid a Type I error and to obtain a better assessment of the statistical significance of the observed relationships (Dolgoplova & Teuber, 2017). Asia, fruit & vegetables and animal welfare were dropped due to collinearity issues.

The WTPs estimated across studies depends significantly on variations of the region and the food categories, the results showed this trend.

Regarding food categories, the results indicated that for cereal & bread products the WTP estimated was higher than for other carrier product categories as a result of a positive coefficient (0.510).

America and Europe (within the region subgroup) were also factors which influence the WTP estimated within the papers, values were lower because the coefficients were negative. Furthermore, results in America showed lower values than those obtained from European studies. These results are similar to the study of Loureiro M. L. (2003) who found that consumers' WTP towards sustainable attributes for wine was only 1.7% in the US compared to 23%-57% in Italy as also showed by Vecchio, R. (2013).

Finally, the results indicated that sustainable claims were not significant factors in this meta-regression.

Table 4. Results of the Meta-regression

	Coef.	Std. Err.	P> t	Monte Carlo permutation test	
				Unadjusted p-value	Adjusted p-value
America	-0.456***	0.123	0.002	0.004	0.008***
Europe	-0.378***	0.102	0.002	0.002	0.006***
Cereal & bread	0.510**	0.215	0.034	0.038	0.042**
Milk & dairy	0.161	0.186	0.404	0.458	0.560
Drinks	0.265	0.215	0.240	0.320	0.384
Pork & meat	0.298	0.170	0.103	0.189	0.258
Environmental	0.045	0.159	0.781	0.824	0.892
Food safety	0.450	0.272	0.118	0.126	0.138
Organic	0.023	0.163	0.890	0.913	0.926
_cons	0.748	0.229	0.011		
Number of obs	19				
Tau ²	0.030				
I ²	99.57%				
Adj R ²	45.98%				
Prob > F	0.0029**				

1.3 Concluding Remarks

This deliverable presents a systematic review on the relevance of sustainable food for consumers' preferences and its quantitative analysis through a meta-regression approach aimed at assessing the drivers of the differences across studies regarding the consumers' preferences and **willingness to pay** for environmental friendly and sustainable food products worldwide. Their results could serve as basis to tackle future consumption patterns, creating valuable information for consumers and producers (trust and understanding). Current global consumption patterns are unsustainable and the need for industry to play a leadership role in promoting sustainable patterns of production and consumption is clear therefore the conclusions here obtained could also serve as a driver for investments in more sustainable technology.

The data obtained from the 19 papers included in the analysis showed that the percentage difference in the WTP estimated across them ranged from 2% to 92% (positive), and the overall WTP valuation was calculated as 33%, that is, **consumers are willing to pay about a 33% more for sustainable attributes in food products.**

Three subgroups were established for the meta-analysis considering region, food categories and sustainable claims. This last subgroup included environmentally friendly, organic and animal welfare products together with those obtained with food safety considerations.

With respect to the region subgroup and although over half of studies were conducted in Europe (58%), **the highest WTP estimated was located in Asia**, with 64.8%, followed by Europe and America.

Concerning the type of food products, a major share of papers about pork meat products were found but **cereal & bread provided the highest WTP** with 60%, and fruit & vegetables products generated the lowest WTP, namely 9.4%.

As a first conclusion, it was observed that the **WTPs estimated across studies depended significantly on variations of the region and the food categories**, the results showed this trend, but the presence of **different sustainable claims was not a significant factor** and it did not influence the WTP significantly.

Following inclusion and exclusion criteria, the most restrictive filter to consider each paper assessed for eligibility was focused on including precise WTP values as a percentage or a monetary amount. In other words, the studies had to satisfy the criteria of including clear and quantitative information on consumers' willingness to pay (WTP). The objective with this restriction was to be able to quantify, as realistically as possible, the payment intention of different groups of individuals, assuming that the preference for sustainable food products was implicit in the fact of showing a positive willingness to pay a premium for them.

The groups of consumers analysed within the papers could be well defined through the characterization of specific variables divided socio-demographically and socio-economically and taking into account consumer preferences, concerns and habits. In total, **16 variables / group of variables** were scored qualitatively to characterize the type of consumers who prefer sustainable food and their participation decision. Variables as gender, income, type of family or the importance of having health concerns for buying this type of products were analysed and pondered in each paper, as it can be seen in the annex.

Nevertheless, the results showed that these variables were not statistically significant when they were included into the meta-analysis model, in other words, this outcome confirmed the **low impact of these variables in defining consumers' willingness to pay** for sustainable food.

It is important to emphasise that due to the considerable efforts dedicated to search and read information in each paper related to consumers' preferences and their willingness to pay for sustainable food, it can be concluded that **a high percentage of consumers have knowledge about sustainable food products but should become more familiar with them to learn to distinguish between different sustainable claims and their meanings**. An **overload of labels** created by different institutions or companies has become clear, resulting in the fact that consumers don't know what the exact value of the label is.

To bridge this informational gap, more detailed information on current environmental labels is required and this has been the aim of the work developed in the section 2 of this deliverable.

It is worth mentioning that the sample size of the included papers in the meta-analysis could have played a key role in the findings that are reported here and could have contributed to the absence of more significant results. This meta-analysis points out that, despite the empirical attention paid to the issue, relatively many studies investigating WTP did not meet the requirements of providing numerical values of it and for this reason were rejected (as can be seen in the PRISMA flowchart (Figure 2)). Furthermore, the fact of limiting the articles to those that study mainly three types of products (pork, milk and cereal) has also contributed to the reduction in the level of significance.

Hence the observations of this meta-analysis call **for broader approaches to always include a practical numerical percentage of WTP** in the surveys conducted when the consumers' preferences should be analysed. Indeed, further research taking into account the inclusion of studies with more specific data could lead to more conclusive results.

In its current state of practice, it is clear that consumers are very demanding in terms of sustainable food quality and the price to be paid for it. To bridge the current misinformation gap between these two issues, consumers need to be better informed about the extra costs that this quality implies and the research behind it.

2. Framework and Governance of the Current Environmental Friendly and Sustainable Label Models in Europe

2.1 Introduction

Ecolabels belong to the group of environmental labelling and information schemes (ELIS) which are used by manufacturers to state sustainability claims about their products, mainly targeting consumers on a Business to Consumers (B2C) basis, although Business to Business (B2B) configurations are also possible. These information schemes are regulated under the framework of the ISO 14020 series. The norm differentiates three types of ELIS (Table 5), depending on the scope, verification methods, etc:

- **Type I – Ecolabels (ISO 14024):** a multiple-criteria label that is awarded to products following third-party verification. It is used by manufacturers to prove that their product has proven environmental benefits over its counterparts in the same market segment. Some of these ecolabels may focus on one single environmental aspect, such as greenhouse gas emissions, energy efficiency. In addition, other aspects could be applied under the framework of this form of ecolabelling, for instance: social development (related to hired labour, prohibition of forced labour and child labour), system management (integrated crop protection, agrochemical handling and soil management and planting stock), etc.
- **Type II – Self-declared environmental claims (ISO 14021):** this category comprises claims made privately by manufacturers on the positive features of their products/services regarding sustainability. Although they do not need to be verified by a third-party, their claims should be supported by accurate and science-based indicators.
- **Type III – Environmental declarations (ISO 14025):** They present quantified environmental information on the life cycle of products to allow comparison between products that fulfil the same function. They are based on measurable data that has been thoroughly assessed using recognised tools such as Life Cycle Assessment providing. They provide objective indicators that support the environmental claims made by companies. Third-party verification is a must for this kind of ecolabels. They are primarily intended for business-to-business communication and an ecolabel identification is not provided.

Table 5. Comparison between the different categories of ELIs

	Type I Ecolabels ISO 14014	Type II Self-made environmental claims ISO 14021	Type III Environmental Declarations ISO 14025/ISO 21930
<i>The company needs to perform an LCA</i>	✗	✗	✓
<i>3rd party verification</i>	✓	✗	✓
<i>B2C communication</i>	✓	✓	✗
<i>B2B communication</i>	✗	✗	✓
<i>Green procurement</i>	✓	✗	✓

2.2 Objectives

The goal of this work is to provide an accurate overview of the current status of the ecolabelling landscape, providing valuable insights on different aspects such as scope of the ecolabels, trends and applications. The results can set the foundations for the development of an adequate ecolabelling scheme for the products resulting from Nutri2cycle's technical WPs, leading to improved market penetration and consumer's acceptance.

2.3 Approach

The working plan has been structured in 4 different steps. First a thorough review of the main information schemes was performed, evaluating the features of each type of ELIS, as mentioned in section 2.1. The next stage consisted of a review of the main ecolabels in the European food sector using the Ecolabel Index (Ecolabel Index, 2020), analysing several aspects such as the main claims, fields of application and geographical scope.

Once the framework has been defined, the focus was placed on the main products covered in N2C's activities, that is fertilizers, and consequently food products. The main legislation affecting these sectors was evaluated, looking for specific criteria related to labelling and ecolabelling.

Finally, taking into consideration the main ecolabelling schemes developed by the European Union, a specific set of guidelines to make N2C's products candidates to ecolabelling was provided.

2.4 Review of the Sustainable Labelling Landscape

Currently, a wide range of environmental labelling schemes can be found in multiple products in the market. This indicates the consumers' swift towards a more sustainable consumption, a trend that has slowly been gaining momentum for the last decades. Gruère (2013) has evaluated the evolution in the number of ecolabels for the last 50 years (Figure 6), showing an increment by a factor of 5 on the 1990's and the early 2000's, although from 2010 onwards, this trend has slowed down, favoured by the shift from the conventional system (where one ecolabel addresses only one aspect) to a more unified model.

This study also cites several drivers that explain this rapid increment:

- ▶ Increasingly stringent standards and regulations.
- ▶ Product differentiation as a market strategy.
- ▶ Increasing awareness of social and environmental issues.
- ▶ Reduction of risks for the producers.

For the food sector (Figure 7), the evolution follows the same general trend, with a steady increase in the number of labelling schemes from the mid 80's onwards, eventually reaching a plateau in the mid 2000's. This situation has result in a market full with a great variety of ecolabels, which needs to be reviewed for the assessment of the different types of ecolabels, its scope and underlying standards and verification processes.

This rapid increment has led to a market flooded with products flagging different ecolabels, self-claimed social and environmental benefits and other forms of sustainability declarations.

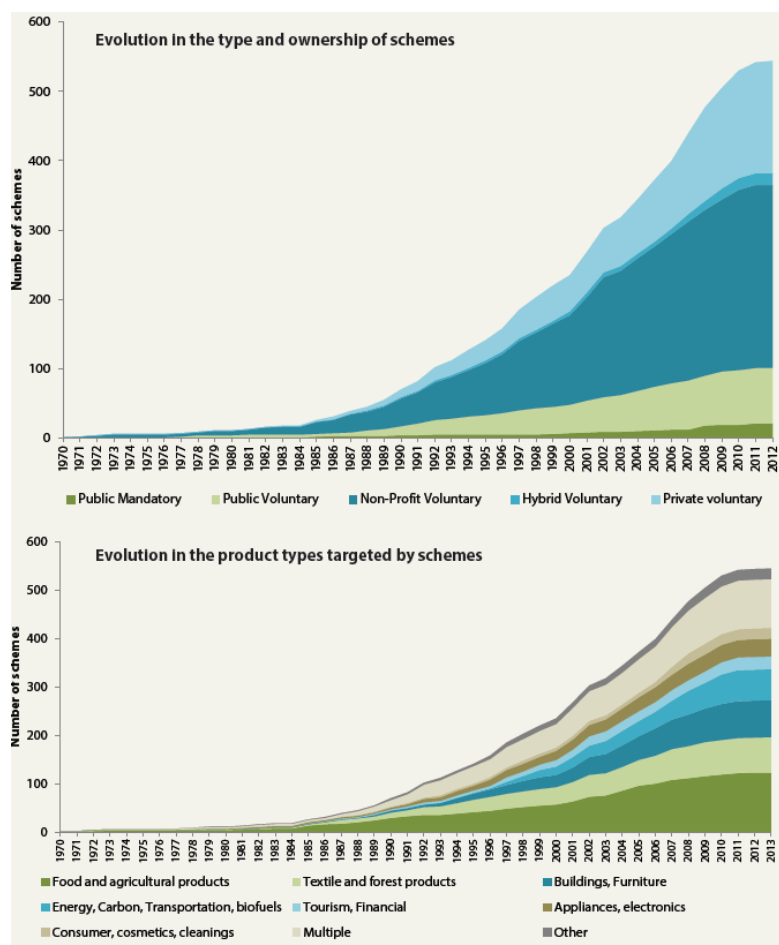


Figure 6. Evolution in the number of ELs. Source: Gruère (2013)

To evaluate the extent of this trend, a review of the main ecolabels that can be found in the current market for food products in Europe has been performed. Then the consequences of this “multiplication” of Ecolabels will be addressed in section 2.4.2.

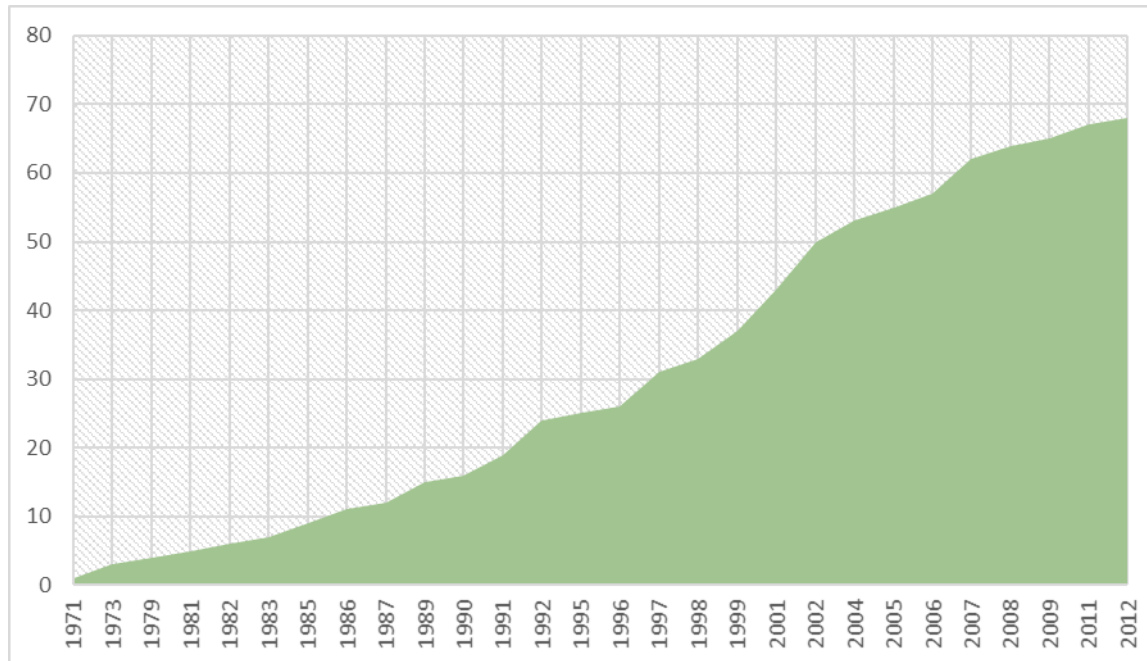


Figure 7 Evolution in the number of food-related labels. Source: own elaboration

2.4.1 A review of the Main Ecolabelling Schemes for Food Products in Europe

The methodology followed has been a review of the main ecolabels in the European food sector using the Ecolabel Index (Ecolabel Index, 2020), analysing several aspects such as the main claims, fields of application and geographical scope. The search criteria considered has been: “food”, “food products” and “Europe”.

After that, the main ecolabels identified have been evaluated according to the information published in their official web pages of each ecolabel revised (code of conduct, basic principles, sustainability criteria, etc).



The Common Code for the Coffee Community (4C) is a label that was created with the contributions of coffee stakeholders worldwide. The scope of the certification covers economic, social and environmental aspects across the 27 principles that have been developed on its own Code of Conduct, which recognises guidelines and good practices for agricultural production, coffee production and brewing.



The AB certification scheme, works similarly as the European organic logo, identifying products containing 100 % organic ingredients, or at least 95 % organic constituents in the case of pre-processed products. In particular, this label focuses on the following aspects:

- ✓ Non-processed agricultural products
- ✓ Animal feed products



This certification scheme assesses and certifies compost for agricultural and gardening purposes in compliance with British standard PAS 100 and the Compost Quality Protocol.



This is an Italian certification for organic products that sets stricter requirements than the EU Regulation 834/07 and it is based on 4 basic principles that ensure that the final product comes from national organic production:

- ✓ 100 % Italian raw materials. Some exceptions have been considered for products that cannot be grown in Italy because of climatic and soil aspects, such as cocoa and coffee.
- ✓ 100 % organic products: companies involved in the value chain must work under the regulation for organic production.
- ✓ GMOs are forbidden at every stage of the production chain.
- ✓ Animal feed has to be 100 % organic.



AMA Biozeichen

This logo ensures 100 % organic-sourced products with the highest quality requirements:

- ✓ High-quality, 100 % organic products
- ✓ Use of good practices in the production process.
- ✓ Traceability
- ✓ Independent control and third-party verification.
- ✓ Chlorine-free packaging materials



Best Aquaculture Practices

Best Aquaculture Practices (BAP) is a seafood specific certification program that addresses the four key areas of sustainability—environmental, social, food safety, and animal health & welfare—at each step of the aquaculture production chain.



Biogarantie Bioforum

Biogarantie is a Belgium trademark owned by BioForum, Unab and Probila. Besides the standards in European regulations, it sets additional requirements at economic, environmental and social level. Some of these standards include:

- ✓ The use of nitrates and nitrites is forbidden.
- ✓ Socially responsible raw materials. As an example, if a product contains cocoa, sugar from sugarcane, coffee and tea (more than 5 %) it must come from fair-trade certified sources.
- ✓ Packaging materials has to be chlorine free. Expanded polystyrene using CFCs is also forbidden.
- ✓ GMOs are forbidden.



Bio Hellas is a Greek certification scheme for organic food products focusing on consumer protection considering the three pillars of sustainability. It covers food companies that cover the whole value chain, from agricultural and husbandry activities to food retailers and export industries.



Bio Hotels is the world's largest eco-friendly hotels association. This logo ensures, among other aspects, the organic sourcing of the food they provide in their restaurants.



Biokreis is a non-governmental organisation that has developed a logo to stimulate organic regional production, promote organic agricultural practices and keep consumers informed in a transparent way about organic agriculture.



This certification scheme covers all the steps in the value chain of food products, from the agricultural production, animal production and processing involving a wide range of stakeholders. Main aspects addressed with this ecolabel are biodiversity, animal welfare, environmental preservation, GMO-free products and local and regional sourcing.





Bio Siegel logo was first developed in 2001 as a voluntary certification for organic food products. It covers the production of organic food products for new producers and for already established producers, importers and distributors willing to increase consumer's attraction for organic products.

The Bio Siegel logo applies to all non-processed agricultural products for human consumption and animal feed that are included under European regulations for organic production. All ingredients of agricultural origin must stem from organic farming, while strict exceptional rules apply to up to 5 % of such ingredients: they must either be listed in Annex IX of Regulation (EC) No. 889/2008.



The Bio Suisse organic label (Bud label) covers organic food products from national production that has been grown under the following sustainability-related principles:

- ✓ Natural diversity on the organic farm.
- ✓ Responsible livestock management and feeding.
- ✓ No use of chemically synthesized pesticides or fertilizers.
- ✓ No use of genetic engineering.
- ✓ No use of unnecessary additives such as flavourings and colourings.
- ✓ Non-aggressive processing of foodstuffs.
- ✓ Regular inspection of organic production and processing.



This certification scheme ensures that the coffee has been produced in a sustainable way, respecting biodiversity, sequestering carbon dioxide and preventing habitats from deforestation.



The Bonsucro certification proves that both Bonsucro’s Production Standard and Chain of Custody Standard have been followed, respecting social and environmental Standards. The Production Standard helps farmers and mills to measure their productivity and key environmental and social impacts.

The Chain of Custody (CoC) Standard concerns the supply of a product including all stages from the feedstock production up to consumption. It ensures that best environmental and social practices have been followed along the chain, and provides transparency and traceability.



Carbon reduction label

This label shows that a product has had its carbon footprint certified according to internationally recognised standards such as the GHG protocol, ISO 14067 and PAS 2050. There are different types of labels depending on the information on display:

- ✓ CO₂ Measured: shows that a product’s carbon footprint has been measured and certified.
- ✓ Reducing CO₂: Shows a company’s commitment for reduction of the carbon footprint, or an effective measurable reduction in the carbon footprint of the product along with a commitment for further reductions in the future.
- ✓ Lower Carbon: certifies that the carbon footprint linked to the life cycle of a product is significantly lower than the average market product.
- ✓ Carbon Neutral: shows that a product’s carbon footprint has been reduced and any significant emissions are offset.



Climatop

This certification scheme shows that the carbon footprint of a product is significantly lower than the average in the reference market. It addresses both business-to-business (B2B) and business-to-consumer (B2C) markets. The certification is supported by a life cycle assessment that covers all the product stages, recording all the GHG emissions from the extraction of the raw materials to end of life. The assessment is complemented by a study of environmental sustainability, to ensure that the label is only awarded to the most climate-friendly products. The carbon footprints of the products are based on international standards (ISO 14040) and verified by an independent expert.



The ø logo is an inspection label and shows that the latest preparation of the product has taken place in a Danish company inspected by the public authorities. Therefore, the logo can be seen on both foods that originate from Danish organic farms and on imported foods that are processed, packed or labeled in Denmark.



Established in 1992 and recognised across Europe and worldwide, the EU Ecolabel is a label of environmental excellence that is awarded to products and services meeting high environmental standards throughout their life-cycle: from raw material extraction, to production, distribution and disposal. The EU Ecolabel promotes the circular economy by encouraging producers to generate less waste and CO₂ during the manufacturing process. The EU Ecolabel criteria also encourage companies to develop products that are durable, easy to repair and recycle. For more details see section 2.4.3.



The EU organic logo was developed in 2010 as part of an initiative of the EU commission for a widespread, standardised development of organic farming. For more information see section 2.4.3.



Certification standard for Fair Trade and responsible supply-chains. This standard provides a framework within which each actor can engage to make fair trade principles a reality in its supply-chain by:

- ✓ Defining clear requirements applying to each actor in a supply-chain in order to characterize fair trade and responsible supply-chains;
- ✓ Guaranteeing the sound and efficient control of these requirements, all while offering a flexible approach capable of adapting to local contexts, cultures and traditions;
- ✓ Ensuring that consumers receive truthful information about these requirements and the efforts made to implement them.



Fairtrade

Fairtrade is a strategy that aims to promote sustainable development and to reduce poverty through fairer trade.

It is also a trading partnership, based on dialogue, transparency and respect that seeks greater equity in international trade. Its contribution to sustainable development is through offering better trading conditions to, and securing the rights of, marginalized producers and workers – especially in the South.

In order to be part of the Fairtrade system, traders and producers have to meet certain criteria which are defined in the Fairtrade Standards set by Fairtrade International. FI -CERT (Fairtrade's independent certification company) manages the process of auditing and certification to guarantee compliance with the Fairtrade principles.



Fairwild

The FairWild Standard (FWS) is an internationally recognized set of principles, criteria and indicators for verifying the sustainable and equitable trade in wild harvested ingredients.

The FWS provides the basis for the current third-party audited certification scheme, as well as other implementation mechanisms (e.g. guidance for resource management; inclusion in national regulatory systems, and voluntary codes of practice).

The FairWild Foundation (FWF) aspires to meet codes of good practice in the on-going development and implementation of the FWS, including stakeholder consultation in standard-setting and conducting of regular review and revision processes. Therefore, this procedure was developed in respect of the principles of the ISEAL Code of Good Practice for Setting Social and Environmental Standards.



Friend of the Sea

Friend of the Sea certification program allows assessment of fisheries and aquaculture products according to sustainability criteria and requirements. The certification, granted following an audit by independent certification bodies, ensures that a product complies with the sustainability requirements. Requirements are classified as Essential, Important or Recommendations, according to their level of importance.



GLOBALG.A.P. *Global Good Agricultural Practice (GAP)*

GLOBALG.A.P. is a trademark and a set of standards for good agricultural practices (G.A.P.). The main objective is getting a safe and sustainable agriculture worldwide. GAP sets voluntary standards for the certification of agricultural products around the globe add value to agricultural supply chains by providing innovative, cost efficient, and transparent solutions.



Good Shopping Guide Ethical Award

The Ethical Company Organisation provides ethical research information and brand comparison tables on thousands of companies & brands, promoting positive policies in three key areas: Human Rights, Environment and Animal Rights.



Green Crane: Ukraine

The main objective of their activity is to evaluate the products for compliance with environmental criteria according to ISO 14024 scheme in order to ensure the reliability of data on the environmental benefits of products within a specific category based on the results of the life cycle assessment.



Hand in hand

The HAND IN HAND partner program is a fair-trade program developed by Rapunzel Naturkost together with HAND IN HAND suppliers and independent experts which aims to link the idea of fair trade with that of organic farming. It is a program for mutually beneficial cooperation with: Small holder cooperatives, farmer associations and farmer groups, farms, plantations, processing companies and exporters.





Ecocert IMOsuisse AG is a member of the international ECOCERT group based in France. It shares core values on organic agriculture, environmental protection and sustainability. IMO certified offers new opportunities of development: a wider range of environmental services and certifications with recognized and demanding standards.



Krav

KRAV is Sweden's most well-known environmental label for food and beverages, based on ecological principles with especially high standards for animal welfare, health, social responsibility and climate impact. KRAV's vision is that all food production should be economical, ecologically and socially sustainable and meet current needs without compromising the ability of future generations to meet their needs.



LEAF

LEAF Marque is an environmental assurance system recognising more sustainably farmed products. LEAF Marque's Intended Impacts aims to inspire and enable sustainable farming that is prosperous, enriches the environment and engages local communities. The Intended Impacts of LEAF Marque are to improve: Soil management to enhance soil quality and soil health, the resilience of cropping systems, management of water use and water quality, energy efficiency and energy use, Waste management, management of livestock to enhance the environment and enhance the management of native habitats and biodiversity.



Marine Stewardship Council

The Marine Stewardship Council is an international non-profit organisation focused on the protection of marine biodiversity through sustainable fishing practices. This label awards fisheries whose activities minimise its environmental impact according to three basic principles: sustainable fish stocks, reduced environmental impact and effective management. Its standards are science based, and subjected to third party verification. Traceability is another key aspect, as the full value chain from ocean to plate has to be addressed.





National System for Integrated Production Quality (SQNPI)

The SQNPI is a certification scheme which aims to enhance the agricultural production of vegetables obtained in compliance with the regional integrated production regulations. It applies to all companies in the Italian national territory that use techniques of integrated agricultural production, with a particular attention to the maintenance of the traceability chain.



Naturland develops and propagates organic agriculture at local, national and global levels. Naturland joins forces to campaign for the production, processing and marketing of high quality, healthy and enjoyable foodstuffs and organic products. Naturland's values are aligned to the holistic principles of sustainable farming practices: organic, innovative and fair.



NEULAND is a program for particularly animal-friendly and environmentally friendly husbandry. NEULAND guidelines are even stricter in some points than in the organic sector. Its conviction is the future of agriculture does not lie in the production of mass-produced goods, but in quality foodstuffs, the production of which focuses on the welfare of animals and the environment, produced by farms.



The Nordic Swan is a type I ecolabel that was developed in 1989 with the intention to be the official Ecolabel for the Nordic countries (Iceland, Denmark, Sweden, Norway and Finland). It is based on a lifecycle perspective, considering from the extraction of raw material to the end of life of the different good/services. Currently, this label addresses more than 60 product groups and has wide acceptancy on the Nordic market with a 95% consumer recognition (nova-Institut GmbH, 2015).



Ø-label: Norway

Most of Debio's services deal with the inspection of organic production in accordance with the Norwegian «Regulations on the Production and Labelling of Organic Agricultural Products». The inspection services are founded on an agreement with the Norwegian Food Safety Authority, and the regulation is based on the EU Council Regulation 834/2007. It covers farming, processing, import and marketing of organic agricultural products.



Organic Farmers & Growers Certification

OF&G relies on the productivity and efficiency of the farming and food system from the perspective of the balance sheet as against a simple profit and loss approach. Through a broader assessment of outputs beyond a simple yield/cost formula the full impacts of our food production system can be monitored, in simple terms if the overall balance sheet value is declining then the overall food production system is not sustainable.



Organic Food Federation

This Standard provides the basis for the sustainable development of organic production while ensuring the effective functioning of the internal market, guaranteeing fair competition, consumer confidence and protecting consumer interests. It establishes common objectives and principles to underpin the rules set out in this Standard concerning: all stages of production, preparation and distribution of organic products and their control and the use of indications referring to organic production in labelling and advertising.



Rainforest Alliance Certified

Rainforest Alliance certification helps farmers to produce better crops, adapt to climate change, increase their productivity, and reduce costs. These benefits provide companies with a steady and secured supply of certified products. Sourcing Rainforest Alliance Certified products also helps businesses meet consumer expectations and safeguard their brand's credibility.



Roukatiето

Roukatiето Yhdistys ry is an association that promotes Finnish food culture by communicating about food and the food production chain, and by distributing information on the Hyvää Suomesta. Produce of Finland label, that is used as the certificate for Finnish food products. Its goal is to raise the appreciation and sales of Finnish food, spread food related information and expertise and strengthen the competitive advantage of the Finnish food production chain. The values that guide the operations are Finnishness, reliability and partnership.



RSPO Certified Sustainable Palm Oil

The RSPO P&Cs covers the most significant environmental and social impacts of palm oil production and the immediate inputs to production, such as seed, chemicals and water, and social impacts related to on-farm labour and community relations. The RSPO P&Cs applies to existing plantings, as well as the planning, siting, development, expansion and new plantings.



Skal Eko Symbol

The object of the Skal foundation is to offer consumers certainty that a product with an organic label was in fact produced following the principles of organic production. Skal inspects and awards organic certification to farms and businesses within the context of organic regulations: (EC) Nr. 834/2007, (EC) Nr. 889/2008 and (EC) Nr. 1235/2008.



Soil Association Organic Standard

The Soil Association standards put the principles of organic production into practice. These organic standards encompass EU Regulations 834/2007, 889/2008 and 1235/2008 (referenced throughout as the EU Organic Regulation). The Soil Association has higher organic standards than required by the EU Organic Regulation in key areas: delivering the highest levels of animal welfare, protecting human and animal health, safeguarding the environment and protecting the interests of organic consumers.



UTZ Certified

UTZ certification shows consumers that products have been sourced, from farm to the shop shelf, in a sustainable manner. To become certified, all UTZ suppliers have to follow our Code of Conduct, which offers expert guidance on better farming methods, working conditions and care for nature. This in turn leads to better production, a better environment and a better life for everyone.

Apart from these ecolabels, there are a number of alternative ELIs that can be found in the European food and feed market. However, little information on their main aspects, requirements and verification processes have been found. Figure 8 shows some of these ecolabels that have not been included in the review because of the lack of information.



Figure 8. Alternative ELIs

The review shows that a great variety of Ecolabels can be found in the market, providing different information and governed by different standards and principles. These labels can be found in different countries since some schemes designed in one country, with the intention of being applied only to products being sold in that country, are used elsewhere because of demand-driven voluntary market uptake in other countries, or endorsement by foreign governments. Others are designed so they can be recognised and applied in many countries.

While most schemes originate in Europe and North America, recent growth has been stronger elsewhere. Data also shows that some country markets have a greater proportion of labels originating from other parts of the world: in some OECD countries over 50% of the schemes present in their markets originate from other world regions. To understand the international spread of schemes, more reliable data is needed to track the growing influence of ELIS on producers in other countries. For example, while 92% of all organic products are sold in North America and Europe, some 36% of the 1.9 million organic producers worldwide are based in Asia, with 600,000 small producers in India alone (Prag, Lyon, & Russillo, 2016).

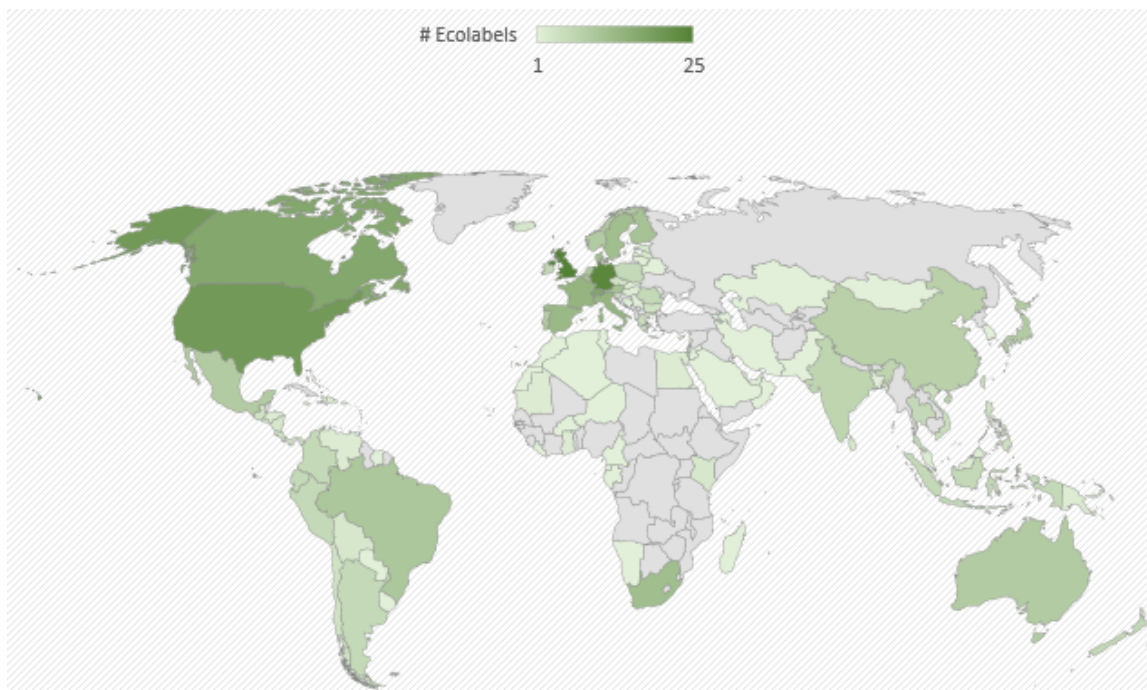


Figure 9. Regional distribution of the Ecolabels included in this study (elaborated by CARTIF)

As shown in Figure 9, clearly North American and European markets are dominant regarding the presence of ELIs for food products. In particular, the USA, Germany and UK are the main markets for sustainable food products. However, the benefits/drawbacks of this increasing number of ELIs are yet to be discussed, as it has resulted in a phenomenon known as multiplication, whose consequences have been addressed in the next section.

2.4.2 The Issue of Multiplication

The review of the ecolabelling landscape has proven that a great range of environmental labelling schemes can be found in the current market, with often different ecolabels for the same products at local, regional, national, international and private level. Although this can be a sign of producers developing a growing concern on the environmental impact of its activities resulting in an increased offer of “eco-friendly” products, this excess of labelling schemes can also have negative impacts.

Table 6. Positive and negative effects of label multiplication for different stakeholders (Prag, Lyon, & Russillo, 2016)

Stakeholder	Positive impact	Negative impact
Producers	Diversity of standards can include local and regional aspects A diverse range of requirements can encourage the improvements of lowest performers Access to high-value niche markets	Harder to evaluate the market uptake of the different labels and the most suitable marketing conditions Higher costs derived from auditing and certification
Manufacturers and retailers	Standards adapted to particular markets Flexibility and lower risk	Higher costs linked to multiple compliance and customer communication channels Higher supply chain complexity
Certification and standardization bodies	More competitive market could result in improved performance and more stringent standards Adaptability to market trends and needs	Competition in the short-term market could lead to lower pressure of standards Higher branding costs
Consumers	Greater choice and personalisation	Difficulty in differentiating criteria Misinterpretation of the labels, loss of credibility and confusion

From Table 6 it can be concluded that the existence of a wide range of ecolabels has two main effects; on the one hand, a more competitive market could foster the performance of producers resulting in products with lower environmental footprint; on the other hand, excess offer can confuse and mislead consumers, resulting in a lack of trust and reduced uptake of environmentally friendly products.

All these factors affect the overall effectivity of Ecolabels and in consequence how consumer choices impact on the environment, since the selection of one product over another at market scale can have a significant environmental impact. However, it is difficult to estimate this impact due to the complexity of the market. In general, it can be said that the effect of an ecolabel on the environment is only a function of the stringency of its underlying standards. In this situation it has been defined a list of scenarios relating the type of label and claims on a product and its actual environmental performance (Gruère, 2013). As a result, several situations can arise, such as *greenwashing* (when a product reports environmental benefits when in reality its performance is low) and its opposite, *greenbashing* (good environmental performance overlooked by the absence of Ecolabel or the underestimation of its benefits).

2.4.3 Towards a Unified Environmental Labelling Scheme: EU Ecolabel, EU Organic Logo and Product Environmental Footprint Initiatives



The EU Ecolabel

As mentioned before in the review of the Ecolabeling landscape, the EU Ecolabel was established in 1992 and recognised across Europe and worldwide, the EU Ecolabel is a label of environmental excellence that is awarded to products and services meeting high environmental standards throughout their life-cycle.

The EU Ecolabel criteria provide strict guidelines for companies looking to lower their environmental impact and guarantee the efficiency of their environmental actions through third party controls. Furthermore, many companies turn to the EU Ecolabel criteria for guidance on eco-friendly best practices when developing their product lines. Currently, it covers 11 major product groups (Figure 10) with significant environmental impact, and guarantees that such products have a good environmental performance.

 <p>Cleaning up (Detergents, surface cleaning agents)</p>	 <p>Clothing and textiles (Footwear and textile products)</p>	 <p>Coverings (Hard coverings, bamboo and wood flooring)</p>
 <p>Do-It-Yourself (Paints and varnishes)</p>	 <p>Electronic equipment (Televisions)</p>	 <p>Furniture</p>
 <p>Gardening (Growing media, soil improvers, mulch)</p>	 <p>Lubricants</p>	 <p>Other household items (Mattresses)</p>
 <p>Paper products (Graphic, printed, tissues...)</p>		 <p>Personal care products (Hygiene products, rinse-off cosmetics)</p>

Figure 10. Product groups set by the EU Ecolabel.



This label is verified by independent, third-party experts and products sourcing outside the EU can be candidates if they fulfil the required criteria. The functioning of this label is set by specific regulation under the REGULATION (EC) No 66/2010 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 25 November 2009.

The regulation explicitly states that the goal of this label is to avoid the multiplication of ELIs thus simplifying the decision-making process for the consumers while reducing the environmental impact of products through its whole life cycle (REGULATION (EC) No 66/2010, 2010). The legislation also sets a number of basic requirements, including the need for science-based results to justify any environmental claims using a life-cycle perspective considering several impact categories, quality assurance and the exclusion of products containing toxic or hazardous substances.



EU Organic logo.

The EU Ecolabel does not cover food and feed product groups. However, the EU developed its EU Organic Logo to address the production of organic food products in Europe. The use of the logo is compulsory for all pre-packaged EU food products, produced and sold as organic within the EU. Such products must contain at least 95 % of organic ingredients. Additionally, the use of the logo is optional for imported products (as long as they are compliant with EU regulations), non-prepacked organic products, EU products placed in non-EU organic markets and as part of information campaigns intended to raise awareness in the general public.

The requirements and applications of the EU Organic logo are set under two main EU regulations: COMMISSION REGULATION (EC) No 889/2008 and REGULATION (EU) 2018/848, both of them will be evaluated in deep in section 1.6.

All the aspects linked to the production of organic products are included under this set of regulations: from plant and livestock production to the final processing, packing and transportation. The fundamental requirements for the production of organic food products, as defined by the EC are (REGULATION (EU) 2018/848, 2018):

- ✓ Respect for the quality of natural ecosystems and ecosystem's services.
- ✓ The preservation of natural landscape elements.
- ✓ Make responsible use of natural resources, such as water, soil and air.
- ✓ Production of high-quality food and feed products by using only processes that do not harm the environment, human health and biodiversity.
- ✓ Ensuring the integrity of the organic production along the whole value chain.
- ✓ Proper design and management of biological processes, following natural principles based on ecological systems, such as the use of living organisms in production processes, sustainable agricultural and aquacultural practices, and the exclusion of genetically modified organisms (GMOs).



- ✓ Exclusive use of internal inputs. Where there is no other alternative, the external inputs shall be restricted to inputs from organic production, natural or naturally-derived substances and low solubility mineral fertilisers.
- ✓ Exclusion of animal cloning, artificially induced polyploid animals and the use of ionising radiation.
- ✓ Respect towards animal welfare according to species-specific needs.

Product Environmental Footprint (PEF)

The product environmental footprint is a recent initiative launched by the European Commission in response to businesses complaints about the proliferation of environmental labels/certification schemes and with some companies making unsubstantiated or unverifiable 'green' claims. Although it still is at pilot stage, the initiative is attracting attention as a unified way of evaluating and communicating the environmental impact of products and organizations. It is fact-based and follows the principles of the Life Cycle Assessment.

Based on previous studies (Lupiáñez-Villanueva, Tornese, Veltri, & Gaskell, 2018), the EC has identified a number of aspects that the PEF label should include to maximize its effectiveness, such as simplicity and transparency, exclusion of complex scientific terms, visual performance indicators and tools like QR codes for more information.

A visual example can be seen in Figure 11.

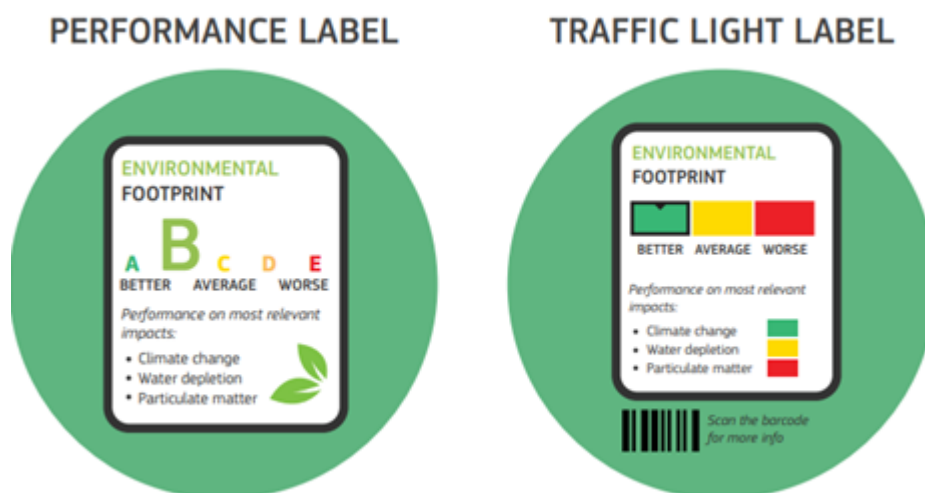


Figure 11. Sample labels for disclosing PEF information to consumers. Source: (European Commission, 2019)

2.5 Stakeholder Mapping

The review of the ecolabelling landscape has shown that the framework for the development of an Ecolabel is complex and multiple factors and stakeholders are involved from consumers, to authorities, governments, consumer associations, manufacturers... As a result, it was decided to include a **potential tool to identify every stakeholder** involved in this ecosystem.

2.5.1 Preparation of the Procedure for the Identification of Stakeholders

The stakeholders' mapping consists of the following three phases:

- ▶ Identification: listing the potential stakeholders
- ▶ Analysis: evaluating the potential stakeholders
- ▶ Prioritizing: ranking the potential stakeholders

1. Identification

The first task of stakeholders' mapping is the preliminary identification of the stakeholders. Clarifying the description of the project or the initiative will help the implementation of this task. These goals will contribute to the effective depiction of the required characteristics of the stakeholders and the identification of which types of stakeholders are required.

Any company which develops a commercial activity aimed at the manufacture of a product / service / process may choose to certify its references by environmental labels if those products are included in current fields of certification (Leach et al., 2016). The target of this task therefore will be to review in detail the current status of the existing environmental friendly and sustainable label and their governance (entities, mechanism, property rights, agents eligible...). This analysis for process labelling latest information will be specific referred to NUTRI2CYCLE framework and by reviewing them at the moment that project begins, the consortium will be able to evaluate how these schemes could contribute to promote the agro-ecology prototypes developed and to define exactly the baseline from which project shall start regarding consumption patterns.

In the same way, it is important to realize that stakeholders must have specific roles during their engagement. Therefore, an initial categorization can be performed according to their roles and the level of involvement. The role is crucial because some stakeholders' roles are more influential and significant than others.

An initial identification of the stakeholders can be performed taking into account the following classification of the stakeholders:

- I. The stakeholders who have a direct relation with the project – direct partner
- II. The stakeholders who do not have a direct relation with the project – indirect partner
- III. The stakeholders who support the success of project - ally
- IV. The stakeholders, who hinder the successful implementation of the project - competitor

The stakeholders will be identified from all the potential stakeholders' groups. Indicatively, the initial list of stakeholders may include the following groups:

- International organizations
- National authorities
- Regional or local administrators
- Food safety agencies & authorities (national and Europeans)
- Research & innovation agencies & authorities (national and Europeans)
- Universities
- Research centers, think tanks & institutions
- NGOs
- Consultancy firms
- Investors
- National Standardization bodies
- National associations (farming, food, consumers, forester, retailers, others?)
- European association (farming, food, consumers, forester, retailers, others?)
- Media

A crucial point is the fact that the procedure of the stakeholders' mapping is a dynamic procedure and it can lead to the continuous changes of the selected stakeholders.

Some indicative questions, which will help for the successful identification of the stakeholders can be the following:

- Do the stakeholders have significant expertise in the relative field(s) of the project?
- Do the stakeholders represent diverse perspectives and/or experiences?
- Can the stakeholders raise crucial questions contributing to the improvement and success of the project?
- Do the stakeholders want to benefit from the project in order to reach self-goals?
- Can the stakeholders be considered as proponents of evaluation and support the testing or implementation of the project?
- Can the stakeholders delay or stop the project?
- Should the official decision-making authority be included into the selected stakeholders?
- Do the stakeholders have the power to implement recommendations?
- Will the stakeholders be affected by the outcome of the project?

The elaboration of the above questions may enhance significantly the procedure for the effective identification of the participating stakeholders.

Some recommendations for the identification of the stakeholders can include:

- Trying to be open-minded and to consider potential stakeholders taking into consideration the innovation – e.g. bioeconomy stakeholders – new markets and technologies, new regulations and legislations etc.
- Trying to keep a balanced selection of representatives including societal organizations, public bodies, private sector representatives, scientific experts etc.

- Thinking strategically and politically about the selected stakeholders. It is important to keep in mind that a single group might have specific interests and expectations, while several groups might have completely different.

2. Analysis

After the step of the stakeholders' identification, characteristics and profiles should be analyzed. It is important to have in mind that different stakeholders may have completely different levels of interest and influence. Nevertheless, as previously mentioned, the stakeholders should represent a mix of perspectives, experiences and roles relative to the project. Profiling the potential stakeholders will help to map and assess them.

The proposed approach targets to the qualitative assessment of specific stakeholders' components such as their degree of expertise, their willingness for participation and the overall impact, which is expected to be triggered by their involvement.

The selected criteria, which must be evaluated, are described briefly below.

- **Capacity:** Evaluate the resource capacity of each stakeholder taking into consideration their knowledge, expertise and technical capabilities.
- **Willingness:** Evaluate stakeholders' availability and willingness for participation.
- **Influence:** Evaluate the number and the quality of stakeholders' connections, which can influence all the involved parties.
- **Necessity:** Evaluate stakeholders' necessity for inclusion.

It should be mentioned that additional criteria can be added for analysis.

All the above criteria will be assessed utilizing the following scale: 1. Low, 2. Medium, 3. High

The person who carried out the identification phase should also analyse and evaluate the criteria of the identified stakeholder.

For instance, Stakeholder A is analysed with the following scale:

Score_{Capacity} = Medium, Score_{Willingness} = High, Score_{Influence} = High, Score_{Necessity} = Medium.

Translating the scale into scores results in:

Score_{Capacity} = 2, Score_{Willingness} = 3, Score_{Influence} = 3, Score_{Necessity} = 2.

3. Prioritization

The final step of the stakeholders' mapping is the prioritization process, which aims at the sorting of the identified and analysed stakeholders.

Identification, analysis and prioritization are usually very subjective activities. Although guidance is provided, it is not unlikely that different persons will rate the identified stakeholders with different marks. Nonetheless, subjectivity will not undermine the results.

Project leaders may mandate a team or a single person to carry out the stakeholder mapping. The bigger the team, the bigger the stakeholders mapped.

The final step of the stakeholders' mapping is the prioritization process, which aims at the sorting of the identified and analyzed stakeholders.

The total score of a stakeholder "i" can be calculated from the following equation:

$$\text{Total Score } i = \text{Score } i, \text{ Capacity} + \text{Score } i, \text{ Willingness} + \text{Score } i, \text{ Influence} + \text{Score } i, \text{ Necessity}$$

The evaluation of the stakeholders can be performed according to the following classification criteria:

1. If the score is higher than 9 then the specific stakeholder can be characterized as "Very important stakeholder".
2. If the score is between 5 and 9 then the specific stakeholder can be characterized "Important stakeholder".
3. If the score is lower than 5 then the specific stakeholder can be characterized "Non-important stakeholder".

For example, if a stakeholder has been evaluated with the following scores:

$$\text{Score}_{\text{Capacity}} = 2, \text{Score}_{\text{Willingness}} = 3, \text{Score}_{\text{Influence}} = 3, \text{Score}_{\text{Necessity}} = 2$$

then, the total score can be calculated with the following equation: $2 + 3 + 3 + 2 = 10$.

Therefore, taking into consideration the above classification criteria, the stakeholder will be assessed as "Very Important Stakeholder".

It is important to select the most effective stakeholders according to the established criteria.

Final, it is important to keep this part of the procedure confidential, because there is the possibility the stakeholders not to be willing to participate if they are aware of the fact that they are not considered as high priority in comparison with other.

2.6 Regulation and Legislation

2.6.1 EU Label Regulation

EU Labelling is regulated by **Regulation (EC) No 66/2010 of the European Parliament and of the Council of 25 November 2009 on the EU Ecolabel**, was developed in order to avoid the proliferation of environmental labelling schemes and to encourage higher environmental performance in all sectors for which environmental impact is a factor in consumer choice.

The EU Ecolabel scheme is part of the sustainable consumption and production policy of the Community, which aims at reducing the negative impact of consumption and production on the environment, health, climate and natural resources. The scheme is intended to promote those products which have a high level of environmental performance through the use of the EU Ecolabel. To this effect, the group of products that shall be include under the EU label framework and them specific regulations are listed in Table 7.

Table 7. EU Label products regulation

Group of products	Specific Product	Regulation
CLEANING UP 	Dishwasher detergents	Commission Decision (EU) 2017/1216 of 23 June 2017 establishing the EU Ecolabel criteria for dishwasher detergents.
	Hard surface cleaning	Commission Decision (EU) 2017/1217 of 23 June 2017 establishing the EU Ecolabel criteria for hard surface cleaning products.
	Industrial and institutional dishwasher detergents	Commission Decision (EU) 2017/1215 of 23 June 2017 establishing the EU Ecolabel criteria for industrial and institutional dishwasher detergents.
	Laundry detergents	Commission Decision (EU) 2017/1218 of 23 June 2017 establishing the EU Ecolabel criteria for laundry detergents.
	Hand dishwashing detergents	Commission Decision (EU) 2017/1214 of 23 June 2017 establishing the EU Ecolabel criteria for hand dishwashing detergents.

Table 7. EU Label products regulation





Group of products	Specific Product	Regulation
CLEANING UP 	Indoor cleaning services	Commission Decision (EU) 2018/680 of 2 May 2018 establishing EU Ecolabel criteria for indoor cleaning services.
	Industrial and institutional laundry detergents	Commission Decision (EU) 2017/1219 of 23 June 2017 establishing the EU Ecolabel criteria for industrial and institutional laundry detergents.
COVERINGS 	Hard coverings	Commission Decision of 9 July 2009 establishing the ecological criteria for the award of the Community eco-label to hard coverings.
	Wood-, cork- and bamboo-based floor coverings	Commission Decision (EU) 2017/176 of 25 January 2017 on establishing EU Ecolabel criteria for wood-, cork- and bamboo-based floor coverings.
ELECTRONICS EQUIPMENTS 	Televisions	2009/300/EC: Commission Decision of 12 March 2009 establishing the revised ecological criteria for the award of the Community Eco-label to televisions.
GARDENING 	Growing media, soil improvers and mulch	Commission Decision (EU) 2015/2099 of 18 November 2015 establishing the ecological criteria for the award of the EU Ecolabel for growing media, soil improvers and mulch.

Table 7. EU Label products regulation









Group of products	Specific Product	Regulation
OTHER HOUSEHOLD ITEMS 	Bed mattresses	2014/391/EU: Commission Decision of 23 June 2014 establishing the ecological criteria for the award of the EU Ecolabel for bed mattresses.
PERSONAL CARE PRODUCTS 	Absorbent hygiene products	2014/763/EU: Commission Decision of 24 October 2014 establishing the ecological criteria for the award of the EU Ecolabel for absorbent hygiene products.
	For rinse-off cosmetic products	2014/893/EU: Commission Decision of 9 December 2014 establishing the ecological criteria for the award of the EU Ecolabel for rinse-off cosmetic products.
CLOTHING AND TEXTIL 	Footwear	Commission Decision (EU) 2016/1349 of 5 August 2016 establishing the ecological criteria for the award of the EU Ecolabel for footwear.
	Textile products	2014/350/EU: Commission Decision of 5 June 2014 establishing the ecological criteria for the award of the EU Ecolabel for textile products.
DO-IT-YOURSELF 	For indoor and outdoor paints and varnishes	2014/312/EU: Commission Decision of 28 May 2014 establishing the ecological criteria for the award of the EU Ecolabel for indoor and outdoor paints and varnishes.
FURNITURE 	Furniture	Commission Decision (EU) 2016/1332 of 28 July 2016 establishing the ecological criteria for the award of the EU Ecolabel for furniture.

Table 7. EU Label products regulation

Group of products	Specific Product	Regulation
LUBRICANTS 	Lubricants	Commission Decision (EU) 2018/1702 of 8 November 2018 establishing the EU Ecolabel criteria for lubricants.
PAPER PRODUCTS 	Converted paper products	2014/256/EU: Commission Decision of 2 May 2014 establishing the ecological criteria for the award of the EU Ecolabel for converted paper products.
	Graphic paper & tissue paper and tissue products	Commission Decision (EU) 2019/70 of 11 January 2019 establishing the EU Ecolabel criteria for graphic paper and the EU Ecolabel criteria for tissue paper and tissue products.
	Printed paper	2012/481/EU: Commission Decision of 16 August 2012 establishing the ecological criteria for the award of the EU Ecolabel for printed.

Of specific interest for the potential Nutri2Cycle products is the regulation specifically detailed in the “gardening” category.

GARDENING 	Growing media, soil improvers and mulch	Commission Decision (EU) 2015/2099 of 18 November 2015 establishing the ecological criteria for the award of the EU Ecolabel for growing media, soil improvers and mulch.
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This Regulation establishes the criteria, as well as, the related assessment and verification requirements for growing media, soil improvers and mulch. According to the Regulation, these concepts involve:

- Growing media: material used as a substrate for root development, in which plants are grown.
- Soil improvers: material added to soil in situ whose main function is to maintain or improve its physical and/or chemical and/or biological properties, with the exception of liming materials.
- Mulch: type of soil improver used as protective covering placed around plants on the topsoil whose specific functions are to prevent the loss of moisture, control weed growth, and reduce soil erosion.

These criteria aim at promoting the recycling of materials, the use of renewable and recycled materials, thus reducing environmental degradation, and decreasing soil and water pollution by means of establishing strict limits on pollutants concentrations in the final product. The different criteria to each type of product covered by the scope are showed in Table 8.

Table 8. EU Label criterion for gardening products

Criterion	Growing media	Soil improvers	Mulch
Criterion 1 – Constituents			
Criterion 2 - Organic constituents			
Criterion 3 - Mineral growing media and mineral constituents			
Criterion 3.1. - Mineral growing media and mineral constituents: Energy consumption and CO2 emissions			
Criterion 3.2 - Mineral growing media and mineral constituents: Sources of mineral extraction			
Criterion 3.3 - Mineral growing media and mineral constituents: Mineral growing media use and after use			
Criterion 4 - Recycled/recovered and organic materials in growing media			
Criterion 5 - Limitation of hazardous substances			
Criterion 5.1 - Heavy metals			
Criterion 5.2 - Polycyclic Aromatic Hydrocarbons			
Criterion 5.3 - Hazardous substances and mixtures			
Criterion 5.4 - Substances listed in accordance with Article 59 of Regulation (EC) No 1907/2006			
Criterion 5.5 - Limits for E. coli and Salmonella spp.			
Criterion 6 - Stability			
Criterion 7 - Physical contaminants			
Criterion 8 - Organic matter and dry matter			
Criterion 9 - Viable weed seeds and plant propagules			
Criterion 10 - Plant response			
Criterion 11 - Growing media features			
Criterion 12 - Provision of information			
Criterion 13 - Information appearing on the EU Ecolabel			

2.6.2 Organic Products

The organic farming sector in the European Union has developed rapidly in the past years, in terms not only of the area used for organic farming but also of the number of holdings and the overall number of organic operators registered in the Union.

Due to the dynamic evolution of the organic sector, Council Regulation (EC) No 834/2007 identified the need for a future review of the Union rules on organic production, considering the experience gained from the application of those rules. The results of that review carried out by the Commission show that the Union legal framework governing organic production should be improved to provide for rules that correspond to the high expectations of consumers and that guarantee sufficient clarity for those to whom they are addressed. Is for that from 2021 a new regulation about organic product will be applied, Figure 12 and Figure 13.

Until 31st of December 2020

In following paragraphs, the currently regulation for the organic products will be listed:

Council Regulation (EC) No 834/2007 of 28 June 2007 on organic production and labelling of organic products and repealing Regulation (EEC) No 2092/91. This Regulation provides the basis for the sustainable development of organic production while ensuring the effective functioning of the internal market, guaranteeing fair competition, ensuring consumer confidence and protecting consumer interest.

This Regulation shall apply to the following products originating from agriculture, including aquaculture, where such products are placed on the market or are intended to be placed on the market:

- Live or unprocessed agricultural products.
- Processed agricultural products for use as food.
- Feed.
- Vegetative propagating material and seeds for cultivation.
- Yeasts used as food or feed.

The products of hunting and fishing of wild animals shall not be considered as organic production.

Commission regulation (EC) No 889/2008 of 5 September 2008 laying down detailed rules for the implementation of Council Regulation (EC) No 834/2007 organic production and labelling of organic products with regard to organic production, labelling and control. This Regulation lays down specific rules on organic production, labelling and control in respect of products referred previously, except the following product:

- Products originating from aquaculture;
- Seaweed;
- Livestock species other than bovine including bubalus and bison, equidae, porcine, ovine, caprine, poultry, and bees.
- Yeasts used as food or feed.

Commission regulation (EC) No 1235/2008 of 8 December 2008 laying down detailed rules for implementation of Council Regulation (EC) No 834/2007 as regards the arrangements for imports of organic products from third countries. This Regulation lays down the detailed rules for the import of compliant products and the import of products providing equivalent guarantees as provided for in Articles 32 and 33 of Regulation (EC) No 834/2007.

Commission regulation (EC) No 710/2009 of 5 August 2009 amending Regulation (EC) No 889/2008 laying down detailed rules for the implementation of Council Regulation (EC) No 834/2007, as regards laying down detailed rules on organic aquaculture animal and seaweed production. This Regulation lays down the detailed rules for:

- Collection and farming of seaweed
- Species of fish, crustaceans, echinoderms and molluscs (covered by Annex XIIIa of this Regulation)

Commission regulation (EU) No 271/2010 of 24 March 2010 amending Regulation (EC) No 889/2008 laying down detailed rules for the implementation of Council Regulation (EC) No 834/2007, as regards the organic production logo of the European Union.

Commission implementing regulation (EU) No 203/2012 of 8 March 2012 amending Regulation (EC) No 889/2008 laying down detailed rules for the implementation of Council Regulation (EC) No 834/2007, as regards detailed rules on organic wine. This regulation lays down specific rules for the organic production of the products of the wine sector

Commission implementing regulation (EU) 2020/25 of 13 January 2020 amending and correcting Regulation (EC) No 1235/2008 laying down detailed rules for implementation of Council Regulation (EC) No 834/2007 as regards the arrangements for imports of organic products from third countries.

Commission implementing regulation (EU) 2020/479 of 1 April 2020 amending Regulation (EC) No 1235/2008 laying down detailed rules for implementation of Council Regulation (EC) No 834/2007 as regards the arrangements for imports of organic products from third countries.

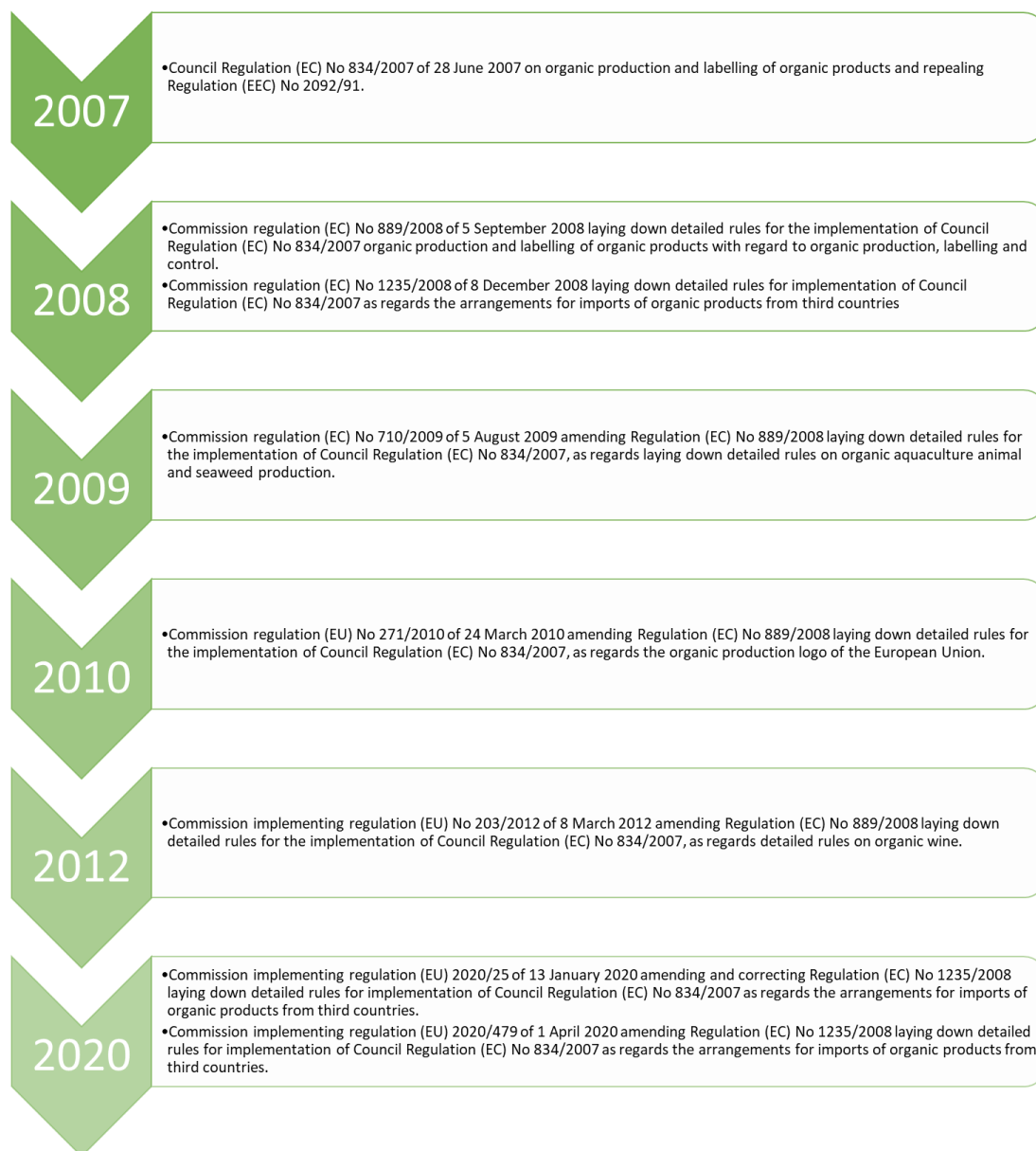


Figure 12. Evolution in Organic products regulation

From 1st of January 2021

The future of organic product regulation is written by the next regulations:

Regulation (EU) 2018/848 of the European Parliament and of the Council of 30 May 2018 on organic production and labelling of organic products and repealing Council Regulation (EC) No 834/2007, that it shall apply from 1 January 2021. This Regulation establishes the principles of organic production and lays down the rules concerning organic production, related certification and the use of indications referring to organic production in labelling and advertising, as well as rules on controls additional to those laid down in Regulation (EU) 2017/625.



Regulation (EU) 2018/848 applies to the following products originating from agriculture, including aquaculture and beekeeping, as listed in Annex I to the Treaty on the Functioning of the European Union (TFEU) and to products originating from those products, where such products are, or are intended to be, produced, prepared, labelled, distributed, placed on the market, imported into or exported from the Union:

- Live or unprocessed agricultural products, including seeds and other plant reproductive material.
- Processed agricultural products for use as food.
- Feed.

Other products closely linked to agriculture listed below, where they are, or are intended to be, produced, prepared, labelled, distributed, placed on the market, imported into or exported from the Union are ruled by this Regulation:

- Yeasts used as food or feed.
- Maté, sweetcorn, vine leaves, palm hearts, hop shoots, and other similar edible parts of plants and products produced therefrom.
- Sea salt and other salts for food and feed.
- Silkworm cocoon suitable for reeling.
- Natural gums and resins.
- Beeswax.
- Essential oils.
- Cork stoppers of natural cork, not agglomerated, and without any binding substances.
- Cotton, not carded or combed.
- Wool, not carded or combed.
- Raw hides and untreated skins.
- Plant-based traditional herbal preparations.

Products originating from hunting or fishing of wild animals should not be considered organic by this Regulation since their production process cannot be fully controlled.

COMMISSION IMPLEMENTING REGULATION (EU) 2020/464 of 26 March 2020 laying down certain rules for the application of Regulation (EU) 2018/848 of the European Parliament and of the Council as regards the documents needed for the retroactive recognition of periods for the purpose of conversion, the production of organic products and information to be provided by Member States.



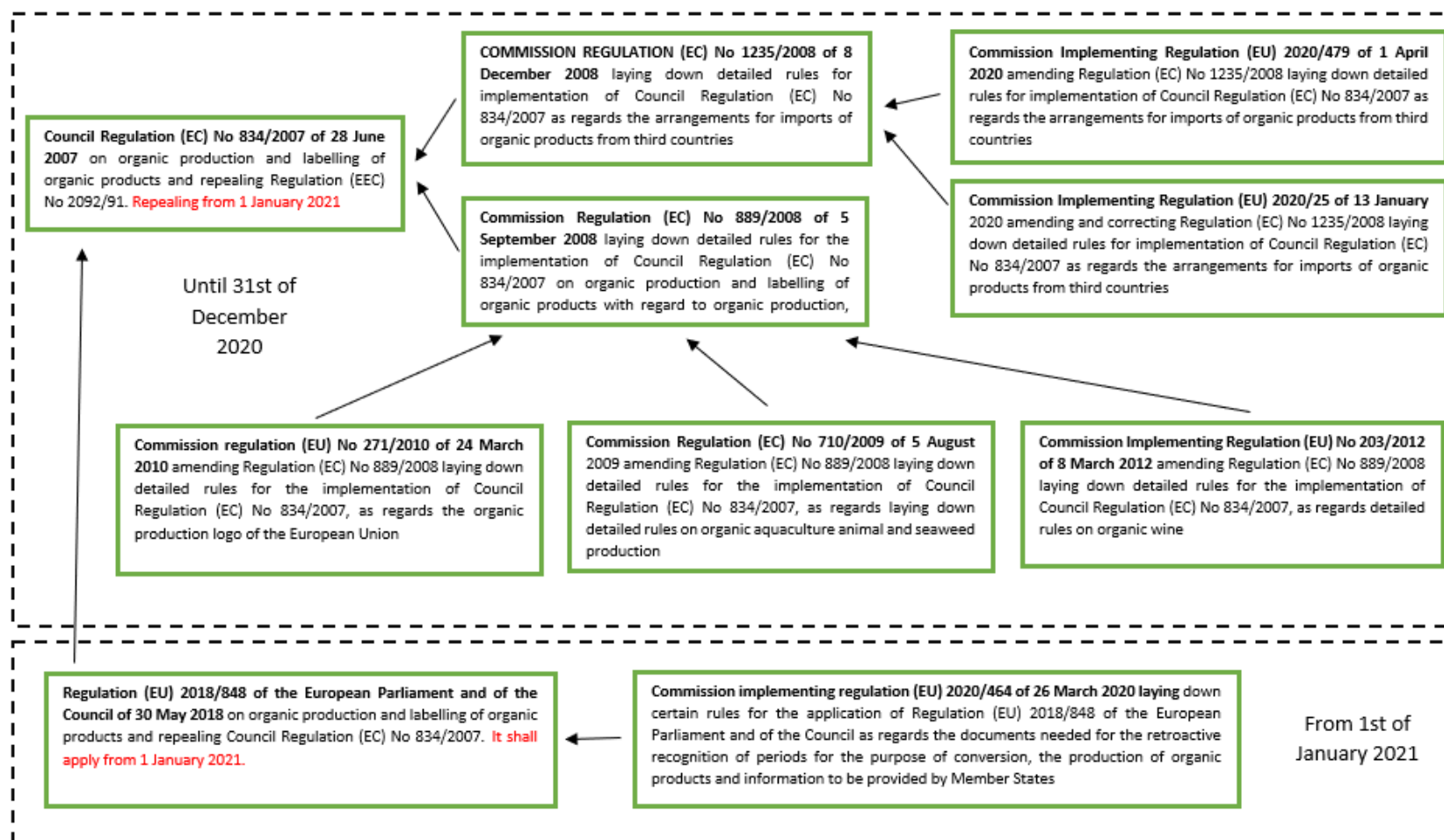


Figure 13. Organic product regulation scheme

2.6.3 Fertiliser

Regulations about the use and requirements of fertilisers products, in order to ensure the internal market in fertilisers within the European Unión, are regulated by the following legislation.

Until 16st of July 2022

Regulation (EC) No 2003/2003 of the European Parliament and of the Council of 13 October 2003 relating to fertilisers. This Regulation shall apply to products which are placed on the market as fertilisers designated ‘EC fertiliser’, a fertiliser belonging to a type of fertilisers listed in Annex I and complying with the conditions laid down in this Regulation. The designation ‘EC fertiliser’ shall not be used for a fertiliser which does not comply with this Regulation. This Regulation will be repealed with effect from 16 July 2022.

Regulation (EC) No 1107/2009 of the European Parliament and of the Council of 21 October 2009 concerning the placing of plant protection products on the market and repealing Council Directives 79/117/EEC and 91/414/EEC. The purpose of this Regulation is to ensure a high level of protection of both human and animal health and the environment and to improve the functioning of the internal market through the harmonisation of the rules on the placing on the market of plant protection products, while improving agricultural production. In order to ger it, this Regulation lays down rules for:

- The authorisation of plant protection products in commercial form and for their placing on the market, use and control within the Community
- Rules for the approval of active substances, safeners and synergists, which plant protection products contain or consist of,
- Rules for adjuvants and co-formulants.

Regulation (EC) no 1069/2009 of the European Parliament and of the Council of 21 October 2009 laying down health rules as regards animal by-products and derived products not intended for human consumption and repealing Regulation (EC) No 1774/2002 (Animal by-products Regulation). This Regulation lays down public health and animal health rules for animal by-products and derived products, in order to prevent and minimise risks to public and animal health arising from those products, and in particular to protect the safety of the food and feed chain.

From 16st of July 2022

One of the main objectives of the EU Action Plan for the Circular Economy is to encourage large-scale production of fertilizers from non-imported organic or secondary raw materials, in line with the circular economy model, transforming residues into nutrients for crops. For this reason, The Council has adopted a Regulation harmonizing the requirements for fertilizers produced from phosphate minerals and from organic or secondary raw materials, thus opening up new possibilities for large-scale production and marketing. Furthermore, the Regulation sets harmonized limits for a series of contaminants present in mineral fertilizers. The result is a new Regulation that will be applied since summer 2022.



Regulation (EU) 2019/1009 of the European Parliament and of the Council of 5 June 2019 laying down rules on the making available on the market of EU fertilising products and amending Regulations (EC) No 1069/2009 and (EC) No 1107/2009 and repealing Regulation (EC) No 2003/2003. According to this Regulation, EU fertilizer products bearing the CE marking must meet a number of conditions to benefit from freedom of movement in the EU internal market. These include mandatory maximum levels for contaminants, the use of defined component material categories, and labelling requirements. This Regulation shall apply from 16 July 2022.

2.7 Guidelines for the Development of one Ecolabel within the Scope of Nutri2cycle

The review of the ecolabelling landscape, along with the review of the current legislation for EU ecolabelling schemes has been used to provide a set of basic principles that the products involved in Nutri2cycle should follow for them to be used in the production of food and feed products flagging the EU organic logo, since it is the main ecolabel framework for food & feed production at EU level.

- ✓ Only organic material or livestock manure, preferably composted shall be used (Article 12 EC 834/2007). Additionally, if the nutritional needs of the plants cannot be met, the fertilisers and soil conditioners in the Annex 1 EC 889/2008.
- ✓ Mineral N fertilisers shall not be used (Article 12 EC 834/2007).
- ✓ The total amount of livestock manure may not exceed 170 kg N/y-ha. (Article 3 EC 889/2008).
- ✓ Appropriate preparations of micro-organisms may be used to improve the overall condition of the soil (Article 3 EC 889/2008).
- ✓ For compost activation, appropriate plant-based preparations or preparations of microorganisms may be used (Article 3 EC 889/2008).
- ✓ There has to be records on the use of the fertilizers including information on the date of application, the type and amount of fertiliser, and the parcels concerned. (Article 72 EC 889/2008).

A summary of these principles can be seen in the Figure 14.

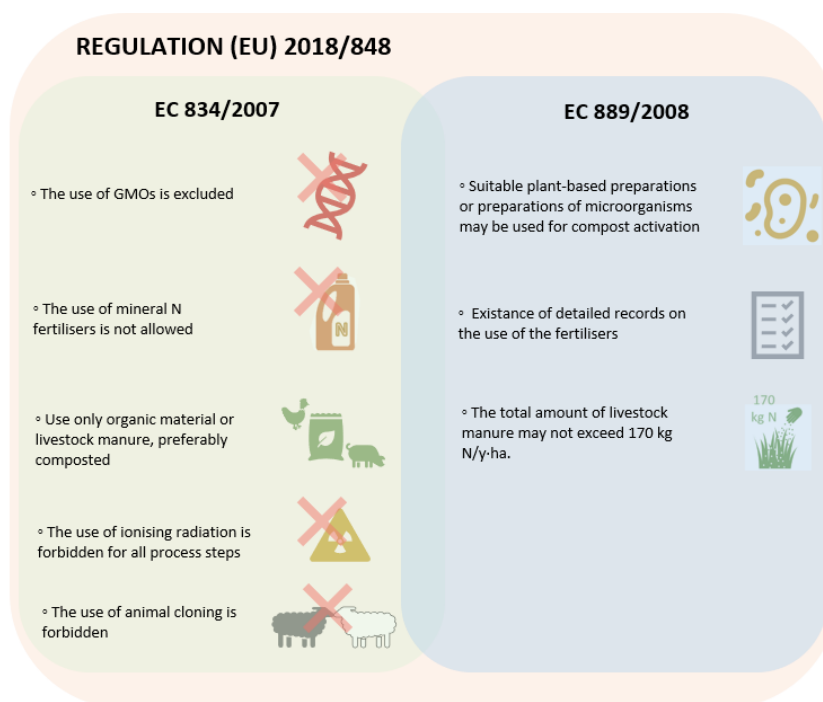


Figure 14. Evolution of Organic product regulation scheme

Apart from the aforementioned requirements, sustainable organic production is expected to include the social and environmental dimensions of sustainability.

Some of the basic principles that should be considered along the whole value chain of the N2C products are:

- ✓ Equal rights are secured with respect to gender, maternity, religion, ethnicity, physical conditions and political views.
- ✓ Workers and producers have the right to found, to belong to and to be represented by an independent organisation of their choice.
- ✓ Child labour and forced labour.
- ✓ Equitable treatment of seasonal and piece rate workers.
- ✓ Employer assures proper occupational health and safety conditions for workers.
- ✓ Environmentally friendly product and process according to LCA indicators (carbon footprint, water footprint, eutrophication, ozone depletion, etc)

Finally, the different solutions in Nutri2cycle have been evaluated to cross-check the main products with the principles related to the EU organic logo to assess its potential use in food and feed organic products (Table 9). As it can be seen, there is a good potential for the use of Nutri2cycle's products, in particular fertilizers, in the production of organic food products.

Table 9. List of Nutri2cycle's fertilizer products and the potential use in organic products

Shortlist Solution #	Longlist Solution #	Type of fertilizer	Application field	Potential use under the EU organic logo	Remarks
3	66	Digestate	Large-scale orchards		Authorised in Annex 1 in COMMISSION REGULATION (EC) No 889/2008. Can only be used to its necessary extent. *
	57	Organic materials and compost	Apple orchards and vineyards		Authorised in Article 12 in COMMISSION REGULATION (EC) No 834/2007. From January 2021 onwards, it is regulated under Annex II part 1 EU 2018/848.
	15	Livestock manure	Feed crops		Authorised in Article 12 in COMMISSION REGULATION (EC) No 834/2007. From January 2021 onwards, it is regulated under Annex II part 1 EU 2018/848.
	14	Organic materials	Vineyards		Authorised in Article 12 in COMMISSION REGULATION (EC) No 834/2007. From January 2021 onwards, it is regulated under Annex II part 1 EU 2018/848.
4	1	Organic NH ₄ NO ₃	Feed crops		It is not explicitly mentioned in the available regulations. Its use is not clear.
	2	Organic NH ₄ SO ₄	Feed crops		It is not explicitly mentioned in the available regulations. Its use is not clear.
	9	Liquid fraction of digestate	Feed crops		Authorised in Annex 1 in COMMISSION REGULATION (EC) No 889/2008. Can only be used to its necessary extent. *
5	62	Mixture of raw and treated organic materials	Not defined		Authorised in Article 12 in COMMISSION REGULATION (EC) No 834/2007. From January 2021 onwards, it is regulated under Annex II part 1 EU 2018/848.

Table 9. List of Nutri2cycle's fertilizer products and the potential use in organic products

Shortlist Solution #	Longlist Solution #	Type of fertilizer	Application field	Potential use under the EU organic logo	Remarks
	47	Composted poultry manure, digestate and biochar	Horticulture applications		Authorised in Annex 1 in COMMISSION REGULATION (EC) No 889/2008. Can only be used to its necessary extent. **
6	65	Struvite	Not defined		The use of struvite has not been regulated yet. Regulation is under development and will be enforced on Directive 2019/1009 on 16th July 2022.
	49	Struvite	Not defined		The use of struvite has not been regulated yet. Regulation is under development and will be enforced on Directive 2019/1009 on 16th July 2022.
7	23	Treated pig manure	Not defined		Authorised in Annex 1 in COMMISSION REGULATION (EC) No 889/2008. Can only be used to its necessary extent. Depends on the processing.
	55	Treated pig manure	Not defined		Authorised in Annex 1 in COMMISSION REGULATION (EC) No 889/2008. Can only be used to its necessary extent. Depends on the processing.
8	22	Bio Phosphate from animal bones	Not defined		Authorised in Annex 1 in COMMISSION REGULATION (EC) No 889/2008. Can only be used to its necessary extent. Depends on the processing. From January 2021 onwards, regulation EU 2018/848 may allow its use following a feasibility and risk assessment.

Good potential: regulated and authorised
 Potential application but may have restrictions
 Not regulated or not enough information

* If digestate is seen as liquid animal excrements used after controlled fermentation. From 2022 onwards, it is included as fertiliser in Component Material Categories (CMCs) 4 & 5.

** For Biochar, Regulation is under development and will be enforced on Directive 2019/1009 on 16th July 2022.

2.8 Inventory of Sustainable Food Products and Sustainability Claims

Finally, the evaluation of the ecolabelling landscape has been complemented with a market review for products bearing a range of sustainability claims. The objective of this research is to provide a repository of products labelled as sustainable or environmentally friendly food products. Taking as the principal source of information the GLOBAL New Product Database (GNPD), this study has focused on dairy, bakery and meat products launched to the market between January 2009 and March 2020. The research has been limited to Italy, Spain, Hungary, Croatia, Poland and Belgium. In order to identify those products labelled as “sustainable” or “environmentally friendly”, the strategy has been to filter the launches using the category ‘claims’. From all the available claims, we chose five claims included in the subcategories ‘ethical and environmental’ and ‘natural’. The selected claims are:

- Ethical – environmentally friendly product
- Ethical – sustainable habitat and resources
- Carbon neutral
- Organic
- All-natural

All the selected claims have in common that they relate in different ways to the concept of sustainability of the product. Although some of these claims refer both to the sustainability of the product and the packaging, in this study the priority has been to identify the sustainability claims of products in the market. The definitions for each claim have been extracted from MINTEL, and in some cases, completed by the authors.

- Organic: this claim is used to identify organic properties in a product (Figure 15). It is used when the product is claimed to be organic or features any reference to organic, and for the terms organically grown, biodynamic and demeter. Some logos include Bioland, EKO, KRAV, or Naturland, among others. The claim is not used for products that are claimed to be All Natural – unless they specifically state that some/all ingredients are also organic.

- Ethical – sustainable habitat and resources (Figure 16): identifies products which claim to sustain or encourage wildlife, species, ecosystems, biodiversity, flora and fauna. It is used for products that mention respect or support to different habitats or habitat preservation; when the product prevents or reduces the amount of landfilling waste; for products that use less energy or water, support conservation of natural resources, or promote responsible management of the world’s forests, and use less material such as paper, carton, strings, tags, staples, wrappers; and when a product is free from microbeads that harm the ocean (if product is only free from microbeads only the Ethical – Environmentally Friendly Product claim should be selected). Keywords to look out for include: biomass, polylactic acid, reduced plastic, solar power, bio-based plastic, plant based plastic, plastic free, no food miles, reduced material, pack made from responsible resources, minimal packaging, locally sourced ingredients, no conversion of forest into other utilizations, renewable ingredients, wind power, clean energy, biodynamic farming, agroecological farming, biodynamic agriculture,



responsibly managed fisheries, responsibly harvested, plastic made of vegetables, sugarcane or other plants, tree free packaging, short distribution channels, shade-grown coffee; FAD-free (Fish Aggregating Device); or fished by pole and line. Note that the claim it is not flagged if it makes a vague reference to the environment or just being earth friendly or for products that are efficient even in short cycles, saving time, money and electricity, cruelty-free/not tested on animal products.

- Ethical – environmentally friendly product (Figure 17): this claim describes products that claim that the product is friendly to the environment. Examples include references to biodegradable, made from recycled materials, toilet tissues made from recycled paper, phosphate-free, ozone-friendly, CFC-free, and sustainable ingredients. The claim is also used for products free from propellants or propeller gas, microbeads or microplastics; references to being environmentally friendly/ethical such as earth-friendly, eco-friendly, taking care of the planet, safe for the environment, minimal impact on the environment, no negative impact to the environment, ethically-sourced or responsibly sourced; climate-neutral; reference to climate change/global warming; carbon positive; short distribution channels; for ISO certifications in the 14000 group; upcycle; reducing CO2 emissions; low carbon footprint; agroecological farming; or for all mentions of ethically sourced without further explanation.
- Carbon neutral (Figure 18): this claim describes products that have been manufactured without producing carbon emissions or where the manufacturer has offset all of the carbon emissions used in the production of the product. This claim is selected for the terms net zero carbon emissions, carbon-free, climate neutral, 0% carbon footprint, or carbon positive. Also, if the packaging itself is described as being carbon neutral, then this claim is applied. The claim is not used if only a fraction of the total carbon emissions has been reduced or offset.
- All-natural products (Figure 19): this claim is used when a product clearly states that it is all-natural. Also used with the following on-pack terms: Ayurvedic, 100% natural, or free from artificial ingredients. Products that claim to be made with natural ingredients are not necessarily all natural and, in this case, the claim is not used unless it is clear that all ingredients are natural. The claim is not used for products that contain less than 100% natural ingredients (99,99% and lower), or products that simply state that some of the ingredients used are 100% natural, as this does not mean all ingredients in the product are natural. In addition, this claim is not used for products that are 100% organic/vegetarian or botanical.

As a result, an exhaustive repository of food products for the 6 aforementioned countries was developed (Table 10), containing valuable information of the market launches for each country considering different sustainability claims. The outcomes of this analysis could potentially be used for future business plans and market strategies involving organic products to enhance market uptake and consumer acceptance.

Table 10. Number of products identified for each claim in the different countries under study

	Spain	Italy	Belgium	Poland	Croatia	Hungary
Organic	1,912	1,936	439	584	120	208
Ethical - sustainable habitat and Resources	1,069	1,364	332	346	103	221
Ethical - environmentally friendly product	717	1,349	259	237	66	135
All-natural	509	246	83	147	10	54
Carbon Neutral	49	32	19	3	0	3

“Organic” claim

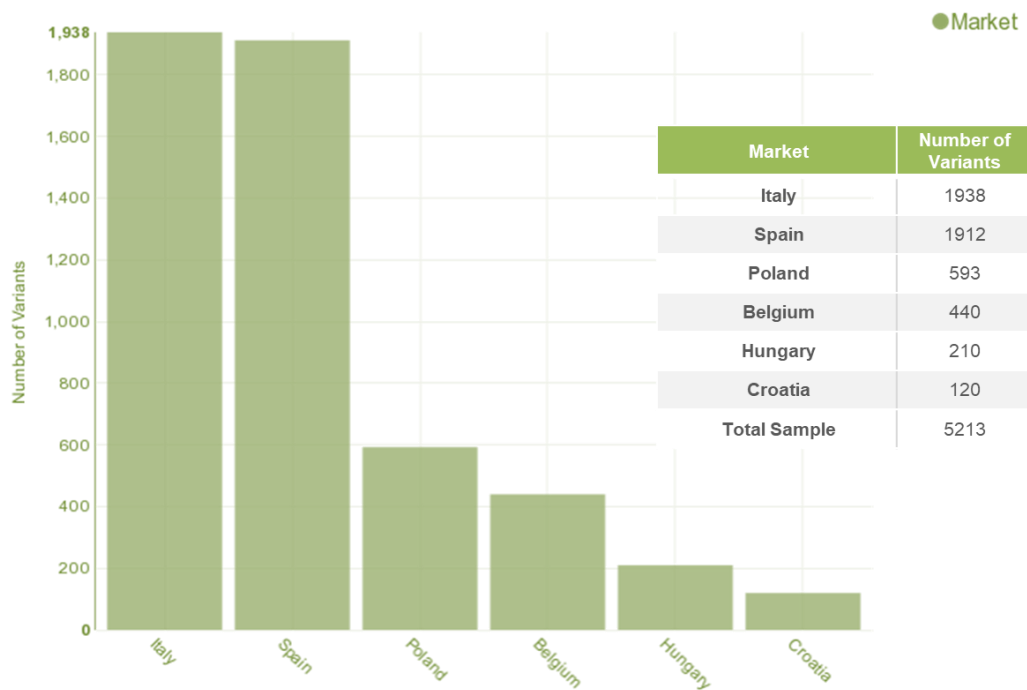


Figure 15. “Organic” claim ecolabelling landscape

“Ethical – Sustainable Habitat & Resources” claim

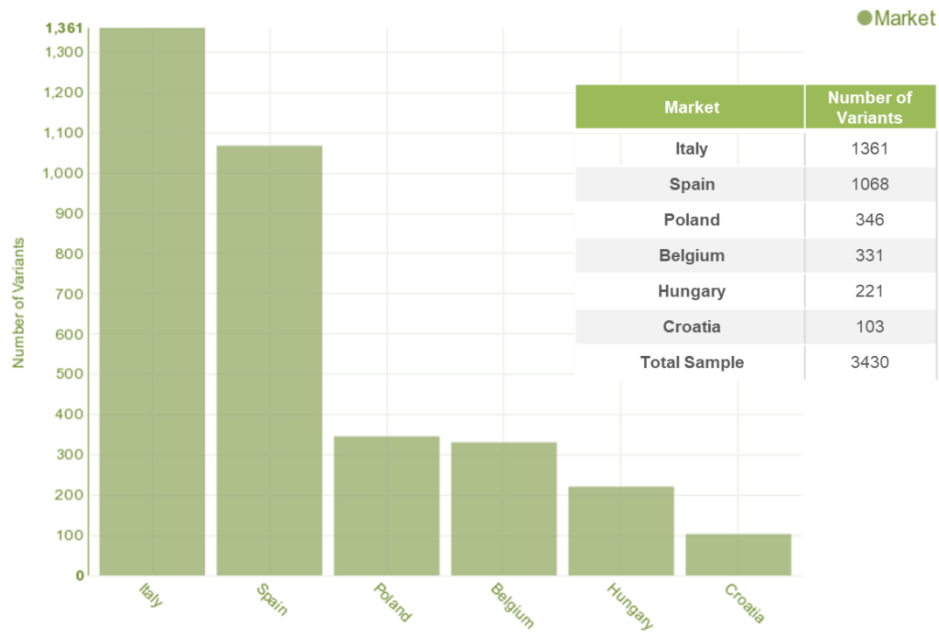


Figure 16. Ethical – Sustainable Habitat & Resources ecolabelling landscape

“Ethical – environmentally friendly product” claim

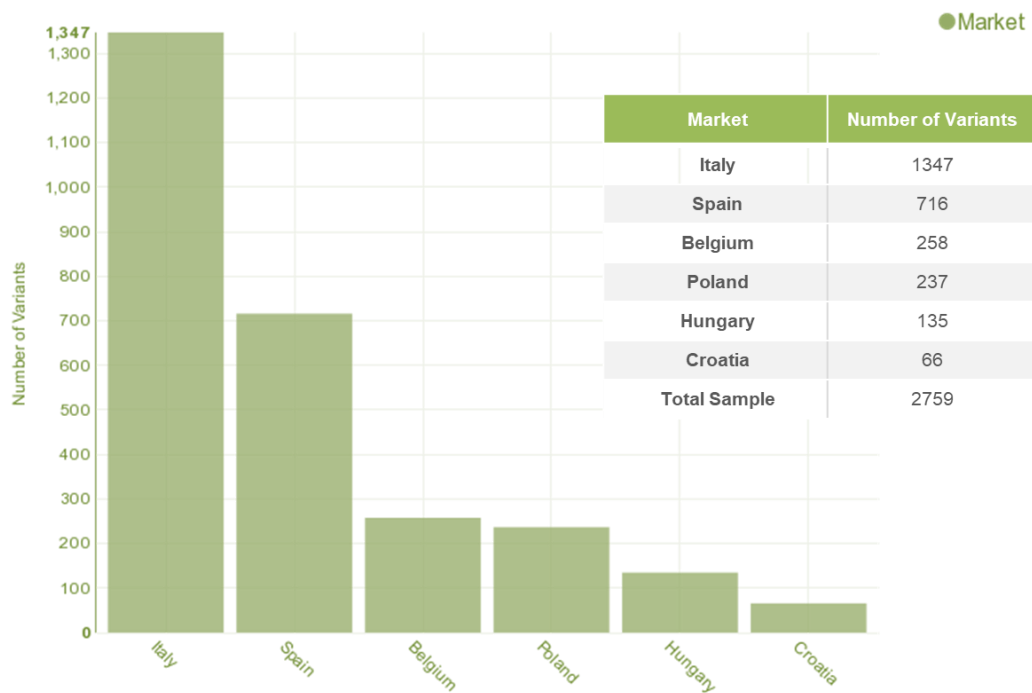


Figure 17. Ethical – environmentally friendly product ecolabelling landscape

“All-Natural” Claim

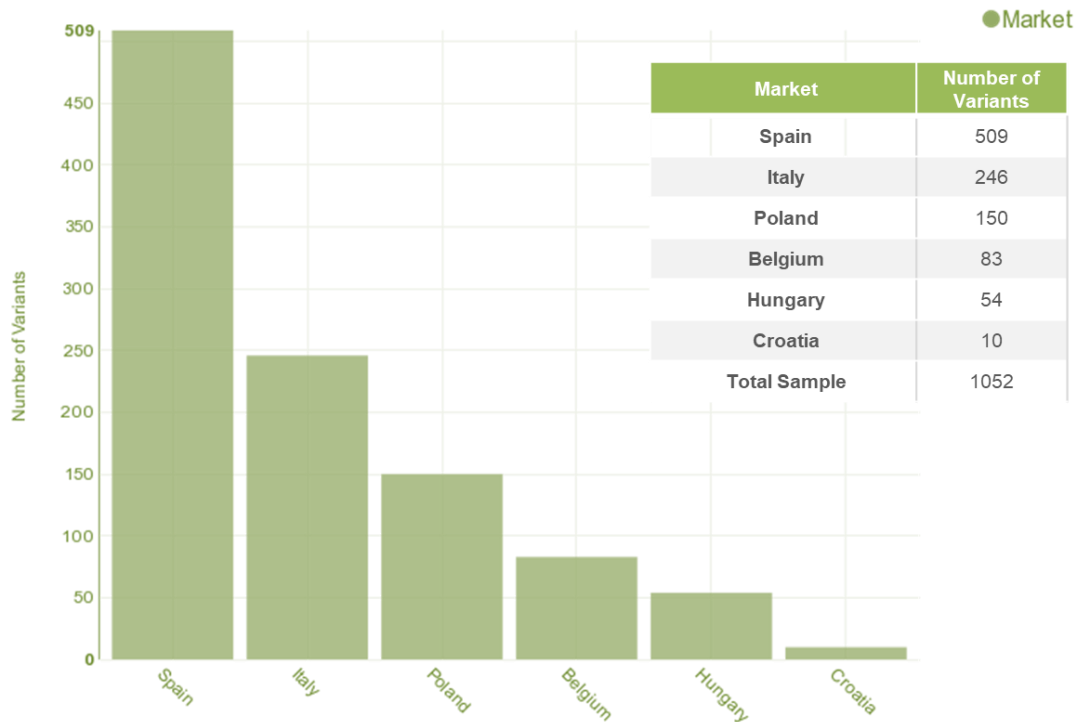


Figure 18. All-Natural ecolabelling landscape

“Carbon-neutral” claim

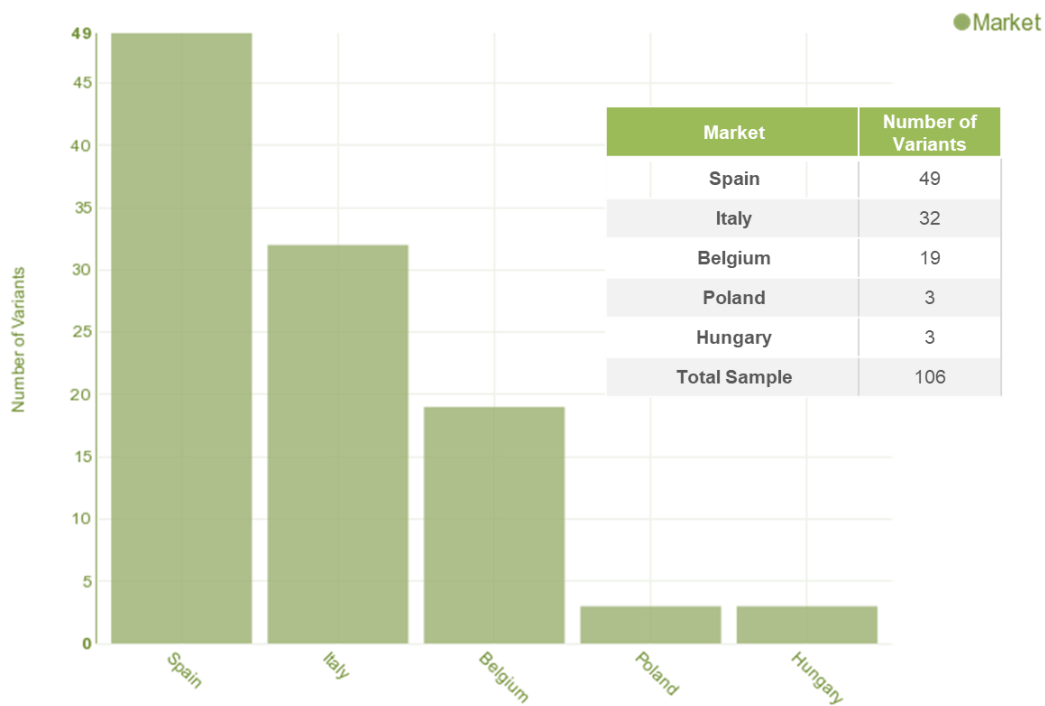


Figure 19. Carbon-neutral ecolabelling landscape

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Annex





Title	Authors	Year publication	Journal	Impact factor of the Journal	DOI	Link	Sustainable claim	Product/s	Method	Year of data collection	Country	City / Cities	Sample size	Price/wtp of conventional product in national currency	Price/wtp of sustainable product in national currency	Price/wtp of sustainable product in % (if not available in monetary term)	
PORK & MEAT																	
1	The impact of social trends: teenagers' attitudes for organic food market in Thailand	Jumpunparach, W	INTERNATIONAL JOURNAL OF SOCIAL ECONOMICS	0.460	10.1108/IJSE-03-2017-0004	https://www.emerald.com/insight/ISSN/1469-0321/2017/0004/010	Organic food	Pork	Choice experiment / Logit model	2013-2014	Thailand		557	165 baht	270 baht	63.0%	
2	Assessing Consumer and Producer Preferences for Animal Welfare Using a Common Elicitation Format	Latacz-Lohmann, U; Schreyer, JA	JOURNAL OF AGRICULTURAL ECONOMICS	2.529	10.1111/1477-9552.12297	https://onlinelibrary.wiley.com/doi/10.1111/1477-9552.12297	Animal welfare	Pork	Discrete choice experiment / RPL model	2014	Germany	Lower Saxony	554	N.A	N.A	26.6%	
3	Factoring Chinese consumers' risk perceptions into their willingness to pay for pork safety, environmental stewardship, and animal welfare	Li, J.; Wang, HH; Ortega, DL; Widmar, NJO	Food Control	4.258	10.1016/j.foodcont.2017.09.032	https://www.sciencedirect.com/science/article/pii/S1569855617345139	Food safety label	Pork	Choice experiment / Random Parameter Logit model	2014	China	Beijing	259	20 RMB/500g	33.34 RMB/500g	66.7%	
											Shanghai	221	20 RMB/500g	36.21 RMB/500g	81.0%		
4	Demand for farm animal welfare and producer implications: Results from a field experiment in Michigan	Ortega, DL; Wolf, CA	Food Policy	4.189	10.1016/j.foodpol.2017.11.006	https://www.sciencedirect.com/science/article/pii/S0195628117349286	Animal welfare	Ground pork	Becker-DeGroot-Marschak (BDM) / Tobit model	2015	US	Michigan	218	N.A	N.A	26.1%	
5	Urban Chinese Consumers' Willingness to Pay for Pork with Certified Labels: A Discrete Choice Experiment	Wang, JH; Ge, Y; Ma, YT	Sustainability	2.592	10.3390/su10-03603	https://www.mdpi.com/2077-9069/s10/3/603	Labels	Pork	Discrete Choice Experiment / Random Parameter Logit model	2017	China	Jiangsu	475	25 Yuan / 500 g	33.10 Yuan	32.4%	With safe food label
												369	25 Yuan / 500 g	51.78 Yuan	107.0%	With organic food label	
													369	25 Yuan / 500 g	32.21 Yuan	28.8%	With safe food label
														25 Yuan / 500 g	43.94Yuan	75.7%	With organic food label
6	Organic consumers' preferences and willingness to-pay for locally produced animal products	Wagel, S; Janssen, M; Hamm, U	International Journal of Consumer Studies	1.538	10.1111/ijcs.12362	https://onlinelibrary.wiley.com/doi/10.1111/ijcs.12362	Organic food	Pork	Discrete Choice Experiment / Mixed Logit models	N.A	Germany	Southern Lower Saxony and Northern Hesse	597	250/200g	3.42 €	36.8%	
														250/200g	3.68 €	47.2%	
7	Could animal welfare claims and nutritional information boost the demand for organic meat? Evidence from non-hypothetical experimental auctions	Akaichi, F; Glenk, K; Revoredo-Giha, C	Journal of Cleaner Production	7.246	10.1016/j.jclepro.2018.10.064	https://www.sciencedirect.com/science/article/pii/S0959652618364843	Organic food & freedom food	Pork / Bacon	Non-hypothetical Vickrey auctions / Random-effects GLS models	N.A	UK	Edinburgh	120	£1.59	£1.84	15.3%	Organic bacon
														£1.84	£ 2.22	20.7%	Freedom food bacon
8	Tasty or Sustainable? The Effect of Product Sensory Experience on a Sustainable New Food Product: An Application of Discrete Choice Experiments on Chianina Trimmed Beef	Torquati, B; Tempesta, T; Vecchiato, D; Venanzi, S	Sustainability	2.592	10.3390/su10-082795	https://www.mdpi.com/2077-9069/s10/8/2795	Organic food	Beef	Sensory test & Discrete Choice Experiment / Random Parameters Logit (RPL)	2014	Italy	Manica	252	0.92€ /90g	1.47€ /90g	37.4%	
9	Red and processed meat consumption and purchasing behaviours and attitudes: impacts for human health, animal welfare and environmental sustainability	Conan, A; Wilson, P; Swift, JA; Lebovici, D G; Holdsworth, M	PUBLIC HEALTH NUTRITION	3.182	10.1017/S13688901500567	https://www.cambridge.org/core	Animal welfare	Meat	SPSS statistical software package version 16.0 using EpiData software version 3.1.	2009	UK	Nottingham City, Broxtowe, Gedling and Erewash) and rural (Rushcliffe) areas	2500	N.A	N.A	N.A	
MILK & DAIRY																	
10	Green marketing strategies in the dairy sector: Consumer-stated preferences for carbon footprint labels	Caravari, M; Coderoni, S	Wiley Encyclopedia of Management	N.A	10.1002/psm.2264	https://link.springer.com/article/10.1002/psm.2264	WTP - label carbon footprint	Fresh Milk	Interval regression model	2016 - 2017	Italy	NA	178	1.3	2	0.30%	
11	Paying for sustainability: A cross-cultural analysis of consumers' valuations of food and non-food products labeled for carbon and water footprints	Greibius, C; Steiner, B; Veeman, M.M	JOURNAL OF BEHAVIORAL AND EXPERIMENTAL ECONOMICS	1.145	10.1016/j.jbeec.2016.05.003	https://www.sciencedirect.com/science/article/pii/S1876394616300877	Water and carbon footprint labels	Yogurt	Mixed logit models	2014	Canada	Atlantic Canada, Quebec, Ontario, Prairie region, British Columbia	1551	3.16 CAD\$	4.27 CAD\$	35.1%	
12	Preferences for locally grown products: evidence from a natural field experiment	Menapace, L; Raffaelli, R	European Review of Agricultural Economics Vol 44 (2) (2017) pp. 255-284	2.323	10.1093/erae/erw017	https://academic.oup.com/erae/article/44/2/255/3483799	Terror and reduced carbon emissions	Ice-creams	Conditional logit models (CLMs)	2012	Italy	Trentino	9865	N.A	0.090 €	1.60%	
13	Are They Buying It? United States Consumers' Changing Attitudes toward More Humanely Raised Meat, Eggs, and Dairy	Spain, CV; Freund, D; Mohan-Gibbons, H; Meadow, R.G; Beacham, L	ANIMALS	1.654	10.3390/ani8-080127	https://www.mdpi.com/2076-2616/8/8/127	Welfare certifications	Eggs (considered as dairy products) and chicken	Poisson regression models	2015	US	NA	1000	N.A	\$0.79	32.0%	Eggs
															\$0.96 for 1lb of chicken breast	48.0%	Chicken
CEREAL & BREAD																	
14	Willingness-To-Pay for Multiple Units of Eco-Friendly Wheat-Derived Products: Results from Open-Ended Choice Experiments	Wongprapasam, R; Pappalardo, G; Canavari, M; Pecorelli, B	JOURNAL OF FOOD PRODUCTS MARKETING	0.477	10.1080/10454466.2015.1121438	https://www.tandfonline.com/doi/full/10.1080/10454466.2015.1121438	Environmental production	Wheat flour and Bread	Poisson, Negative Binomial, Zero Inflated Negative Binomial (ZINB) and Double Hurdle models	2014	Italy	Bologna, Catania and Palermo	270	1.40 €	1.80 €	28.6%	Bread
														1.10 €	3.60 €	45.5%	Wheat Flour
15	The roles of pollution concerns and environmental knowledge in making green food choices: Evidence from Chinese consumers	Tang, QM; Anders, S; Zhang, JB; Zhang, L	FOOD RESEARCH INTERNATIONAL	3.579	10.1016/j.foodres.2019.108881	https://www.sciencedirect.com/science/article/pii/S0969759719305634	Food produced under a system devoted to reducing environmental damage	Rice	Likert scale Survey questionnaires ANOVA	2017	China	Guangzhou, Wuhan and Lanchou	622	2.5 CNY	4.79 CNY	92%	
FOOD in general																	
16	Exploring environmental consciousness and consumer preferences for organic wines without subtitles	D'Amico, M; Di Vita, G; Monaco, L	JOURNAL OF CLEANER PRODUCTION	6.395	10.1016/j.jclepro.2016.02.014	https://www.sciencedirect.com/science/article/pii/S0959652616300101	Organic products	Wine	Likert scale Ordered logit model	2012	Italy	Region of Sicily	201	N.A	N.A	20%	
17	Biotechnology to sustainability: Consumer preferences for food products grown on biodegradable mulches	Chen, KJ; Marsh, TL; Tozer, PR; Galinato, SP	FOOD RESEARCH INTERNATIONAL	4.972	10.1016/j.foodres.2018.08.083	https://www.sciencedirect.com/science/article/pii/S0969759718305634	Agricultural sustainable practices	Strawberries	Dichotomous-choice Contingent Valuation (CV)	2016	US	Different regions of the US	1510	\$350/lb	\$386/lb	10.3%	
18	Eco-labeling in the Fresh Produce Market: Not All Environmentally Friendly Labels Are Equally Valued	Chen, XQ; Gao, ZF; Swisher, M; House, L; Zhao, X	ECOLOGICAL ECONOMICS	4.281	10.1016/j.ecolecon.2018.07.014	https://www.sciencedirect.com/science/article/pii/S0924646018309718	Agricultural sustainable practices	Strawberries	Open-ended contingent valuation method (CVM) / Multivariate Tobit model	2014	US	Different regions of the US	2525	\$2.76/lb	\$2.94/lb	6.5%	Less fertilizer
														\$2.76/lb	\$3.07/lb	11%	Less pesticide use
19	Consumers' perceptions, purchase intention, and willingness to pay a premium price for safe vegetables: A case study of Beijing, China	Zhang, B; Fu, ZT; Huang, J; Wang, JQ; Xu, SY; Zhang, LX	JOURNAL OF CLEANER PRODUCTION	6.385	10.1016/j.jclepro.2018.06.273	https://www.sciencedirect.com/science/article/pii/S0959652618305634	Safe vegetables	Vegetables	Survey (contingent valuation method (CVM)) Logistic regression method	2016	China	Beijing	840	N.A	N.A	N.A	
20	Factors affecting consumer preferences for "natural wine"	Magliome, G; Throssano, A; Crescimanno, M; Schifani, G	BRITISH FOOD JOURNAL	2.102	10.1108/BFJ-07-2019-0474	https://www.emerald.com/insight/ISSN/1469-0321/2019/07/0474	Natural products	Wine	Likert scale Tobit regression model	2018	Italy	NA	613	5 €	7.60 €	52.0%	
21	Consumers' willingness-to pay for sustainable food products: the case of organically and locally grown almonds in Spain	De-Magistris, T; Gracia A.	Journal of Cleaner Production	7.246	10.1016/j.jclepro.2016.01.050	https://www.sciencedirect.com/science/article/pii/S0959652616300101	Greenhouse gases emissions	Almonds	Non-hypothetical choice experiment / Latent class modeling	2011	Spain	Aragon	171	250 € / package	3.68 € / package	47.2%	Lowest km distance label
															3.35 € / package	34.0%	Organic label

p<0.01; *p<0.001; *p<0.10



Variables affecting consumers' willingness-to-pay a premium price for sustainable food (Pork&Meat)

ARTICLE: The impact of social trends, teenagers' attitudes for organic food market in Thailand (2007) (Jumpangrach, W)

Product: PORK	Significance			Sample size
	Yes	No	Not Available	
Gender				
Male		x		
Female				
Age	***			
Education			x	
Income			x	
Household size			x	
Family with children under 18			x	
Price	***	x		557
Familiarity with type of product	***			
Family with the sustainable claim			x	
Health concerns	**			
Environmental concerns		x		
Food quality concerns	***			
Label			x	
Packaging			x	
Animal welfare			x	
Brand	***			

ARTICLE: Assessing Consumer and Producer Preferences for Animal Welfare Using a Common Elicitation Format (2009) (Latacz-Lohmann, U; Schreiner, J.A)

Product: PORK	Significance			Sample size
	Yes	No	Not Available	
Gender				
Male			x	
Female				
Age	***			
Education			x	
Income			x	
Household size			x	
Family with children under 18			x	
Price	***			554
Familiarity with type of product	***			
Family with the sustainable claim	***			
Health concerns			x	
Environmental concerns		x		
Food quality concerns		x		
Label			x	
Packaging			x	
Animal welfare	***			
Brand			x	

ARTICLE: Factoring Chinese consumers' risk perceptions into their willingness to pay for pork safety, environmental stewardship, and animal welfare (2008) (Li, J; Wang, H; Ortega, DL; Welmer, ND)

Product: PORK in Beijing	Significance			Sample size
	Yes	No	Not Available	
Gender				
Male			x	
Female				
Age		x		
Education		x		
Income		x		
Household size		x		
Family with children under 18		x		
Price	***			221
Familiarity with type of product	***			
Family with the sustainable claim	***			
Health concerns	***			
Environmental concerns	***			
Food quality concerns	***			
Label		x		
Packaging		x		
Animal welfare	***			
Brand			x	

Product: PORK in Shanghai	Significance			Sample size
	Yes	No	Not Available	
Gender				
Male			x	
Female				
Age		x		
Education		x		
Income		x		
Household size		x		
Family with children under 18		x		
Price	***			259
Familiarity with type of product	***			
Family with the sustainable claim	***			
Health concerns	***			
Environmental concerns	***			
Food quality concerns	***			
Label		x		
Packaging		x		
Animal welfare	***			
Brand			x	

ARTICLE: Demand for farm animal welfare and producer implications: Results from a field experiment in Michigan (2008) (Ortega, DL; Wolf, CA)

Product: GROUND PORK	Significance			Sample size
	Yes	No	Not Available	
Gender				
Male				
Female	***			
Age	***			
Education		x		
Income	**			
Household size		x		
Family with children under 18		x		
Price	***			218
Familiarity with type of product	***			
Family with the sustainable claim			x	
Health concerns		x		
Environmental concerns		x		
Food quality concerns		x		
Label		x		
Packaging		x		
Animal welfare	***			
Brand			x	

ARTICLE: Urban Chinese Consumers' Willingness to Pay for Pork with Certified Labels: A Discrete Choice Experiment (2012) (Wang, J; He, J; Ma, Y)

Product: PORK with safe food label in Beijing	Significance			Sample size
	Yes	No	Not Available	
Gender				
Male				
Female		x		
Age		x		
Education	**			
Income		x		
Household size		x		
Family with children under 18		x		
Price	***			475
Familiarity with type of product	***			
Family with the sustainable claim	***			
Health concerns		x		
Environmental concerns		x		
Food quality concerns		x		
Label		x		
Packaging		x		
Animal welfare		x		
Brand			x	

Product: PORK with safe food label in Anhui	Significance			Sample size
	Yes	No	Not Available	
Gender				
Male				
Female				
Age		x		
Education	**			
Income	***			
Household size		x		
Family with children under 18		x		
Price	***			369
Familiarity with type of product	***			
Family with the sustainable claim	***			
Health concerns		x		
Environmental concerns		x		
Food quality concerns		x		
Label		x		
Packaging		x		
Animal welfare		x		
Brand			x	

Product: PORK with organic food label in Beijing	Significance			Sample size
	Yes	No	Not Available	
Gender				
Male		x		
Female				
Age	***			
Education		x		
Income		x		
Household size		x		
Family with children under 18		x		
Price	***			475
Familiarity with type of product	***			
Family with the sustainable claim	***			
Health concerns		x		
Environmental concerns		x		
Food quality concerns		x		
Label	***			
Packaging		x		
Animal welfare		x		
Brand		x		

Product: PORK with organic food label in Anhui	Significance			Sample size
	Yes	No	Not Available	
Gender				
Male			x	
Female				
Age		x		
Education		x		
Income	***			
Household size		x		
Family with children under 18		x		
Price	***			369
Familiarity with type of product	***			
Family with the sustainable claim	***			
Health concerns		x		
Environmental concerns		x		
Food quality concerns		x		
Label	***			
Packaging		x		
Animal welfare		x		
Brand		x		

p<0.01; *p<0.001; *p<0.10

ARTICLE: Organic consumers' preferences and willingness-to-pay for locally produced animal products (2009) (Wagell, S; Jansson, M; Hamn, U)

Product: PORK	Significance			Sample size
	Yes	No	Not Available	
Gender				
Male		x		
Female				
Age		x		
Education		x		
Income		x		
Household size		x		
Family with children under 18		x		
Price	**			597
Familiarity with type of product	***			
Family with the sustainable claim	***			
Health concerns	*			
Environmental concerns	***			
Food quality concerns	***			
Label		x		
Packaging		x		
Animal welfare		x		
Brand			x	

ARTICLE: Tasty or Sustainable? The Effect of Product Sensory Experience on a Sustainable New Food Product: An Application of Discrete Choice Experiments on Chinkina Tinned Beef (2016) (Torquati, B; Tempesto, T; Vecchiato, D; Veronici, S)

Product: ORGANIC BACON	Significance			Sample size
	Yes	No	Not Available	
Gender				
Male	***			
Female				
Age	***			
Education	***			
Income	***			
Household size		x		
Family with children under 18		x		
Price		x		
Familiarity with type of product	***			
Family with the sustainable claim		x		
Health concerns	**			
Environmental concerns	**			
Food quality concerns	*			
Label	***			
Packaging		x		
Animal welfare	**			
Brand			x	

Product: FREEDOM FOOD BACON	Significance			Sample size for both products
	Yes	No	Not Available	
Gender				
Male	***			
Female				
Age	***			
Education	***			
Income	***			
Household size		x		
Family with children under 18		x		
Price	**			120
Familiarity with type of product	***			
Family with the sustainable claim		x		
Health concerns		x		
Environmental concerns	***			
Food quality concerns	***			
Label	***			
Packaging		x		
Animal welfare	***			
Brand			x	

ARTICLE: Red and processed meat consumption and purchasing behaviour and attitudes: impacts for human health, animal welfare and environmental sustainability (2005) (Cloran, A; Wilson, P; Swift, J.A; Leiboiovi D.G; Holdsworth, M)

Product: BEEF	Significance			Sample size
	Yes	No	Not Available	
Gender				
Male		x		
Female				
Age		x		
Education		x		
Income	**			
Household size		x		
Family with children under 18		x		
Price	***			252
Familiarity with type of product		x		
Family with the sustainable claim		x		
Health concerns		x		
Environmental concerns		x		
Food quality concerns		x		
Label	***			
Packaging	***			
Animal welfare		x		
Brand			x	

Product: MEAT	Significance			Sample size
	Yes	No	Not Available	
Gender				
Male	***			
Female	***			
Age	***			
Education		x		
Income	**			
Household size		x		
Family with children under 18		x		
Price		x		2,500
Familiarity with type of product		x		
Family with the sustainable claim		x		
Health concerns		x		
Environmental concerns		x		
Food quality concerns		x		
Label		x		
Packaging		x		
Animal welfare	**			
Brand			x	

Variables affecting consumers' willingness-to-pay a premium price for sustainable food (Milk&Dairy)

***P<0.01; **P<0.05; *P< 0.10



ARTICLE: Green marketing strategies in the dairy sector: Consumer-stated preferences for carbon footprint labels (2019) (Canavari, M; Coderoni, S)

Product: FRESH MILK	Significance			Sample size
	Yes	No	Not Available	
Gender				178
Male	-.***			
Female				
Age		x		
Education		x		
Income	+ **			
Household size			x	
Family with children under 18			x	
Price	-.***			
Familiarity with type of product		x		
Familiarity with the sustainable claim		x		
Health concerns			x	
Environmental concerns	+***			
Food quality concerns		x		
Label	+ ***			
Packaging		x		
Animal welfare		x		
Brand		x		

ARTICLE: Paying for sustainability: A cross-cultural analysis of consumers' valuations of food and non-food products labeled for carbon and water footprints (2016) (Greibitus, C; Steiner, B; Veeman, M.M)

Product: YOGURT in Germany	Yes	No	Not Available	Sample size	Product: YOGURT in Canada	Yes	No	Not Available	Sample size
Gender		x		1,579	Gender		x		1,551
Male		x			Male		x		
Female		x			Female		x		
Age		x			Age		x		
Education		x			Education		x		
Income		x			Income		x		
Household size		x			Household size		x		
Family with children under 18		x			Family with children under 18		x		
Price	-.***				Price	-.***			
Familiarity with type of product		x			Familiarity with type of product		x		
Familiarity with the sustainable claim		x			Familiarity with the sustainable claim		x		
Health concerns		x			Health concerns		x		
Environmental concerns	-.***				Environmental concerns	-.***			
Food quality concerns		x			Food quality concerns		x		
Label		x			Label		x		
Packaging		x			Packaging		x		
Animal welfare			x		Animal welfare			x	
Brand			x	Brand			x		

ARTICLE: Preferences for locally grown products: evidence from a natural field experiment (2017) (Menapace, L; Raffaelli, R)

Product: ICE CREAM	Yes	No	Not Available	Sample size
Gender				9,865
Male	+.***			
Female				
Age	+*			
Education			x	
Income			x	
Household size			x	
Family with children under 18	+++			
Price	-.***			
Familiarity with type of product			x	
Familiarity with the sustainable claim			x	
Health concerns			x	
Environmental concerns	+++			
Food quality concerns			x	
Label		x		
Packaging			x	
Animal welfare			x	
Brand		x		

ARTICLE: Are They Buying It? United States Consumers' Changing Attitudes toward More Humanely Raised Meat, Eggs, and Dairy (2017) (Spain, C.V; Freund, D; Mohan-Gibbons, H; Meadow R.G; Beacham, L.)

Product: EGGS	Yes	No	Not Available	Product: CHICKEN	Yes	No	Not Available	Sample size for both products
Gender		x		Gender		x		1,000
Male				Male				
Female				Female				
Age		x		Age		x		
Education		x		Education		x		
Income	-.**			Income	-.**			
Household size			x	Household size			x	
Family with children under 18			x	Family with children under 18			x	
Price		x		Price		x		
Familiarity with type of product			x	Familiarity with type of product			x	
Familiarity with the sustainable claim			x	Familiarity with the sustainable claim			x	
Health concerns			x	Health concerns			x	
Environmental concerns			x	Environmental concerns			x	
Food quality concerns			x	Food quality concerns			x	
Label		x		Label		x		
Packaging		x		Packaging		x		
Animal welfare		x		Animal welfare		x		
Brand			x	Brand			x	

Variables affecting consumers' willingness-to-pay a premium price for sustainable food (Cereal&Bread)

***P<0.01; **P<0.05; *P< 0.10



ARTICLE: Willingness-To-Pay for Multiple Units of Eco-Friendly Wheat-Derived Products: Results from Open-Ended Choice Experiments (2016)
(Wongprawmas, R; Pappalardo, G; Canavari, M; Pecorino, B)

Product: BREAD	Significance			Product: WHEAT FLOUR	Significance			Sample size for both products
	Yes	No	Not Available		Yes	No	Not Available	
Gender				Gender				270
Male		x		Male		x		
Female				Female				
Age		x		Age		x		
Education		x		Education		x		
Income		x		Income		x		
Household size		x		Household size		x		
Family with children under 18		x		Family with children under 18		x		
Price	***			Price	***			
Familiarity with type of product	***			Familiarity with type of product	***			
Familiarity with the sustainable claim	***			Familiarity with the sustainable claim	***			
Health concerns			x	Health concerns			x	
Environmental concerns			x	Environmental concerns			x	
Food quality concerns			x	Food quality concerns			x	
Label			x	Label			x	
Packaging		x		Packaging		x		
Animal welfare			x	Animal welfare			x	
Brand			x	Brand			x	

ARTICLE: The roles of pollution concerns and environmental knowledge in making green food choices: Evidence from Chinese consumers (2017)
(Tong, QM; Anders, S; Zhang, JB; Zhang, L)

Product: RICE	Yes	No	Not Available	Sample size
Gender				622
Male		x		
Female				
Age		x		
Education	**			
Income	***			
Household size			x	
Family with children under 18		x		
Price			x	
Familiarity with type of product			x	
Familiarity with the sustainable claim			x	
Health concerns	***			
Environmental concerns	***			
Food quality concerns	***			
Label			x	
Packaging		x		
Animal welfare			x	
Brand			x	

Variables affecting consumers' willingness-to-pay a premium price for sustainable food (Food in general)

***P<0.01; **P<0.05; *P< 0.10



ARTICLE: Exploring environmental consciousness and consumer preferences for organic wines without sulfites (2020) (D'Amico, M; Di Vita, G; Monaco, L)

Product: WINE	Significance			Sample size
	Yes	No	Not Available	
Gender				201
Male				
Female	..**			
Age		x		
Education		x		
Income		x		
Household size			x	
Family with children under 18			x	
Price			x	
Familiarity with type of product	..*			
Familiarity with the sustainable claim	..*			
Health concerns	..**			
Environmental concerns	..*			
Food quality concerns			x	
Label	..*			
Packaging			x	
Animal welfare			x	
Brand	..***			

ARTICLE: Biotechnology to sustainability: Consumer preferences for food products grown on biodegradable mulches (2019) (Chen, KJ; Marsh, TL; Tozer, PR; Galinato, SP)

Product: STRAWBERRIES	Yes	No	Not Available	Sample size
Gender				1,510
Male				
Female	..***			
Age	..**			
Education		x		
Income	..**			
Household size			x	
Family with children under 18		x		
Price	..***			
Familiarity with type of product	..**			
Familiarity with the sustainable claim	..***			
Health concerns	..*			
Environmental concerns	..***			
Food quality concerns			x	
Label			x	
Packaging			x	
Animal welfare			x	
Brand			x	

ARTICLE: Eco-labeling in the Fresh Produce Market: Not All Environmentally Friendly Labels Are Equally Valued (2018) (Chen, XQ; Gao, ZF; Swisher, M; House, L; Zhao, X)

Product: STRAWBERRIES produced with LESS FERTILIZER	Yes	No	Not Available	Product: STRAWBERRIES produced with LESS PESTICIDE	Yes	No	Not Available	Sample size for both products
Gender				Gender				2,525
Male		x		Male		x		
Female				Female				
Age		x		Age	..*			
Education		x		Education		x		
Income	..***			Income	..***			
Household size			x	Household size			x	
Family with children under 18		x		Family with children under 18		x		
Price	..***			Price	..***			
Familiarity with type of product			x	Familiarity with type of product			x	
Familiarity with the sustainable claim	..***			Familiarity with the sustainable claim	..***			
Health concerns			x	Health concerns			x	
Environmental concerns			x	Environmental concerns			x	
Food quality concerns	..***			Food quality concerns	..***			
Label			x	Label			x	
Packaging			x	Packaging			x	
Animal welfare			x	Animal welfare			x	
Brand			x	Brand			x	

ARTICLE: Consumers' perceptions, purchase intention, and willingness to pay a premium price for safe vegetables: A case study of Beijing, China (2018) (Zhang, B; Fu, ZT; Huang, J; Wang, JQ; Xu, SY; Zhang, LX)

Product: VEGETABLES	Yes	No	Not Available	Sample size
Gender				840
Male		x		
Female				
Age		x		
Education		x		
Income	..**			
Household size			x	
Family with children under 18		x		
Price	..**			
Familiarity with type of product	..***			
Familiarity with the sustainable claim			x	
Health concerns	..**			
Environmental concerns			x	
Food quality concerns	..***			
Label	..***			
Packaging	..***			
Animal welfare			x	
Brand			x	

ARTICLE: Factors affecting consumer preferences for "natural wine" (2020) (Migliore, G; Thrassou, A; Crescimanno, M; Schifani, G)

Product: WINE	Yes	No	Not Available	Sample size
Gender				613
Male		x		
Female				
Age	..*			
Education	..*			
Income	..*			
Household size			x	
Family with children under 18			x	
Price	..*			
Familiarity with type of product	..*			
Familiarity with the sustainable claim	..*			
Health concerns	..*			
Environmental concerns	..*			
Food quality concerns	..*			
Label	..*			
Packaging			x	
Animal welfare			x	
Brand			x	

ARTICLE: Consumers' willingness-to-pay for sustainable food products: the case of organically and locally grown almonds in Spain (2016) (De-Magistris, T; Gracia, A)

Product: ALMOND	Yes	No	Not Available	Sample size
Gender				171
Male				
Female	..**			
Age	..***			
Education		x		
Income		x		
Household size		x		
Family with children under 18			x	
Price	..***			
Familiarity with type of product	..***			
Familiarity with the sustainable claim			x	
Health concerns			x	
Environmental concerns	..***			
Food quality concerns			x	
Label		x		
Packaging			x	
Animal welfare			x	
Brand			x	