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# Deliverable 4.1:

# Market analysis: Assessing the transformational potential of an environmental rating label in four European countries, including French feedback on the national environmental labelling for food

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# 1 Introduction

Achieving environmentally sustainable food consumption is a critical priority in addressing the global challenges of climate change and resource conservation. However, a significant barrier to more environmentally sustainable food choices is the lack of clear and trustworthy information to consumers, and consumer knowledge on foods' environmental impact is found to be low (Hartmann et al., 2022; Shi et al., 2018).

Food labels are considered as an important means to guide consumer behaviour (Grunert et al. 2014, Thøgersen, 2010; Tiboni-Olischewski et al., 2024). Greater transparency for consumers is a distinct goal of the European "Farm2Fork"-Strategy and the European Green Deal. With the proliferation of so-called green claims, however, there is a strong need to scrutinise claims' substantiation (ECA 2024; JRC 2024). This is reflected in recent policies: the Directive on Empowering Consumers for the Green Transition (Directive (EU) 2024/825, ECGT Directive; (EC, 2025)) entered into force in 2024, and has to be put into national law by March 2026 and will be effective from September 2026 in most countries.

A research report by the European Commission (2024) revealed a heterogeneous but increasing uptake of sustainability labelling among food businesses across EU Member States, with over 200 labels and claims identified. However, the majority concerns particular product categories such as tea, coffee or chocolate only, and often they refer to products produced outside the EU (e.g., cocoa, oil palm, etc.). A report by the European Court of Auditors (ECA, 2024), in addition, criticises, that many extant labels cannot prove they are well understood by consumers. Furthermore, these traditional labels are usually certifications schemes which do not allow for more differentiation than being certified or not.

An environmental rating label (ERL), as a policy instrument, holds promise for bridging this information gap by addressing credence attributes that are relevant to a majority of consumers. For the purpose of this report, the term 'Environmental Rating Label (ERL)' refers to a multi-dimensional, colour-coded label that communicates the LCA-based environmental impact of a food product across multiple categories (e.g., climate, biodiversity, water use), typically aggregated into a single score or grade (e.g., A to F). It can support environmentally conscious consumption by providing consumers with relevant information, enhancing their understanding, and raising awareness of food products' environmental impacts (European Commission, 2024). The ECO FOOD CHOICE (EFC) project aims at proposing such an LCA-based ERL for all food.

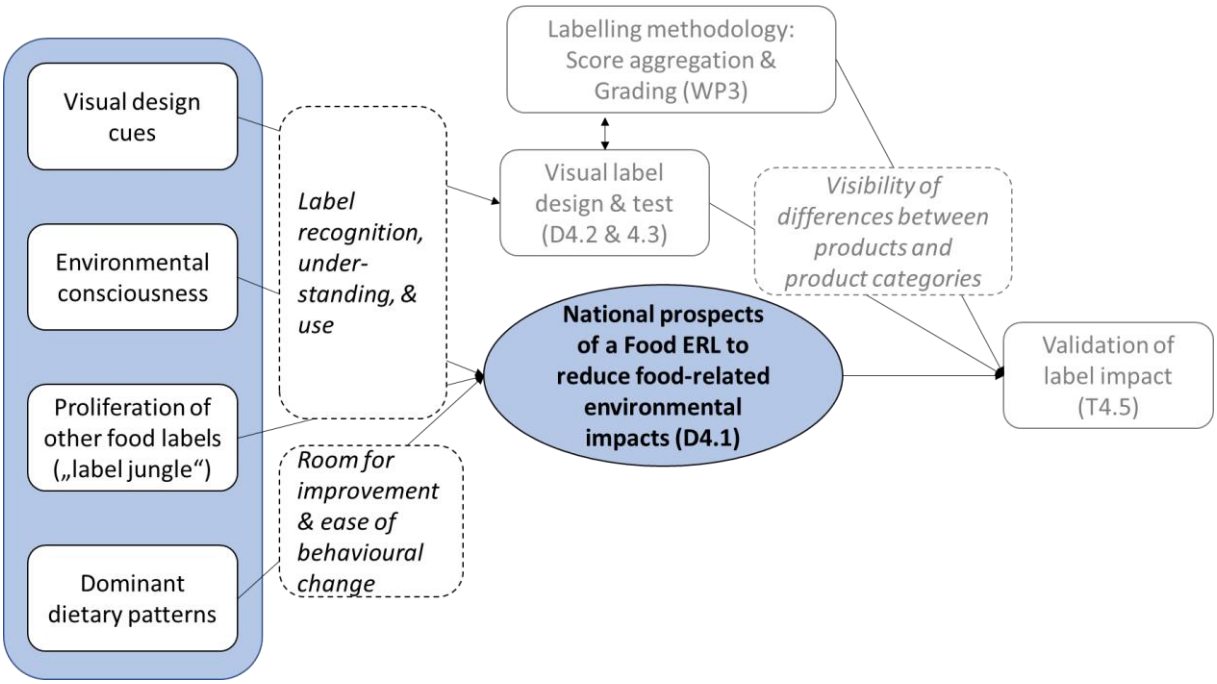
With a large gap between expert knowledge among LCA specialists on the one hand, and consumers as laypersons on the other, it is important to achieve a mutual understanding of the drivers of food label effectiveness from a consumer perspective in order to provide an optimal label design – both visually and methodologically. There is a growing body of literature focusing on comparing different label visuals, but the focus has been on nutrition labelling so far (Dubois et al. 2019, Egnell et al. 2020, Packer et al., 2021). This project report is therefore dedicated to take stock of current knowledge on consumer research on drivers of food label effectiveness in general and to analyse the prospective transformational effect of eco-labelling on food choices in particular in the light of these drivers. While the visual design of a food label is quite important for its effectively changing consumer behaviour, the environmental consciousness as well as the presence of other labels in a particular market strongly affects the attention that can be given to a new label. Finally, knowing human inertia in changing habits, current dietary patterns strongly affect the rate at which behavioural changes can take place.

Our report is organised along these three lines: Sections 2 and 3 provide insights into consumers' preference for and use of labels as well as critical aspects driving effectiveness. We also report on studies documenting national differences in the drivers of label effectiveness, with a particular focus on environmental consciousness.

Section 4 of this report examines the proliferation of food labels in Germany, France, Spain, and The Netherlands, to analyse whether differences in this aspect of the food environment could be a source of differential transformational potentials of the new ERL. Finally, changing consumer behaviour towards foods with lower environmental impacts usually implies a dietary change – towards less meat in particular, but also generally towards less animal-based products. We therefore also discuss the sustainability of typical diets in the four countries, and options to reduce meat consumption, in section5 of this report. To assess the framework conditions in the four countries, we conduct an extensive review of grey and scientific literature as well as statistics. Review articles and studies comparing our focus countries were prioritised where possible, to ensure a coherence of applied methodologies underlying our synopsis.

For France, a special section (6) is furthermore dedicated to describe the efforts to implement a national ERL for all consumer goods. At the start of the project, there was hope that an ERL for food would be implemented at the beginning of 2024. At the time this report was first published, however, the French ERL was only introduced for textiles on a voluntary basis. In summer 2026, two French retail companies have set out to implement the French label proposal, "Coût Environnementale" also for food products.

*Figure 1: Dimensions of the analysis of country-specific prospect of a food ERL to reduce food related environmental impacts*




Shaded elements in this figure represent the focus of this report.

Own representation

Our report ends with our key conclusions for the transformational potential of the label in the four countries. Limitations to the overall report are raised at the end, in conjunction with an outlook to next steps in consumer research of the project. Figure 1 illustrates the analytical framework of this report, and its connection with other elements of the EcoFoodChoice project, which feed into the final validation of label impacts in real life: insights on visual design cues informed our development of competitive label designs that were tested in Summer 2025. Based on the results of this testing, one best label will be tested for its real-life impact in a series of experiments in all countries in 2026/2027. These next research steps are synthesized in the outlook at the end of the report.

# 2 Background on Food (eco-)label effectiveness

This section first provides an overview of definitions and models of food label effectiveness, before exploring research methods and operationalisation of the key variables and finally presenting results on critical factors influencing the effectiveness of food eco-labels, as well as estimations of the extent to which outcome variables could be influenced by visual label design.

## 2.1 Definitions and models of label effectiveness

The effectiveness of a food label can be assessed at different levels, ultimately depending on the goals that are pursued with the label in question: is it designed primarily as a) an educative information tool, that might also impact the purchasing decisions of a person or household over time, or b) as a nudge towards a desired behaviour, that immediately impacts consumer choices at the point of sale (PoS)? Most of the available empirical studies focus on the latter, and as particular KPIs are addressed in this project regarding impact reduction of food consumption, this is also the focus in this report.

Thøgersen (2000) presents a comprehensive psychological model in which the ultimate measure of effectiveness is the decision to purchase an eco-labelled product. The underlying drivers of this decision are label availability, "paying attention to eco-labels", knowledge, and motivation (including trust and the belief in environmentally friendly buying), where these variables are not independent of each other. Using multinational data, Thøgersen (2000) finds supporting evidence for parts of the proposed framework. Grunert and Wills (2007) extended the model by adding "label liking" as a driver of label use. In line with these early models, we define (eco-)label effectiveness as

*the extent to which a label is recognised, liked, understood, trusted, and used as a tool for environmentally friendly decision making.*

With its focus on psychological motivation to buy environmentally friendly, the Thøgersen model (and many other models that can be related back to it, including Grunert & Wills 2007 or Grunert et al. 2014) does not consider label design as a driver of recognition.

Research on food label visual design however has gained momentum in the past decade, and particularly with the discussion around nutrition labelling, where various label formats have been tested in different countries and with different methodological approaches (Dubois et al., 2018, Egnell et al. 2020, Packer et al. 2021). In the following, we first present an overview of research directions and approaches to the measurement, before we dive deeper into the results of research on effective visual label design elements. We incorporate food label research as whole, as it does not seem appropriate to limit the review on food eco-labels at this stage. Please also note that, for the purpose of this report, the term 'eco-label' refers to any label that communicates environmental performance of a food product, including aggregated scores, category-specific indicators, or multi-dimensional rating systems.

## 2.2 Research methods and measures of label effectiveness

Food labels have been in the focus of marketing scholars for decades. There is thus a broad range of empirical methods and measures that have been used to quantify label effectiveness across the above-mentioned four dimensions of label recognition, liking, understanding, trust, and use, although not all studies on label effectiveness cover all of its' dimensions.: Tiboni-Olischewski et al. (2024) for their review on eco-labelling identify 21 studies which focus on labels impact on consumers' product perceptions, sustainable purchasing intentions and actual purchasing behaviour. 16 studies look at particular willingness-to-pay for eco-labelled products, and 13 consider particularly trust and understanding of the labels with a view at certification and certifying entities. Finally, 14 studies focus more on design features as well as the effect of other labels' presence.

While some studies just use one label format and evaluate its effectiveness, other studies compare different label visuals. Given the longer political history, most extant studies have focused on nutrition labelling (Ducrot et al. 2015, Egnell et al. 2018, Fialon et al. 2022, Fialon et al. 2023, Hafner et al. 2026, Hagmann et al. 2020, Magriplis et al. 2024, Mejean et al. 2013, Pettigrew et al. 2023, Talati et al. 2019; Vasseur et al. 2025). For eco-labelling only a few comparative studies exist (Dreist et al., 2024, Edenbrandt et al., 2025), and these only focus on carbon labels, which are far less complex in their content than an ERL that covers, besides greenhouse gas emissions, at least 15 further environmental impact categories (Sala et al., 2018). Most of the studies use social-psychological scales to assess label effectiveness along the dimensions of acceptability (including liking and trust) as well as understanding (Mejean et al., 2013). Liu et al. (2015) also show that perceived comprehension does not necessarily coincide with objectively measured understanding. Intentional scales have as well been applied to measure stated willingness to use or buy. The behavioural impact of label (design) on label use in purchasing decisions has been studied both in field (Dubois et al. 2019) and laboratory experiments as well as in survey experiments.

The research on label effectiveness in terms of behavioural impact is often relies on stated preferences approaches, i.e., measuring behavioural intentions rather than actual behaviour (Majer et al. 2022). While the internal validity of most experiments (randomised controlled trials (RCT), some with between subjects-design, some with a difference-in-difference-approach) can be judged rather high, the external validity is therefore rather low. The limited evidence on the actual reduction of environmental impacts that can be achieved by food labels has been mentioned by Deconinck and Hobeika (2022) and reiterated by Sanyé-Mengual et al. (2024).

Despite some additional studies carried out since 2022, there are still very few field experiments that validate labelling effects in real life. These studies reveal that habitual shopping behaviours can limit the visibility and effectiveness of labels. Consumers often rely on low-involvement heuristic decision-making, reducing the impact of sustainability labels in everyday supermarket settings (Cook et al., 2023). The field experiments that have been carried out, suffer from a limited number of products that have been labelled, and the Eco-Score test of Lidl in four of their Berlin stores used shelf signage only (Lidl 2022). Consumers interviewed in this study reported that they had not seen the label at the shelf, as they would expect a label to be on the package.

Large-scale field experiments such as the one carried out by Dubois et al. (2018) in the context of nutrition labelling, would be warranted to estimate true effect sizes. A high availability of the label is required, thus the application of the label on a high number of products, both complements and

substitutes. This ensures sufficient recognition of the label and enables consumers to become aware of the differences within and between food categories. Finally, it is necessary to implement large-scale information campaigns in order to make consumers aware of the label (DeBauw et al. 2022). The retail company Colruyt is one example of a private actor contributing extensively to the recognition of the Eco-Score: with their introduction of the Eco-Score in their supermarkets, a TV campaign and YouTube video (YouTube 2023) was implemented which led to high awareness among Belgian consumers (BEUC, 2023). Having established the methodological landscape of label effectiveness research, we now turn to the most critical practical dimension: visual design. The way a label looks significantly influences whether it is noticed, understood, and trusted—especially in the fast-paced environment of the supermarket.

## 2.3 Effectiveness of visual design cues

The visual design of the label is critical for label recognition, understanding and use (Vermeir & Roose, 2020). Decisions need to be taken, among others, regarding the optimal degree of visual complexity. Visual complexity (Donderi 2006) or feature complexity, as it is called by Pieters et al. (2010), refers to the number of design elements that are used. These include verbal expressions, colours, icons, numerical scores, and references to further information. Also, the number of levels in a scale is part of the visual complexity (Donato & Adıgüzel, 2022; Madan et al., 2017). Overall, these label characteristics influence a label's salience, consumers' understanding, preference and acceptance, e.g. liking or perceived ease of understanding. As Yokessa and Marette (2019) note, the challenge of eco-labelling lies in conveying simple messages without oversimplifying complex environmental assessments. With the discussed environmental *rating* labels (ERL), consumer decision making becomes more complex, as it is not a yes (labelled) or no (not labelled) decision any more (like, e.g., with the organic label), but more incremental differences between products can be considered. Among products with a similar nutritional utility, e.g., there could then be a choice between more or less environmentally friendly products.

In a focus group study on carbon label design, Carrero et al. (2021) identify the following aspects of label design as most important in driving label attention: A label's location, size, colour, icons, coloured background or frame, and textual anchors as well as design basics such as vividness, incongruity, simplicity, and clarity. This is further supported by eye-tracking results by Rihn et al. (2019) which not only indicate that label format influences both, visual attention and product valuation, but that logos tend to capture more attention than text-based labels. Results in the context of nutrition labelling further support these impacts of label characteristics on attention (Bialkova & van Trijp, 2010).

In the following, we first describe these elements and present examples from the world of sustainability labels. Each time, this is followed by a review of research results regarding the effect of the different elements.

### 2.3.1 Verbal elements

Most of the recently proposed environmental rating labels use verbal elements as a labels' name, such as Enviroscore, Eco-/ Green-Score, Planet Score, or the likes. Experimental evidence suggests that verbal elements lead to greater effectiveness compared to a purely graphical logo: in a simulated online shopping setting, verbal cues had significant and additive effects on purchasing eco-labelled products (Tang et al. 2004). For the organic label, Hartmann et al. (2025) clearly show that the EU's purely graphical "Green Leaf" organic label would benefit from an additional verbal cue. Currently,

food packages typically show it in combination with the older, national organic labels. These typically include a verbal reference to organic production, such as the term “Bio” in the German national organic label, or “AB” as abbreviation for the French organic label “Agriculture Biologique”, which represents, combined with a leaf, the French organic label.

Further, text-based environmental information tends to be perceived as less ambiguous and elicits less skepticism than purely pictorial “green” cues—especially among highly environmentally conscious consumers—implying that verbal label elements can strengthen perceived credibility in skeptical segments (Grebmer and Diefenbach, 2020). Evidence from eco-label information processing further indicates that pairing an eco-label icon with short descriptive text can improve eco-label cognition for consumers with lower eco-label knowledge, consistent with a “dual coding” advantage of combining visual and verbal information (Wang et al., 2022).

More complex labels further include terms to describe selected subcategories, such as “Biodiversity”, “Pesticides” and “Climate” in the case of the Planet Score. However, for the term biodiversity, a Eurobarometer study in 2018 has shown that while 71% state to have heard the term before, only 41 % claim to know what it means, with wide spread across European countries. In Germany, recent research has shown that some notions are understood only by less than half of consumers (Schulze-Ehlers et al., 2025; Schwab et al., 2024).

A much simpler verbal element is the use of letters – e.g. A to E or A+ to G, which is used in several currently available rating labels such as the Nutri Score and the EU Energy label, but also in many currently proposed ERL.

### 2.3.2 Black & white vs (multi-)colour labels

In the context of eco-labelling, black-and-white as well as multi-colour labels have been proposed (Cicek et al., 2024). In the case of multi-colour labels, these use five or more colours on the spectrum green (low impact) – yellow (medium) – red (high impact) to indicate the grading of different products (Zühlsdorf et al. 2024). The number of colours used in such labels ranges between five (e.g., in the Nutri-Score or the Planet Score) and eight (e.g., in the EU Energy label or the Eco-Impact (Williams et al., 2023).

There is wide agreement in food labelling research, that the above-mentioned colour coding from green to red yields superior results in consumer understanding and consequentially, behavioural response (Dubois et al., 2018; Egnell et al. 2020; Packer et al. 2021; Schuldt 2013). It is widely accepted the colours bear meaning, and that this meaning can differ culturally (Vermeir & Roose, 2020). The number of colours (and thus, grades), however, has barely been addressed in research so far and will be part of further research in this project. Given that more colours increase the visual complexity of a label, one might argue that a higher number of grades & colours could be detrimental to consumer understanding.

### 2.3.3 Use of icons or logos

The visual label design can also encompass an icon or logo that spurs associations with the informational content of the label. In the case of eco-labelling, leaves, planets, or combinations thereof, can be found. Again, visual complexity increases with the number of graphical elements the icon or logo contains. The use of icons often enhances engagement and memorability, and icons have been shown to positively influence consumer choices (Madan et al., 2017; Ducrot et al., 2015; Rihn et al., 2019).

### 2.3.4 Single score or individual impact categories displayed

Once more than just one environmental impact category is to be included in an ERL, the question arises, whether or not to aggregate these into one single score, and whether or not to display one or more subcategories on the label. In line with the previous sections, the more categories are displayed, the higher the visual complexity of the label.

Aggregated scores (i.e., including a number of environmental impact categories which are combined into one dimensionless score, such as the Product Environmental Footprint (PEF) proposed by the JRC (Sala et al. 2018) are generally well understood by consumers, while more intricate data on biodiversity or pesticide use can create significant comprehension challenges (Yokessa & Marette, 2019). For instance, the category "pesticides" displayed in the Planet-Score label indicates the type and level of pesticide use rather than their complete absence. However, consumers, at least in Germany, often misinterpret this information, associating it with health risks from consumption rather than environmental impacts in the production process (BfR, 2010; Koch et al., 2017; Schulze-Ehlers et al. 2025). These misunderstandings can arise even when criteria are objectively measurable, as consumers may be unaware of their false assumptions (BfR, 2018).

### 2.3.5 Display of numeric scores

Depending on the previous decision (single score or separate impact categories displayed), a numeric score on an ERL can as well either relate to a dimension, e.g., the Carbon Footprint, measured in CO2-equivalents (Lemken et al., 2021), or to a dimensionless aggregated score such as the Product Environmental Footprint (PEF) proposed by the EU's Joint Research Centre (JRC, Sala et al. 2018).

For the Green-Score, the grading relies on a logarithmic transformation of products' EF-scores to a 0-100 scale, which is not displayed on the label.[1] The final score also includes bonuses and maluses for certain aspects that are currently not covered by the EF-scores reported in Agribalyse (2025). Examples include packaging, or environmentally friendly production methods such as organic. Hence, a 0-100 score could generally be displayed on the label.

The currently discussed environmental label in France, the "Coût Environnemental" takes this approach and displays a value that is calculated as the Environmental Footprint obtained from the French database Agribalyse, multiplied by 1,000 (see section 6 for more information).

Experiments like discrete choice studies have demonstrated that the inclusion of directive scales or numeric benchmarks can improve both objective understanding and subjective evaluation of labels (Lemken et al., 2021; Schulze-Ehlers et al. 2025), which are preconditions of behavioural change.

### 2.3.6 Additional information on back of pack or through QR codes

With a view at the need to reduce complexity of front of pack labels while maintaining consumer understanding, the question of how to provide additional information becomes salient. For nutritional information, ingredient lists as well as nutrition facts tables are compulsory elements of food packaging, but usually do not appear on the Front of Pack. Neuhofer et al. (2023) found positive effects of nutrition and sustainability facts tables when added to the organic label. This points at the possibility of combining an attractive, easy-to-interpret visual cue on the front-of-pack and to combine this with

[1] The website https://docs.score-environnemental.com/methodologie-recette/fonctionnement-general-recette still refers to the grading system based on a 5-level label.

more informative details on the back of pack. More recently, some labels include QR codes which link interested consumers to more background information on the label, which is provided on an external website (Li et al. 2024) . Consumers can decide whether or not to access the additional information, and if they use it, where to do it (in the store or at home). On the one hand, the display of a QR code adds complexity to the Front-of-Pack-Label (FOPL), but on the other hand, it points at the availability of further information and thus reduces the specific information included on the pack as a whole. Gaudeul & Krawczyk (2023) provide some insights into the effectiveness of QR codes on food packaging from a comparative study in Bulgaria, Germany, and Spain. They report that Spanish consumers were more likely to make use of QR codes offered. In a preference experiment, however, Germans were (weakly) more likely to favour hybrid labels. Across all countries, older individuals (>55 years) as well as less educated individuals were less likely to choose hybrid labels which included QR codes. However, this study did not include linkages to environmental information; as Gaudeul & Krawcyk (2023) report strong differences in the use of QR codes depending on the type of information provided through that code, a generalisation of their findings to the case of a hybrid ERL thus seems not to be appropriate. Li and Messer (2019) conducted a field experiment with oyster shoppers in the US and found that QR codes were only used by 1.2% of consumers. Atkinson's (2013) study on the use of sustainability apps and QR codes had a clearer focus on environmental impacts, but dates back more than ten years and was carried out in the USA, which limits its transferability to the contemporary European context.

References to further information on the labelling content can act as a cue to foster trust in a label. A qualitative study using an online community, revealed that consumers who are generally rather sceptical regarding green claims, appreciate the level of background information which was provided on the Eco-Score on the OpenFoodFacts website[2] (Schulze-Ehlers et al. 2025). However, Hoffmann et al. (2022) find evidence that high levels of information provision can also backfire, when the provided information is difficult to understand. Generally, knowing that food shopping represents a habitual behaviour with low involvement for most food categories, it can be assumed that the effort of using a QR code to access deeper information on a particular food product at the point-of-sale will not gain more relevance in the future. Nevertheless, for products which are put on the table in their packages, such as breakfast cereals, milk boxes, cream cheese, or sliced meat products such as sausages or ham, consumers might take their time to access further information through the QR code. This could, over time, induce a stronger engagement with the food label and improve the understanding and knowledge of environmental impacts of different food categories.

# 3 Individual drivers of label effectiveness

## 3.1 Visual complexity and its impact on label liking and understanding

Research on environmental labelling of foods highlights significant challenges related to misunderstandings and a lack of comprehensibility (Cook et al., 2023; Samant & Seo, 2016). Studies show considerable problems of consumers misinterpreting existing food-related sustainability information. A review by Cook et al. (2023) shows problems found in carbon footprint labelling, which provides a measure of greenhouse gas emissions linked to a product. Their results indicate a number

[2] While the scores' name and visual have changed since the study in question was conducted in autumn 2024, the level of information provided on the website https://de.openfoodfacts.org/green-score is still comparable to the former information provision on the Eco-Score.

of major problems: 1) Consumers often struggle to understand such labels when they rely solely on numerical values without additional, intuitive, or visual cues. 2) Information overload from excessive information may lead to disregard of a label entirely (Competitions and Market Authority, 2021). 3) Consumers find difficulty in contextualizing greenhouse gas emission values within their personal decision-making frameworks (Meyerding et al., 2019). 4) Some of them even misinterpret carbon footprint labels as references to pollution or contamination in the food itself, rather than to emissions associated with its production (Carrero et al., 2021). Consumers' limited cognitive resources and time further complicate label comprehension during grocery shopping, where decisions are made rapidly (Cohen & Babey, 2012; Grunert & Wills 2007; Miller & Cassidy 2015).

While higher visual complexity may appeal to environmentally conscious consumers, it can overwhelm others and reduce the overall effectiveness of the label (Yokessa & Marette, 2019; Suchier et al., 2023). Evidence from nutrition labelling suggests that what consumers say they prefer can deviate from what they demonstrably understand in objective tests. Hafner et al. (2026) and Magriplis et al. (2024) report such deviations, with multidimensional nutrition labels being more liked but less understood. This finding is attributed to a general consumer preference for more information despite a lack of knowledge (Dana et al. 2019). Fialon et al. (2022) and Fialon et al. (2023) however report mostly consistent results regarding stated preference for a certain label visual, and the understanding thereof.

Dreist et al. (2024) and Edenbrandt et al. (2025) compare different versions of carbon labels but only include one multilevel colour-coded label and compare this against carbon neutral and carbon footprint labels. To our best knowledge, no study comparing different multilevel colour-coded eco-labels exists so far.

## 3.2 Familiarity and label use

Bialkova and van Trijp (2010) also find an impact of consumers familiarity with the label type to influence their intention. This insight has important implications for the creation of new labels: on the one hand, a new label that is introduced could profit from its' being visually similar to already existing labels, as consumers are already familiar with features such as colour coding. In that sense, the Nutri-Score may have profited from the earlier existence of the EU energy label, which is also colour coded and omnipresent in the appliances market, thus has gained a lot of attention well before the Nutri-Score appeared on the food market.

On the other hand, the similarity of certain design features can also lead to consumer confusion (Schoemann et al. 2025). This is particularly important in cases where visually similar labels appear on the same product - which would be the case when Nutri-Score and a colour-coded ERL coincide on a label (Bolhuis et al. (2025). Nevertheless, Jürkenbeck et al. (2024) report instances of confusion, while Bolhuis et al. (2025) show that, at least in an experimental setting, confusion between Nutri-Score and Eco-Score is rather low. Given this mixed evidence, more research is needed to optimise the design of an ERL while taking into account other labels.

## 3.3 Consumers' food- and labelling-related environmental knowledge and concern

Research indicates that greater environmental knowledge enhances perceived label quality, trust, and purchase intention (Taufique et al., 2017; Zheng et al., 2022). Simplified label designs have been recommended to address knowledge gaps, improving recall and comprehension (Buratto & Lotti, 2023; Schubert, 2017).

However, consumers often lack comprehensive knowledge about the environmental impacts of food consumption (Camilleri et al., 2019; Hartmann et al., 2021; van Bussel et al., 2022), which poses a significant barrier to behavioural change (Hartmann et al., 2021). Moreover, the concept of environmental sustainability remains ambiguous to many, with limited understanding of the environmental implications across various stages of the food production cycle, including sourcing, production, processing, packaging, transportation, and disposal (Dihr et al., 2021; Otto et al., 2021). For instance, misconceptions such as viewing climate information on labels as redundant to organic labelling (Schulze-Ehlers et al.,) indicate a need for clearer communication about the differential climate impacts of organic versus conventional farming (Lazzarini et al., 2018; Shi et al., 2018).

Despite gaps in objective environmental knowledge, concern for environmental issues is widespread among European citizens. Approximately 80% report feeling affected by these issues in daily life (European Commission, 2024), with higher rates in Southern European countries (88–98%). Consistent findings since 2019 suggest this concern stems from direct experiences of climate-related effects such as extreme weather or water scarcity. Additionally, a BEUC (2023) survey across 16 countries found that while 76% of consumers consider environmental information, only 48% actively prefer eco-labelled products.

D'Attoma and Ieva (2024) developed a composite index of environmental consciousness based on the theoretical framework proposed by Sanchez and Lafuente (2010), who define environmental consciousness as "a psychological awareness of the need for pro-environmental action". Based in attitude structure theory, environmental consciousness in their definition encompasses affective, cognitive, dispositional, and active elements. For validation of their composite index, D'Attoma and Ieva (2024) use Eurobarometer consumer surveys from 2019. While such secondary data often pose difficulties regarding the use of appropriate measures that align with a particular theoretical construct, a strong advantage is their international comparability, across 28 European member states, and the large-scale sample. The robustness of the index is examined using environmental-related searches on Google Trends as an independent measure. The positive and significant relationship that is found between the composite index and this measure can be seen to support the index' robustness. The results reveal a heterogeneous distribution of environmental consciousness composite index (scaled from 0 and 100) across countries, with lowest value found in Poland (49.72 points), and highest in the Scandinavian countries (Sweden: 67.78). For the countries relevant for our Eco Food Choice project, the highest level of environmental consciousness was found in The Netherlands (65.71), followed by France (63.45), Germany (61.67), and Spain (58.52). In general, environmental consciousness in all four countries is above the overall average of the sample (57.73)

## 3.4 Trust and scepticism in food labels

Trust is fundamental to the effectiveness of labelling schemes in influencing consumer behaviour (Thøgersen , 2000; Tonkin et al., 2015). However, the complexity of modern food production and the proliferation of sustainability labels have led to consumer confusion and scepticism (Cook et al., 2023; Meis-Harris et al., 2021). Trust declines further when the certifying body is unclear, or when the superiority of labelled products over non-labelled ones is not evident (Cook et al., 2023; Leire & Thidell, 2005; Plank & Teichmann, 2018). Unverified claims, such as "green" marketing claims, undermine the credibility of eco-labels and hinder trust in sustainability initiatives across the food system (Cook et al., 2023; Dreist et al., 2025). Such unsubstantiated claims are more and more banned by the European Union through directives such as the Directive on Empowering Consumers for the Green Transition

(Directive (EU) 2024/825, ECGT Directive; (EC, 2025)), which came into force in 2024, and has to be put into national law by March 2026, or the proposal for a "Green Claims Directive", which seems to be off the table right now, despite some recent publications claiming its being expected to come into force in 2027 (Meyer, 2025).

Mistrust poses challenges for the food industry and governments aiming to promote healthier, more sustainable consumption habits. The credibility of the organization overseeing certification is a key determinant of trust (Darnall et al., 2018; Sirieix et al., 2013). Institutional trust plays a significant role in fostering confidence in sustainability labelling. Studies in France, Germany, and Serbia reveal that consumer trust increases with knowledge of third-party certification, especially when supported by effective communication campaigns (Gorton et al., 2021).

Consumers prefer labelling schemes managed by independent bodies, such as government agencies or NGOs, which are perceived as more trustworthy than industry-led schemes (Cook et al., 2023). A 2021 EU survey found relatively high levels of trust in EU authorities to administer sustainability standards, with stronger support for labels backed by NGOs and public authorities than those managed by food companies (EIT Food, 2021; International Finance Corporation & Europäische Kommission, 2022). Regional differences also influence trust. For example, Danish consumers show higher trust in organic labelling due to significant government involvement, unlike consumers in the UK, Sweden, or the USA (Sønderskov & Daugbjerg, 2011). Similarly, in North America, the USDA organic logo is more trusted than generic organic labels (Nagy et al., 2022). However, consumers in developing countries often express scepticism toward certifications from domestic organizations (Cook et al., 2023).

A critical barrier to trust in environmental sustainability scores is the limited accessibility of the data underpinning their calculations, unlike nutrition declarations, which are mandatory (BEUC, 2020). The publication, in an open and user-friendly format, of the data considered in the calculation of these scores, could boost consumer trust in such systems (BEUC, 2020). Osburg et al. (2020) explore the effects of additional product and find positive impacts on trust and, consequently, purchase intentions. This effect is particularly strong among consumers with a high environmental self-identity.

While trust and scepticism are crucial psychological drivers of label effectiveness, they do not operate in isolation. In real-world shopping environments, these attitudes interact with other product characteristics, such as price, taste, and the presence of competing labels. The following section explores these key moderators in detail.

## 3.5 Interactions with other product characteristics and labels

Several factors influence the extent to which sustainability labels impact behaviour. The following sections describe the state of knowledge regarding the most important moderators

### 3.5.1 Price relations between food categories with different environmental impacts

There is wide agreement that product prices are of high importance for most consumers. There is a strong risk of social desirability effects in opinion polls working with stated preference methods, but more realistic experiments clearly reveal that not all consumers are willing to pay more for sustainability characteristics of food products (see, e.g., Li et al. 2021 for a meta-analysis on Willingness-to-Pay).

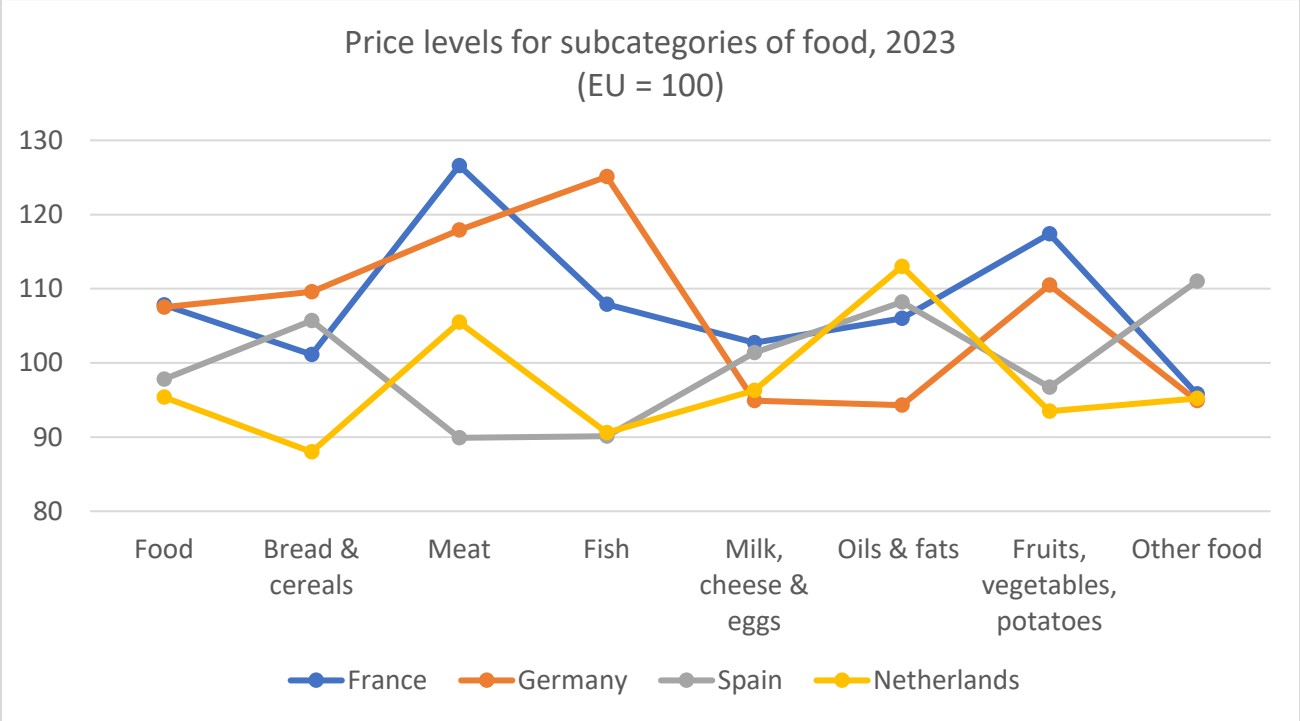
While such findings are of high importance for companies willing to invest in sustainability labelling strategies, our perspective on the transformational potential of a food ERL is broader: A couple of

recent studies have pointed at price differences between food categories (Siegrist et al., 2025; Springmann et al., 2025), which are partly driven by tax policies. Eurostat data on price levels in our four study countries (**Error! Reference source not found.**) reveal, that across all food categories France and Germany build one group with price levels above the EU average, and Spain and Netherlands form another group where the food price level is slightly below the EU average. Still, the picture changes once individual product categories are looked at. While price levels for all product categories are above or at the European average in France, the situation in other countries is more heterogeneous: in Germany, meat and particularly fish products are far above the average, while prices of milk, cheese and eggs as well as oils and fats, are below the average.

Overall, we can conclude that the current price relations between food categories with different environmental impacts do not favour a shift away from meat in Spain, as meat is relatively cheaper. The price structure in The Netherlands, on the other hand, seems to provide some incentives to consume more plant-based products, as the average price levels are below the overall average of food products in the country, while particularly meat is priced above this average. Of course, this analysis remains quite rough.

Siegrist et al. (2025) investigate price relations between animal-based products & milk and meat substitutes, and conclude that the average premium for meat and milk substitutes between 24 and 58 %, with premiums for milk substitutes above those of meat substitutes. Exceptions were found for the German retailer where price parity between meat substitutes and benchmarks has been reached and one Spanish retailer where the average price premium for meat substitutes remains at over 100 %.

*Figure 2: Price levels of food categories with different environmental impacts in France, Germany, Spain, and The Netherlands*




Source: Own representation based on (Eurostat, 2023)

However, further differences occur between these countries: The Good Food Institute shows that in Germany and Spain, differences in tax levels occur for meat and dairy products on the one hand, and their plant-based alternatives, on the other: in Spain, the VAT rate for cow's milk is at 0%, whereas plant-based milk is taxed with 10%. In Germany, the reduced food VAT applies for cow's milk (7%), while for plant-based milk the normal rate of 19% VAT applies (GFI 2025e). This renders plant-based alternatives relatively expensive compared to the animal-based product. Springmann et al. (2025) further show that changes in countries' tax regimes could lead to considerable reductions of environmental impacts from food consumption.

These insights show that a future ERL's effectiveness will strongly depend on decisions at retail and political levels. Given the high importance of prices in consumer decision making, a shift towards more plant-based diets would be facilitated by price structures that favour respective products. While France, Germany, and The Netherlands, with above-average price levels for meat, provide rather good conditions, in Spain, relative meat prices seem to counteract a dietary change.

### 3.5.2 Trade-offs between environmental friendliness and other shopping motives

Food choices are typically guided by a variety of motives, with egocentric motives such as price, taste, appearance, and health concerns taking precedence over altruistic ones (DeBauw et al., 2022; OECD, 2022). Typically, animal welfare and social dimensions like fair trade rank higher than environmental concerns (De Bauw et al., 2021; Ufer & Ortega, 2023; Williams et al., 2023). Environmental concerns rank lower but may interact with other motives at the point of sale (Lemken et al., 2024). Spontaneous influences, such as visible sustainability attributes, can impact decision-making (Lemken et al., 2024; Yokessa & Marette, 2019). However, consumers may also use labels and claims for other, e.g., hedonic goals (Ishikawa & Okada, 2021; Sörqvist et al., 2015)

Environmental impact will thus, for most consumers, be only one among multiple purchasing motives (Thøgersen, 2000; Grunert, 2011; DeBauw et al., 2022). Consumers' food purchasing behaviour is further dominated by dietary habits as well as shopping habits (selection of stores and brands or labels, focus on particular cues such as price offers) (Gardner et al. 2011; Munro et al. 2023). Such habits usually change only slowly. Since particularly ruminant meat and cheese are among the most environmentally impactful foods, an environmental rating label not only requires consumers to choose the more environmentally friendly product within the same food group, but rather, to decide whether or not to consume this food group at all, or how much of it (Dussiot et al., 2024). As an example: where the organic label is intended to draw consumers away from a conventional butter or beef product to the organic alternative (*intra*-category switching), an ERL should additionally motivate consumers to (gradually) substitute these products with more environmentally friendly alternatives (*inter*-category switching). Thus, adapting the food purchasing behaviour according to the guidance of an ERL can be expected to demand much more of consumers, than the use of the organic or other, binary, sustainability labels which currently dominate the market (see section 4). The development of meat and dairy as well as alternative protein consumption will be explored in more detail in section 5. The next section discusses findings on how the organic label might be affected by the introduction of an additional environmental rating label.

### 3.5.3 Specific role of the organic label

As part of the goal to stimulate environmental sustainability of food production, an important target of the EU's common agricultural policy (CAP) to promote organic farming and to achieve a share of 25% of agricultural land in the EU by 2030 (EC, 2023a). An action plan was set up to stimulate demand and ensure consumer trust, and to stimulate farm conversion (EC, 2023b). For 2022, the European Commission reported that 61% of EU citizens were aware of the European organic label, reflecting a 37% increase since 2012 (Kantar Public Brussels & European Commission, 2022). In the target countries for consumer research within this project, awareness of the organic label varies significantly, with relatively high recognition in France (68%), Germany (71%), and the Netherlands (64%), compared to lower levels in Spain (44%) (Kantar Public Brussels & European Commission, 2022).

Organic products are often associated with additional attributes such as healthiness (Aertsens et al., 2009). While this can be justified by allowed ingredients or a production process renouncing on most chemical pesticides, it must be clear that the nutritional quality, namely contents of fat, salt and sugar, is not necessarily better than in conventional products. There is thus the risk of a halo-effect created by the organic label (Neuhofer et al., 2022; Richetin et al., 2022).

Regarding interaction with other eco-labels, a review of 25 studies by (Potter et al., 2021) found that organic food purchases increased in most cases when another (traditional) eco-label was added, indicating positive interaction effects. These studies employed various labelling formats, including organic logos, text-based labels, and combinations of both. Overall, findings from the literature indicate increased consumer purchasing behaviour in both hypothetical and real-world scenarios (Cook et al., 2023). On the other hand, a more recent study from France (Shaikh et al., 2024) shows that the fully aggregated Eco-Score was perceived by consumers as too limited to environmental impacts compared to the organic label, which was also perceived to have positive health effects. Some consumers also perceive climate information as redundant when paired with organic labelling (Lazzarini et al., 2018; Shi et al., 2018), although health or climate benefits of organic labels remain contested (Boschiero et al., 2023; Chiriacò et al., 2022; Guéguen & Pascal, 2023; Leifeld, 2012; Nemecek et al., 2016; Tricase et al., 2018). Neuhofer et al. (2023) studied the effects of adding to the organic label a sustainability facts table that provides quantitative environmental information related to global warming potential, land use, and energy use per serving size of the product.

Despite the strong positive image that organic food carries among citizens, the price barrier has inhibited a more pronounced growth of this food segment. In the past decade, the trend towards foods marked with the unspecified terminology of "local", increasingly was seen as a threat to the growth of the organic market both in the US (Adams & Salois, 2010; Neuhofer et al., 2023) and the EU (Jafari, 2025). Furthermore, Hartmann et al. (2025) present critical results regarding the effectiveness of the very simplified EU organic label (Green Leaf), which could be enhanced by adding the term "organic" to it. The question of how consumers would use the organic and a new environmental rating label as complements, thus remains open.

### 3.5.4 False associations between "regional" and low environmental impact

Environmentally conscious consumers often adhere to additional (and potentially misinterpreted) heuristics, such as favouring regional, seasonal, or organic products, or avoiding meat and plastic packaging (Donato et al., 2021; Magnier & Schoormans, 2015; Neuhofer et al., 2023; Neumayr & Moosauer, 2021). However, life-cycle assessments (LCAs) of food products reveal that such judgments

can be flawed (Guéguen & Pascal, 2023; Hartmann et al., 2022; Molina-Besch et al., 2019). Particularly, the perception of environmental advantages of regional foods does not correspond to LCA-results, which usually show that transportation only accounts for a smaller share of environmental footprints, compared to the environmental impacts associated with the agricultural production stage (Urbano et al., 2022) - with the exception of air transport. However, regional products are of high interest for consumers, and the association of "regional" products with short transportation and a consequential low Carbon Footprint sticks strongly in consumers' minds (Hartmann et al., 2021). Therefore, as we analyse the prospects of an environmental label, we have to take the strong trend towards products marked as "regional" or "local" into account in our analysis, as far as respective labels are available in our study countries.

### 3.5.5 Information overload in the "label jungle"

Eco-labels compete for attention amid numerous product attributes (Asioli et al., 2017; Drugova et al., 2020; Lemken et al., 2021; Li, 2024). In grocery shopping, consumers face a multitude of labels and claims while making up to 200 decisions daily (Wansink & Sobal, 2007), each of them often in less than a second (Königstorfer & Gröppel-Klein, 2012). On the one hand, this induces an information overload (Thøgersen, 2000) which is hard to overcome for individual labels. On the other hand, in case of recognition, it may create trade-offs between product traits that were previously neglected. Williams et al. (2023) demonstrate that among several sustainability labels, the environmental impact received the lowest level of importance, while origin, animal welfare, packaging, and organic, in falling order, were more important.

In the proverbial "label jungle" (Sonntag et al., 2023), consumers often struggle to interpret numerous labels simultaneously, including public certifications (McLeod et al., 2024). Given a high number of other food labels already present in supermarkets (Sanyé-Mengual et al. 2024), the hurdle for a new ERL to be recognised at the point of sale is immense, and to be actually driving choice even more so. Nevertheless, we have seen successful label introductions in the past such as the organic label in Germany, which was accompanied by a massive communication campaign in 2001, and "profited" from the - back then still new - food scare, Bovine Spongiforme Encephalitis (BSE) (Bruhn, 2003). The EU organic label, which was introduced later and with less communication effort and some issues in label visual design, has still not achieved a similar level of awareness and understanding (Hartmann et al., 2019, 2025). Also, TV campaigns introducing the Eco Score (now Green Score) at the Belgian supermarket Colruyt from 2021 (EIT Food, 2021; Van Rompaey, 2021), seem to have been successful in terms of consumers awareness and recognition of the label, yielding even higher awareness rates than the EU organic label (BEUC 2023).

Finally, the Nutri Score which has been accepted by six European member states as a voluntary nutrition label, is reported to be known by the majority of consumers, provide appropriate guidance for consumers and effectively shifting consumers towards healthier diets (Gassler et al., 2022, for an extensive review). Consumers' familiarity with the Nutri-Score as a colour-coded multi-level label may support a faster acceptance and understanding of ERL with similar visual cues (see Bialkova and van Trijp, 2010, who report that familiarity with a label type is positively associated with label recognition).

Once consumers' attention threshold is surpassed, a next challenge is that the information the label transports a) could be confused with messages of other labels (e.g., ERL and Nutri-Score might be mixed up in consumers' perception) or b) conflicts with other goals consumers might pursue in their

food shopping. While the nutritional quality of foods is often positively related to their environmental friendliness, for more hedonistic shopping motives, this may not be perceived to be the case.

The proliferation of sustainable food labels further exacerbates consumer confusion and dissatisfaction (Yokessa & Marette, 2019) through information overload (Wansink & Sobal, 2007). In response, consumers often simplify their decision-making by relying on heuristics (Grunert, 2011). However, this reliance may lead to suboptimal choices, a perceived lack of self-efficacy, or halo effects (Molina-Besch et al., 2019; Zühlsdorf et al., 2024).

## 3.6 Sociodemographic effects on label effectiveness

In any behavioural study, controlling for sociodemographic characteristics is vital, as they often affect variables which are more closely related to the behaviour in question: Reviews of food eco-labels and carbon footprint labelling often show that females exhibit a more positive attitude toward labels (Potter et al., 2021; Rondoni & Grasso, 2021; Tobi et al., 2019). This is particularly relevant in Western societies, where women remain predominantly responsible for shopping and meal preparation (Storz et al., 2022).

Studies show that environmental labelling, including carbon footprint labels, has a significantly stronger behavioural impact on consumers with higher education levels (Potter et al., 2021; Rondoni & Grasso, 2021; Tobi et al., 2019). One must not forget, though, that these consumers are also overrepresented in the groups with higher environmental consciousness, so it is crucial to take interactions into account.

Income also indirectly affects label effectiveness. Evidence suggests that consumers with higher incomes demonstrate improved understanding and responsiveness to eco-labels and carbon footprint labels (Potter et al., 2021; Rondoni & Grasso, 2021). Differences in income influence the level of label comprehension across various European countries (Cook et al., 2023; Grunert et al., 2014).

A systematic review by Potter et al. (2021) documents mixed evidence regarding the effects of age. Some reluctance to react to directive environmental labels was found in recent studies (Vermeir et al., 2020). The authors attribute this to inertia, as long-formed dietary habits may be difficult to change.

## 3.7 Dietary style and the effectiveness of an ERL to trigger dietary changes

The intention of a food label is to alter food choices towards more environmentally friendly products, and product categories. This means in particular, to reduce products stemming from ruminants – i.e., red meat as well as dairy products. Beyond consumers' environmental awareness, their further shopping motives, and their attitude towards labels, it is therefore important to understand drivers and barriers to food label use that stem from dietary habits. The Transtheoretical Model (TTM) or Stages of Change Theory by Prochaska and Velicer (1997) has been extensively applied to study dietary changes (Horwath, 1999; Armitage, 2010; Joyce et al., 2012; Nakabayashi et al. 2020; Lemken et al., 2019

There is a broad body of behavioural research on dietary changes that discusses drivers and barriers of such changes, particularly for the reduction of meat consumption (Kwasny et al., 2022). In relation to labelling, some studies investigated whether a climate label can lead consumers to switch to the vegan alternatives (Carlsson et al., 2022; Edenbrandt & Lagerkvist, 2021; van Loo et al., 2020). On the other hand, studies that considered dairy products only explored whether a climate label would lead consumer to choose the milk with the more positive label, signalling a more climate friendly option

(Canavari & Coderoni, 2019, 2020; Echeverría et al., 2014; Sonntag et al., 2023). Williams et al. (2023) explicitly analyse the relationship between meat consumption and ERL use, with the example of Foundation Earth's Eco-Impact label. They found that attachment to meat is an important barrier to making use of the environmental rating label. This means that in countries with higher shares of flexitarians, who have already reduced their meat consumption, an ERL could be more effective in shaping consumer behaviour, as the barrier to more change might be lower.

In section 5, we will explore more in depth the assessment of currently typical country-specific diets and the relevance of dietary patterns that renounce on meat or any animal products. From this analysis, we can draw some inferences regarding the prospects of an ERL in the respective countries.

## 3.8 Limitations of present research approaches

A broad application of an environmental rating label requires sufficient data availability, which is currently not the case in most food companies. Building own LCA capacities or paying for LCA services has so far only been viable for large companies or those whose business models are strongly grounded in sustainability. As an intermediate step, more generic LCI databases can be used (Trebbin and Geburt (2024) provide a comprehensive overview of such databases), but given strong methodological differences and differences in impact categories covered, these cannot be used arbitrarily.

Another precondition for real-life testing of multi-level colour coded labels is the presence of a proper grading mechanism that translates environmental footprints into the label levels (Courtat et al., 2025). Not all current eco-labelling initiatives are transparent about their approaches, while others clearly state that this aspect is still work in progress. The Eco-Score was the only really transparent environmental rating initiative, but currently, after the change into the Green-Score with seven levels, the documentation on Open Food Facts has not yet been adapted. A brief explanation of the new thresholds between the levels A+ to F can be found at the website of Colruyt (2026).

For these reasons, some of the extant studies evaluating labelling effects suffer – probably unintentionally - from their lack of scientific basis to estimate and display environmental impacts of food. E.g., Neumayr and Moosauer (2021) test the effect of an additional multicolour eco-label on organic food sales. However, differences between (different forms of ) organic and conventional foods are chosen arbitrarily in the case of multicolour labels that do not display, e.g., explicit numerical values such as a Carbon Footprint. Thus, the results can only indicate potential positive effects of an eco-label on organic sales in the case that the grading system used actually leads to the products being graded in exactly the same way as in the experiment, e.g., as B (organic high) and D (organic low). However, to our best knowledge, this assumption is quite strong and could, if at all, only be kept up in case of very strict intra-category grading of products. Such an approach, however, would not allow to compare products between food categories – where the strongest differences occur.

Some methodological approaches such as choice-based conjoint analysis, which is frequently used to analyse labelling effects, require a systematic variation and recombination of attribute levels in order to be efficient. This is not necessarily appropriate in a context where inter-category switching is the target behaviour and environmental impacts of individual foods are necessarily fixed. Thus, simple choice designs or online shop settings seem more appropriate. Majer et al. (2022) also criticise a lack of theoretical background of most research done in the field of label effectiveness. They call for more theory and hypothesis testing to better understand the processes driving label effectiveness, and for more research on actual purchasing behaviour. Having reviewed the limitations of current research,

we now synthesize the key drivers of ERL effectiveness into a coherent framework. This synthesis not only informs the design of the label but also guides our assessment of its transformational potential in the four target countries.

## 3.9 Synopsis on food label effectiveness: drivers of an ERL's transformational potential

Research suggests that across Europe, consumers are willing to alter dietary behaviours for health, but also for environmental reasons; however, in the absence of clear guidance, the environmental impacts of food have not played a significant role in most consumers' shopping decisions to date (van Bussel et al., 2022).

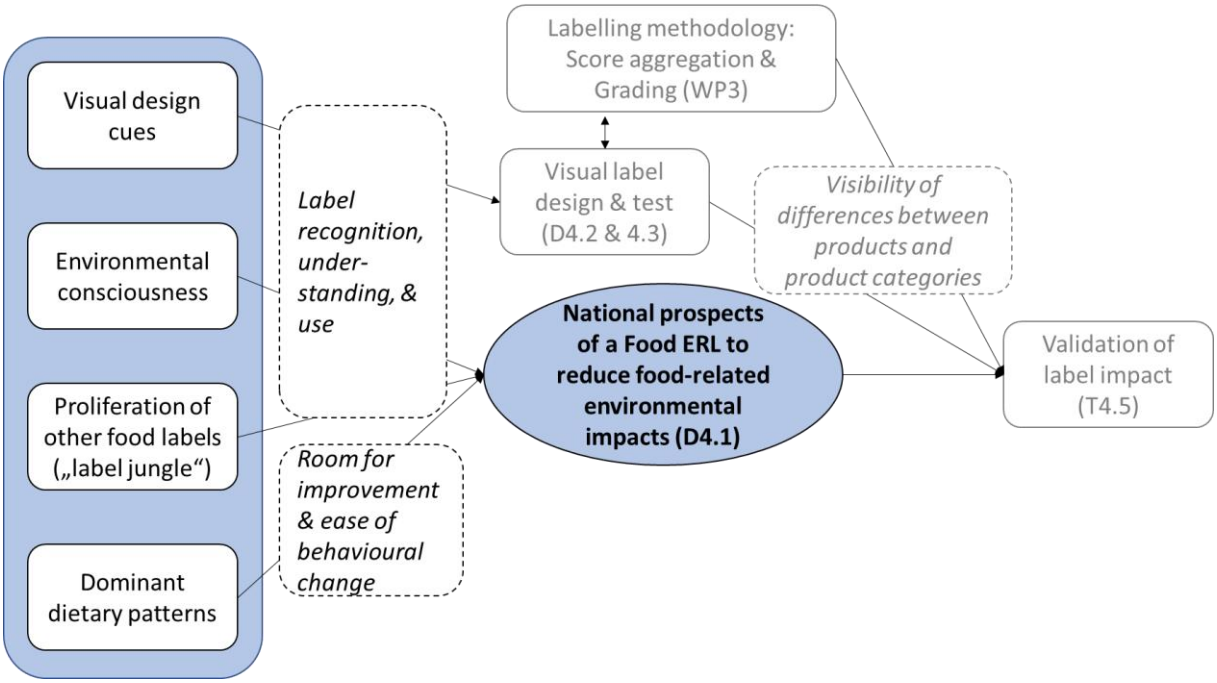
A food label's effectiveness - the extent to which it can shift consumers' food choices towards more desirable (e.g., more healthy, more environmentally friendly) foods - depends on a number of factors that relate to both, visual design cues, and consumer traits. The label design determines whether it is recognised, understood, and trusted. Consumers' dietary habits and their interest in reducing the environmental impact of their diet shape their readiness to adapt their food purchasing behaviour according to the labels' indications. Furthermore, environmental labels compete for attention with numerous other product and packaging attributes (Asioli et al., 2017; Drugova et al., 2020; Lemken et al., 2021), and particularly, price (Williams et al., 2023).

For the EcoFoodChoice project, this leads to the following considerations regarding label design: Given clear evidence for a superior effectiveness of multi-level colour coded labels, an optimal ERL design must be sufficiently distinct from the Nutri-Score not to be confused, but should at the same time be sufficiently similar to profit from consumers' familiarity with this type of label, to ensure fast recognition and information processing. A number of visual design cues can be used to balance these needs. The label designs developed and tested in EcoFoodChoice are briefly introduced in the Outlook section at the end of this report.

Besides the visual design, a couple of consumer and food system related factors need to be taken into account to project the transformational potential of an ERL:

1) The general disposition of a countries' population to react to environmental cues resides in the **environmental consciousness** or **awareness**. With a low environmental awareness, an ERL will, at least at the time of introduction, be taken up more slowly than in countries with high environmental awareness. The literature review above, and namely section 2.5, has revealed some differences between the four countries of interest.
2) The dietary patterns that prevail in a country, together with the availability of plant-based meat alternatives, affect the prospects of an ERL: the more vegetarian or vegan lifestyles have diffused into the population, and the broader the offer of meat alternatives, the better the prospects for the ERL to "convince" more consumers to reduce their meat consumption. In the next section, we will take a deeper look at the current trends in our four countries of interest.
3) Finally, as described above, consumers' attention to a new ERL can be compromised by the presence of other labels. Thus, the extent to which other food labels have spread in the countries in question will affect an ERL's chances to be used by consumers to guide their food choices.

*Figure 3: Dimensions of the analysis of country-specific prospect of a food ERL to reduce food related environmental impacts*




Shaded elements in this figure represent the focus of this report.
Own representation

Figure 3 depicts the above-stated dimensions, and the connection of this report with other elements of the EcoFoodChoice project which feed into the final validation of label impacts in real life: the learnings on visual design cues fed into the development of competitive label designs (D 4.2) that were tested in Summer 2025. Based on the results of this testing, one best label will be tested for its real-life impact in a series of experiments in all countries in 2027 (T4.5). In addition to the labels' effectiveness in altering consumer behaviour, the methodology behind the label – both in terms of score aggregation and in terms of grading, will affect the final reduction in environmental impacts that can be found.

This section has already delivered important insights regarding the environmental consciousness, where in general, in all four countries relevant for our Eco Food Choice project, environmental consciousness is above the overall average of the sample. Among the four, the highest level of environmental consciousness was found in The Netherlands, followed by France, Germany, and Spain. Regarding the overall prospects of an ERL, the general consumer interest could therefore be judged positively in all countries.

To further deliver on the goal of this report, the next section then takes a deeper look at the level of food label proliferation in the four countries, while section 5 focuses on the prevalent dietary patterns in France, Germany, Spain and The Netherlands.

# 4 Overview of sustainability-related FOP labels competing for awareness with a future environmental rating label

The only environment-related label which is currently clearly regulated under EU law, is the organic label (Sanyé Mengual et al. 2024). While LCA-based environmental rating labels are still under development and the methodological base is not yet regulated (Cicek et al. 2024), behavioural research can already contribute to understanding such labels' effectiveness. This, however, requires the consideration of labels already present in the market (see section 3.5.5 on information overload in the label jungle). To ensure a focused and comparable analysis, we applied strict criteria to select the most relevant labels for each country. These criteria are outlined below.

The goal of this section is to a) analyse the different levels of food label proliferation in the four countries and b) to identify and describe the major Front-of-Pack food labels which might compete for consumers' awareness – and credibility - with the newly developed environmental rating labels (Asioli et al. 2020).

Since for the report of the European Commission (Sanyé-Mengual et al., 2024) over 200 sustainability-related food labels were found, it is however important to identify those labels which are more likely to enter into competition with a newly introduced environmental rating label. We decided to select the labels based on the following criteria:

- Only front-of-pack(FOP) labels (e.g. the FSC label, is in most cases to be found on the back of the package, although any position is allowed by the regulation)
- Only FOP label that focus on the sustainability of the ingredients, i.e., the food component. Labels referring to the packaging are excluded.
- Only traditional FOP labels, which could realistically co-exist on a food package. No other designs of environmental rating labels for food, such as Planet Score or Green Score, which are today implemented by some brands, will be discussed in this report. Details on these labels can be found in another Eco Food Choice project report (Cicek et al. 2024).
- Only labels that can be found on food products in a country's supermarkets (main distribution channels for food).

There are big differences in the relevance of sustainability-related labels across the four countries. Table 1 gives an overview of the most relevant labels for all countries as well as for individual countries. These will be the most prominent labels against which a new environmental rating label will compete for consumers attention. We distinguish four different types of labels: organic labels, category-specific multinational labels, country-specific labels, and health-related nutrition labels.

As the report by Sanyé-Mengual et al. (2024) extensively describes the majority of these labels and provides a thorough assessment of the substantiation of their claims, we renounce on an in-depth description and rather focus on the national availability of the labels in terms of presence on products.

*Table 1: Most relevant food labels in France, Germany, Spain, and The Netherlands*

| | **France** | **Germany** | **The Netherlands** | **Spain** |
|---|---|---|---|---|
| **Organic production** | • EU organic logo<br>• national organic logo (AB) | • EU organic logo | • EU organic logo | • EU organic logo |

| | | | | |
|---|---|---|---|---|
| | • demeter | • National organic logo (Bio)<br>• Labels of organic producer associations (e.g., Bioland, Naturland, demeter…)<br>• Labels of food retailers (BioBio, ReweBio, …) | • National organic logo (EKO)<br>• demeter | • Logos of regional certification bodies<br>• demeter |
| **Category specific, multinational labels** | • Fair Trade<br>• MSC<br>• UTZ<br>• RSPO<br>• Rainforest Alliance<br>• V-Label | • Fair Trade<br>• MSC<br>• UTZ<br>• RSPO<br>• Rainforest Alliance<br>• V-Label | • Fair Trade<br>• MSC<br>• UTZ<br>• RSPO<br>• Rainforest Alliance<br>• V-Label | • Fair Trade<br>• MSC<br>• UTZ<br>• RSPO<br>• Rainforest Alliance<br>• V-Label |
| **Country-specific labels** | • Haute Valeur Environnementale<br>• Label Rouge1<br>• Laît paturage1<br>• Bleu-Blanc Coeur | • Haltungsform1<br>• Für mehr Tierschutz1<br>• Pro Weideland1<br>• KAT1<br>• Logos indicating regional provenance | • On the way to Planet Proof<br>• Better Leven1<br>• Weidemelk1 | • Bienestar Animal1 |
| **Nutritional labels, multinational** | • Nutri-Score | • Nutri-Score | • Nutri-Score | • Nutri-Score |

[1] Label focusing on animal welfare, operationalised through animal husbandry systems

The most obvious label representing environmental benefits is the organic label. The conventional mass distribution, i.e., supermarkets, hypermarkets, and the likes account for 40-70% of all organic sales in the four countries (BÖLW, 2025; Agence Bio, 2025). This means, that any consumer will be exposed to products with an organic label in almost all food categories. In Germany, there are, besides the EU Green Leaf and the public “Bio Siegel”, further labels issued by organic producer associations (Bioland, Naturland and demeter being the most prominent ones), and private organic labels issued by food retailers do exist, making organic labelling a much-criticised part of the label jungle. In the other countries, the main organic labels are the EU Green Leaf and the national organic label (France, Netherlands) or regional organic labels (Spain).

Category specific sustainability labels can be focused on countries imported from developing countries (e.g., Fair Trade), on particular products (RSPO for palm oil; Rainforest Alliance for bananas, cocoa, tea and coffee, ASC and MSC for fish from sustainable aquaculture or marine fisheries, respectively). The V-label as well is category-specific, as it focusses on vegetarian or vegan products. All these labels are

generally present in all countries, although with different levels of availability and, consequentially, consumer awareness.

Country-specific labels cover particular sustainability dimensions such as environmental (Haute Valeur Environnemental in France), animal welfare (Label Rouge in France, Haltungsform, Für mehr Tierschutz, Pro Weideland, and KAT in Germany, Beter Leven in The Netherlands, and Bienestar Animal in Spain). The Bleu-Blanc-Coeur in France claims to also target social well-being. In addition, particularly in Germany, there are a lot of labels and claims indicating a certain regional provenance. However, there is no regulation defining a region, thus the informational content of these regional claims differs widely.

Although it is not very obvious from table 1, the Spanish retail market seems to be quite dominated by private retail labels, and there are only few country-specific labels which inform consumers about additional sustainability cues. While on the one hand, this means that there is also less competition for consumers awareness of a new FOP label, it also means, on the other hand, that Spanish consumers overall are not as used to incorporating food labels into their shopping decisions.

Overall, the above assessment of sustainability related food label proliferation clearly indicates that food labels which compete for awareness of environmentally conscious consumers are far most numerous in Germany, followed by The Netherlands, France, and, with wide distance, Spain. In section 6, we conclude the implications of this finding with respect to the transformational potential of a new ERL. As shown before (Figure 3), in combination with environmental consciousness and sustainability of current dietary patterns, the current label proliferation will be crucial for the success of such a new label.

# 5 State of sustainable diets: Dietary patterns in France, Germany, Spain, and The Netherlands

To assess the transformational potential of an ERL, we first need to understand the current dietary patterns with respect to their environmental as well as health impacts. This is important to note, as the reduction of environmental impacts from food consumption should not lead to malnutrition. It is however not the goal of this study to engage in own modelling activities. Rather, we rely on studies from environmental and nutrition sciences as well as epidemiology.

Using the Planetary Health Diet (Willet et al. 2018) as a reference, a recent study by Grant et al (2025) shows that adherence to such a both healthy and environmentally friendly diet is low in all eleven European countries they analysed. Nevertheless, the Southern European Countries show a bit better compliance: the Mediterranean diet, namely with more fish, and rather oil than butter, plays a crucial role here. Based on Grant et al. (2025), the four countries we analyse can be ranked depending on the healthiness and environmental impact of the dietary patterns. However, the results of a comparison of three different indices do not deliver a consistent picture: the assessment of the WISH index by Trijsburg et al. (2020) and the derived WISH 2.0 (Grant et al., 2025) assess Spain as the best performing country among the four, followed by France and last Netherlands and Germany with scores close to each other. On the other hand, an analysis performed by Stubbendorff et al. (2022) based on the EAT-Lancet index, leads to Germany and Spain showing the best fit, followed by France and the Netherlands.

Given these unclear assessments, we decided to complement the study of Grant et al. (2025) by an analysis of selected additional criteria deemed suitable to analyse the sustainability of diets in the respective countries. These criteria are explained in the following, before we present evidence regarding the assessment of these criteria in the four countries and discuss the implications

## 5.1 Criteria to analyse diet sustainability

As key drivers of diet sustainability, we focus on meat consumption, the trend towards alternative proteins, and organic food consumption, with the following rationale:

- Meat, namely ruminant and other red meat, has been identified as a major driver of both, negative health and environmental impacts (Dussiot et al. 2023; Kramer et al. 2017; Springmann et al. 2016; Walker et al. 2019; Willet et al. 2018). Ruminant meat is evaluated as most critical given high greenhouse gas emissions. The levels of per capita **meat consumption** are commonly considered as too high, both from a health and from an environmental perspective (Breidenassel et al., 2022, Dussiot et al. 2023, Kramer et al. 2017, Battle-Bayera et al. 2020, Willet et al. 2019). Section 5.2 provides information on trends in per capita meat consumption as well as the evolution of flexitarianism, vegetarianism and veganism in the four countries, while section 5.3 reports research results on options to reduce meat consumption and the consequence for environmental impacts of the diet.
- More **plant-based diets** are seen as an important contribution to reducing the environmental impact of diets (Springmann et al., 2016; Breidenassel et al. 2024; Dussiot et al. 2023). However, it is crucial for the estimation of the overall effect on a diet's environmental (and health) impact, by which other foods the meat is substituted: Springmann (2024) identifies pulses, such as beans and peas, as the most suitable substitutes for animal-based proteins.

Highly processed alternatives to meat and dairy products, which are designed to resemble meat and dairy products in their sensory properties currently do not necessarily provide the expected advantages and are also being criticised from the nutritional perspective (Siegrist et al. 2025, Springmann 2024). In section 5.4, we therefore describe the trend towards alternative proteins as it emerges in the four countries.

- Besides "less meat", consuming "more organic" is often a major recommendation to increase diet sustainability. Boschiero et al. (2024) document strong evidence for organic food being environmentally favourable over conventionally produced food. Insights into organic food consumption and production in the four countries are presented in section 5.5.

Having established the key criteria for assessing diet sustainability, we now turn to the empirical evidence on meat consumption in the four target countries.

## 5.2 Meat consumption

Prochazka et al. (2024) provide an analysis of daily per capita intake of animal protein and its development in Europe since the year 1961. They show, based on data retrieved from World Bank (2022) and FAO (2022), that the importance of animal protein in overall protein intake has considerably increased in the past 60 years in all European countries. Among our four study countries, however, the change is particularly pronounced in Spain. While typically, Southern European countries were characterised by less meat-based Mediterranean diets, this differentiation has however diminished over time. While still, Northern Europeans rely more strongly on animal-based proteins (share in total protein consumption), animal protein has become more important than plant protein in Southern European countries approximately since 1975 (Prochazka et al. 2024). With some 50 years of rather high per capita meat consumption, one can assume that eating meat frequently has become habitual in many households (Kwasny et al. 2022).

The level of per capita meat consumption differs across sources, but there can be no doubt that overall meat consumption levels exceed a healthy and environmentally friendly level. According to data by Statista (2024), per capita meat consumption has increased in the past decade in Germany, Spain, and the Netherlands, but slightly decreased in France. A deeper look into the meat types consumed, also shows that the increase in per capita consumption is to be attributed to poultry consumption, while pork and beef consumption has dropped in many European countries (OECD/FAO 2025).

The Good Food Institute (2022) carried out a survey among 4,096 citizens of France, Germany, Italy, and Spain to identify reasons for reducing meat consumption. Interestingly, there are strong national differences: while in Germany, Animal Welfare and Environment are mentioned by 38 and 37% respectively, and health ranks third with 22%, in France, affordability is mentioned by 39%, followed by animal welfare and environment with 23% each. Interestingly, health does not appear at all as a reason for reducing meat consumption among French consumers. In Spain, however, health was mentioned by 29% as motivation to reduce meat consumption, followed by environment (27%) and animal welfare (25%).

The Netherlands were not covered by this study. However, Verain et al. (2022) provide much deeper insights from their quantitative survey in The Netherlands. They report to find quite heterogeneous reduction motives, with animal welfare and environment being most important among those clearly identifying themselves as flexitarians, whereas among those who identify themselves as meat eaters, any reduction occurring is rather attributed to affordability.

Interestingly, for Spain, Garcia-Espejo et al. (2025) find that meat consumption is linked to social groups with high occupational and educational status, which is in stark contrast to trends in other countries, where a higher social status is usually related to lower meat consumption .

It is not trivial to find consistent data on the share of vegetarians or vegans in one country (Dittmann et al. 2023), let alone across all of Europe. Lacking a clear definition (Strässner & Wirth, 2024, Dagevos 2021), the identification of comparable shares of "flexitarians" is even more difficult. We therefore present an overview of different statistics which help to at least get a rough impression regarding the importance of the different dietary styles.

In the EU-27, 58% of consumers are reported to not follow any specific diets or nutrition rules regarding meat. Some 12% follow a flexitarian diet and mostly eat plant-based foods with occasional consumption of fish or meat. 3% of consumers consider themselves pescetarian, 5% as vegetarian and 3% as vegan (Statista 2024). According to Statista (2024), the prevalence of a flexitarian diet is above European average in the target countries of this project: France 14%, Germany 19%, Netherlands 17% and Spain 19%. ProVeg (2023), however, reports even a share of 40% flexitarians for Germany in 2021.

Table 2 provides and overview of results from the Statista Global Consumer Survey 2021/2022 regarding the shares of people following vegetarian nutrition rules. For France, Statista (2025a) reports, based on 12,196 respondents, a share of approximately 5% of people following vegetarian or vegan diet rules among the under 30ies, and decreasing shares for older respondents. For those older than 60 years, a prevalence of 0% is reported. For Germany, covering 35,936 respondents between 18 and 64 years, shares of above 5% among the under 50ies, and of 4% for the 50-59 years old are reported.

*Table 2: Shares of people in different age groups following a vegetarian diet in 2021/2022 based on the Statista Global Consumer Survey*

| Age group / country | 18-19 | 20-29 | 30-39 | 40-49 | 50-59 | 60-64 |
|---|---|---|---|---|---|---|
| France | 5% | 5% | 4% | 3% | 2% | 0% |
| Germany | 9% | 10% | 8% | 6% | 4% | 2% |
| Spain | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| The Netherlands | 8% | 7% | 6% | 6% | 4% | 4% |

*Source: Statista (2025a, b, c)*

For Spain, Statista provides only data on people following VEGAN diet by age group. Reported shares are 6% (18-19), 2% (20-29, 30,39 and 40-49), 1% (50-59) and 1% (60-64 years old) (Statista 2025d). For 2019, Statista (2025e) reports a share of 1.5% vegetarians, 0.5% vegans, and 7.9% flexitarians in Spain. Data by EFE:Agro (2021) show an increase in the share of vegans (0.5% to 0.8% from2019 to 2021) and flexitatrians (7.9% to 10.8%) and a slight reduction of the share of vegetarians (1.5% to 1.4%). Garcia-Espejo et al al. (2025) use data from the Spanish Household Budget Survey (2006 to 2022) and the European Health Interview Survey (EHIS) in Spain (2014-2020). They find that there is currently no strong proliferation of vegetarian or vegan diets.

## 5.3 Options for reducing meat consumption in a healthy way

Meat-reducing strategies range from consumption of less meat or consuming meat less often, and becoming a vegetarian or vegan (Onwezen, 2022). Onwezen also includes substituting meat with novel proteins as one strategy of meat reduction. However, one could argue that typically, the partial or complete removal of meat from one's diet requires a substitution – where novel proteins are just one option. We will discuss this trend in section 3.4, as to our knowledge, nutritional studies analysing pathways to meat reduction for healthier and environmentally friendly diets do not yet include such alternative foods.

From an environmental point of view, ruminant meat causes the biggest impacts, and the reduction of ruminant meat therefore is key to the reduction of dietary impacts on the environment. Dussiot et al. (2023) found that for their French survey population, a complete, gradual removal of ruminant meat from males' and females' diets is possible. Red and processed meat was substituted with poultry, with a daily consumption quantity of about 100g per person, irrespective of gender. This meant a reduction of more than a third of total meat consumption for males and a slight increase for females compared to the consumption levels observed before. with partial substitution by poultry meat and a strong increase of fruit and vegetable, as well as cereal consumption. The authors modelled a resulting change in environmental impacts of the diets, amounting to a reduction of GHG emissions of ca. 29%, and a reduction of land use of -36%. At the same time, water consumption would strongly increase by +47% and a smaller increase in total energy use. This shows that, especially when using aggregated measures in a food label, this may lead to some adverse effects in impact categories which are inversely related to the strongest-weighted impact categories (in the PEF as well as the EF scores reported in Agribalyse 3.2, the strongest-weighted category is Climate Change (GHG emissions).

In the Netherlands, Kramer et al. (2017) undertook an attempt to improve diets healthiness and environmental friendliness with as little change to dietary habits as possible. With a linear programming approach, they find that, given different nutrient requirements, there is no "one size fits all"- approach to achieving a healthy and environmentally friendly diet. They argue that there should be tailored advice for people of different gender and age rather than general recommendations.

In Germany, Breidenassel et al. (2022) et al compared the current dietary guidelines put forward by the German Nutrition Society (DGE) and against the Planetary Health Diet (PHD), a global reference diet proposed by the EAT-Lancet Commission. (Willet et al. 2018). Despite methodological differences, the clear focus on more plant-based diets is common to both dietary recommendations. Compared to the study by Dussiot et al. (2023), the overall quantity of recommended meat consumption is much lower in both the PHD and the DGE recommendations, where an average quantity of 43 g/d is mentioned. Interestingly, other than in the approach by Dussiot et al. (2023), the PHD does not fully exclude beef and pork consumption, and the DGE does not distinguish meats and sausages any further. The DGE recommendations as such therefore do not suggest a complete substitution of beef and pork meat with poultry. In that same line, also the Dutch study does not completely move away from beef and pork.

In Spain, Batlle-Bayera et al, (2020) showed the potential of both increasing nutritional quality and reducing environmental impacts based on a stronger shift towards the National Dietary Guidelines. This again in particular refers to a reduction of meat consumption and its substitution with fish and

vegetables. With regional differences in Spanish diets, the potential of improvement was shown to be higher in the northern parts of Spain.

To summarize the above findings on meat reduction strategies, we can conclude that it is important to not only consider the what (meat reduction), but also the how (replacement of ruminant meat with poultry, or replacing of all meats with pulses or alternative proteins, including novel foods). Furthermore, Springmann (2024) also warns that "replacing all meat and dairy with only one or two alternative foods could increase pressures on natural resource use and biodiversity in regions where those foods are currently produced". The following section sheds light on the development of alternative proteins in our study countries.

## 5.4 Trend towards alternative proteins

Given the above-described problems around meat consumption, alternatives to animal-based products are widely discussed as a means to reduce environmental, health, and ethical issues associated with animal husbandry (WBAE, 2025). WBAE (2025) classifies products as alternatives to meat and dairy if they not only are comparable in terms of functionality but also in terms of sensory attributes. Within this category, further distinction is warranted, but no clear delineation exists. While Onwezen et al. (2021) distinguish pulses, algae, insects, plant-based meat alternatives, and cultured meat, Malila et al. (2024) propose four categories of alternative proteins: plant-based, insect-based, microbe-derived, and cultured meat and seafood. For this report, we follow this latter distinction.

While there is clear evidence for reduced environmental impacts of plant-based and insect-based proteins, evidence for the impacts of microbe-derived proteins and cultured meat are still scarce (Cucurachi et al. 2022; Detzel et al. 2022; Geburt, 2022; Malila et al. 2024). We therefore limit the further analysis on plant-based meat and dairy alternatives. For the purpose of this report, the term 'plant-based alternatives' refers to food products designed to mimic the sensory and functional properties of animal-based foods (e.g., meat, dairy), but made from plant ingredients such as pulses, soy, or grains.

Although a more plant-based diet is unquestionable favourable for both health and environment (Breidenassel et al 2022; Dussiot et al. 2023; Kramer et al. 2017; Springmann et al. 2016; Willet et al. 2018), the role of often highly processed plant-based meat and dairy alternatives is less clear: With respect to health aspects, Siegrist et al. (2024), e.g., strongly criticise that so far, "substitute manufacturers and retailers are not able to provide suitable replacements", particularly in terms of protein quality and micronutrient contents. Pointke and Pawelzik (2022) find that the NutriScore was generally lower for the analysed plant-based meat alternatives and higher for cheese alternatives as compared to the respective animal products. They therefore call for nutritional guidelines for these products.

It can be assumed that, given the vast heterogeneity of the products falling into this category, a clear statement regarding environmental favourability of plant based over animal-based proteins can be drawn up neither. Shanmugam et al. (2023), e.g. claim that some intransparency regarding the reporting on life cycle stages and production methods make it currently difficult to compare animal based products and their plant based alternatives.

*Table 3: Plant-based sales in France, Germany, Spain and The Netherlands 2024*

| | Product category (Plant-based alternatives only) | Sales value [million €] | Sales volume [millions of kg] | per capita spend /a [€] |
|---|---|---|---|---|
| France | Meat | 155.7 | 9.0 | n.a. |
| | Seafood | n.a. | n.a. | |
| | Dairy products | 381.7 | 137.5 | |
| Germany | Meat | 758.7 | 53.9 | 19.92 |
| | Seafood | 18.6 | 1.4 | |
| | Dairy products | 906.9 | 456.7 | |
| Spain | Meat | 68.5 | 4.5 | n.a. |
| | Seafood | n.a. | n.a. | |
| | Dairy products | 422.9 | 281.1 | |
| The Netherlands | Meat | 135.2 | 10.2 | 15.78 |
| | Seafood | n.a. | n.a. | |
| | Dairy products | 152.5 | 60.6 | |

*Source: own representation based on GFI (2024a, b, c, d)*

The Good Food Institute (2024) represents one of the few sources of market information on the development of plant-based foods in Europe. From the reports, we can derive that the plant-based milk and drinks category is the largest plant-based category in France, Germany, Spain, and The Netherlands, but at very different levels (Table 3). Another common characteristic for all four countries is the prevalence of retail brands as drivers of market growth in the plant-based foods category.

Meat alternatives, to the contrary, are reported to have lost sales volume between 2022 and 2024 in France and The Netherlands, remained stable in Spain, but grew in Germany (+5.3%). Germany is the biggest market for plant-based meat and dairy alternatives, followed by the Netherlands, France and Spain. The sales volumes and per capita-spend for plant-based alternatives however shows that still, this is a very small market segment in all countries.

## 5.5 Organic food consumption

Organic food consumption refers to the purchase and consumption of food products that are produced according to organic farming standards, which prohibit synthetic pesticides, fertilizers, and genetically modified organisms (GMOs). It is currently the major pathway of following and environmentally friendly diet, as the organic label is the only clear guidance for consumers so far (see section 3.5.3).

Over the past four to five years, the organic sector in all European countries was subject to some volatility, with ups related to the Corona pandemic, and downs related to inflation and increasing economic uncertainty, particularly in France and Germany (Berlizot & Ronceray, 2025; Kuhnert, 2025; Willer et al., 2025). Generally, organic food differs in popularity across Europe. According to AMI (2025), among our four study countries, per capita spending on organic food is highest in Germany

(191€), followed by France (177€), The Netherlands (91€), and Spain (57€). Still, there are countries such as Switzerland (476€), Denmark (364€), Austria (292€) and Sweden (220€) with much higher yearly per capita expenditures.

The share of organic products in overall food sales (without away from home and export markets) still is rather low in Germany (6.3%), France (5.6%), and The Netherlands (4.6%) (BÖLW 2025). An important diet-related observation refers to the food categories in which organic quality seems to be most important to consumers: Fruit and vegetables, dairy products, as well as eggs are much more frequently consumed in organic quality than meat (Willer et al., 2025). While an important reason is the higher price difference in this category compared to the more consumed categories, it is also important to note that high organic consumption is often associated with low meat consumption in general (Bravo et al., 2013). At the same time, the relatively low demand for organic meat also poses challenges to the organic sector, as organic manure is needed for the circular production cycles which are at the heart of organic food production. In summary, the current state of organic food consumption reveals both progress and challenges. The following section synthesizes these findings into a comprehensive assessment of dietary patterns across the four countries.

## 5.6 Synopsis of dietary patterns and their environmental impacts in France, Germany, Spain, and The Netherlands

With a focus on the development of meat consumption, proliferation of plant-based alternatives, and the relevance of organic food consumption, the above section was dedicated to analyse the sustainability of dietary patterns in France, Germany, Spain, and the Netherlands. Besides these findings, however, nutritional studies that compare the sustainability of national diets, should not be neglected. role here. Based on Grant et al. (2025), the four countries we analyse can be ranked depending on the healthiness and environmental impact of the dietary patterns. However, the results of a comparison of three different indices do not deliver a consistent picture: the assessment of the WISH index by Trijsburg et al. (2020) and the derived WISH 2.0 (Grant et al., 2025) assess Spain as the best performing country among the four, followed by France and last Netherlands and Germany with scores close to each other. On the other hand, an analysis performed by Stubbendorff et al. (2022) based on the EAT-Lancet index, leads to Germany and Spain showing the best fit, followed by France and the Netherlands.

In summary, the dietary patterns in France, Germany, Spain, and the Netherlands vary significantly in terms of meat consumption, plant-based alternatives, and organic food use. Germany and the Netherlands show higher consumption of plant-based alternatives (also marked by a higher availability in supermarkets!), while Spain and France exhibit stronger adherence to Mediterranean dietary patterns. However, overall meat consumption remains high in all countries, and the transition to more sustainable diets is still in its early stages. These findings suggest that an ERL will face both opportunities and challenges in driving behavioural change, depending on national contexts

# 6 Insights from the French labelling process

## 6.1 Historical development

France has pioneered a standardized system to quantify the ecological footprint of consumer goods. Under the **2021 Climate and Resilience Law**, this initiative has transitioned from experimental pilots to a formal regulatory framework known as **Environmental Cost** (*Coût Environnemental*). Managed by the Ministry for Ecological Transition and ADEME, the system aims to make environmental impact as visible and comparable as a product's price.

The purpose of the scheme is to inform consumers about the environmental impacts of the products or services they consume. In the same way that price represents the “economic cost” of a good or service, environmental cost translates its life cycle impact into numerical terms. It thus makes it possible to:

- Help consumers favour products and services with a lower impact.
- Mobilize producers towards more environmentally friendly production.

The labelling applies to all products in a market sector, in addition to labels that distinguish "better" products or those that meet distinctive specifications. The long-term objective is to apply the label across several market sectors, including **food, textiles, and furniture**.

The transition toward an official environmental label has been a multi-decade process:

- **2009–2012:** Began with the **"Grenelle de l'environnement,"** identifying a need to evaluate agricultural production systems and sensitize consumers.
- **2013–2018:** Launch of **Agribalyse 1.0**, with a progressive shift from raw materials to processed products.
- **2020–2021:** Under the **AGEC** and **Climate and Resilience Laws**, the state resumed control, launching **Agribalyse 3.0** and the **GIS Revalim** governance structure. National experiments to test different scoring methods for clothing and footwear.
- **2022–2024:** Development of the **Ecobalyse** calculator and methodologies for the calculation of food and textile environmental score. However, the project faced significant delays, in particular for the food sector, due to political instability and agricultural protests. The expected launch of the food eco-label is now postponed to 2026.

## 6.2 The eco-labelling landscape

France is a pioneer in both official and private sector eco-labelling. Harmonization is key to ensuring these initiatives align with the standardized state framework.

- **Eco-Score (now Green Score):** Launched by a collective including **Yuka** and **Open Food Facts**, it uses a simple A-to-E scale. In 2025, it adapted its branding to align with European laws regarding the term "Eco." Based on Agribalyse with a bonus/malus system for some parameters(ex: organic, etc.), it has not reached a large number of brands yet.
- **Planet-Score:** Developed initially by **ITAB** (Institute for Organic Agriculture); and now supported by a private foundation (Solid Ground Institute), it displays a detailed breakdown across four pillars: Pesticides, Biodiversity, Climate, and Animal Welfare. It

faces criticism in particular on the transparency of the method and regarding several methodological choices, such as accounting of methane with the indicator GWP* against IPCC recommendation.

- **Textile Sector:** Private actors like **Clear Fashion** have shaped the market since 2020, providing scoring scheme that must now coexist with the official “French Environmental Cost” label.

## 6.3 The official framework: textiles and food

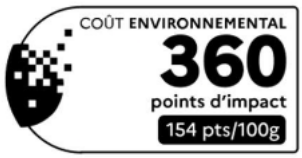
The official system relies on an official assessment method published in (Ademe 2025), which can be then implemented by companies in the **Ecobalyse public tool; or through private tooling** . While the textile and food sectors follow the same overarching "Environmental Cost" logic (transversal guidance), they utilize different data sources and methodologies for sector specific dimensions (like PEFCRs).

### 6.3.1 Textiles (active implementation)

Governed by **Decree n° 2025-957**, this system became effective on **October 1, 2025**.

- **Methodology:** It uses the European Product Environmental Footprint (PEF) as a basis with specific adjustments and **non-LCA indicators**, such as microfiber release, end of life for clothing exports outside Europe, extrinsic durability coefficient.
- **Data:** Generic data comes mainly from Ecoinvent, with a few additions. Product specific data are reported by the companies themselves.
- **Tool:** Ecobalyse provide an official "calculator" where producers can modify raw materials and life cycle steps. Private alternatives are allowed as long as they follow the official methodology.
- **Visual:** The label is displayed as a numerical value on an open-ended scale (0 to infinite), as well as a score in "points per kilo," allowing for direct comparison (see figure 2).

*Figure 4: Official French environmental label for textiles*




- **Implementation:** The European Commission validated this system, considering the scientific robustness of the approach and the attempt to transparently adress emerging issues not covered by PEF framework today. Brands can voluntarily display the label since October 2025. In December 2025, 35 brands took part in the project with 11 267 products scored. From **October 2026**, third parties will be permitted to publish scores for any product on the market, which is expected to lead to broader adoption.

### 6.3.2 Food (finalization phase)

The **Ecobalyse** tool for food completed its technical consultation on October 31st 2025.

- **Methodology:** It builds on the PEF with adjustments and additional non-LCA indicators.
- **Data:** Generic data mainly comes from **Agribalyse**, which provides "average" Life Cycle Assessment (LCA) data for thousands of agricultural and food products consumed in France. In additional, international and private databases (ecoinvent and world food database) are also being used to fill data gaps.
- **Tool:** Ecobalyse implements the official method. Producers can modify ingredients and life cycle steps to refine these Agribalyse averages into a specific product score. The tool also integrate methodological adjustments, including a differentiated weighting set of indicators, additional non-LCA indicators, and changes in the toxicity indicator. Private tools are also allowed to calculate the environmental cost.
- **Visual:** Final decisions has not been taken yet. It is likely that it will mirrors the textile system's numerical score. It may also integrate a colour scale as a reading aid.
- **Implementation:** Regulatory decisions are expected in 2026. Once validated, a decree will define implementation, likely beginning as a voluntary system.

## 6.4 Methodological arbitrations for food

To ensure the label remains fair and robust, several adjustments were made compared to the PEF calculation methods:

- **Pesticide Impact:** Weighting was significantly increased, moving from **3% to 21%** to match the weighting of climate impact.
- **Biodiversity:** A specific indicator was added to reflect territorial best practices, which can trigger a **bonus or malus of up to 30%** of the final score.
- **Refining Indicators:** Adjustments on heavy metal modelling were implemented to avoid bias on ecotoxicity scoring.

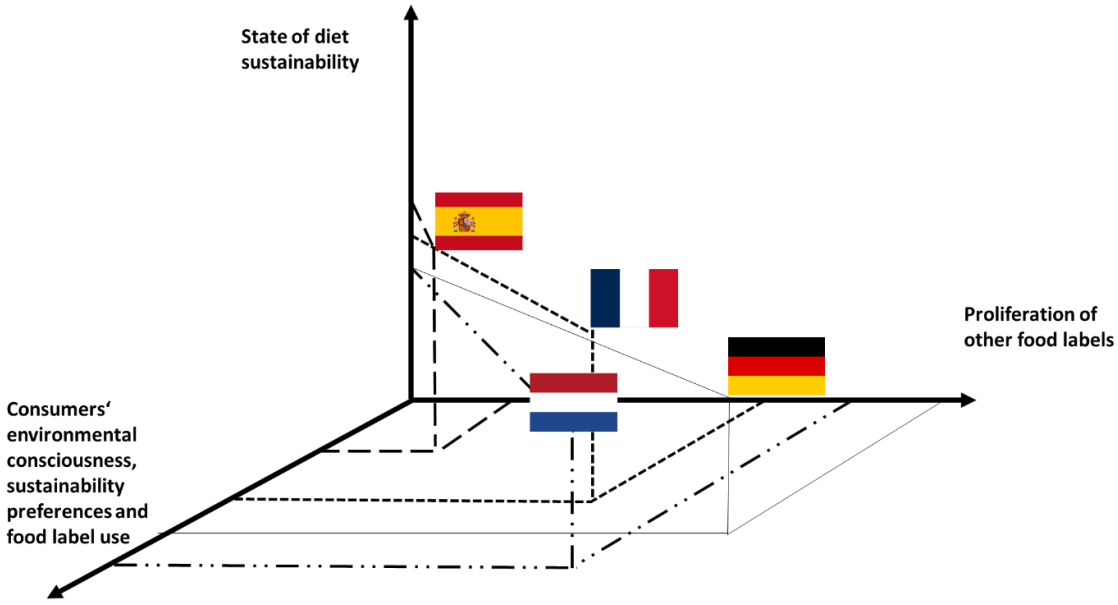
# 7 Conclusion: Transformational potential of environmental rating labels for food in France, Germany, Spain and The Netherlands

This report first detailed drivers of food label effectiveness from the consumer research perspective. For a label to effectively influence consumer behaviour in the intended way, the label needs to be recognised, liked, understood, trusted, and used. Visual cues play an important role for all of these aspects. An Environmental Rating Label, which is the heart of the Eco Food Choice project, is expected to induce dietary changes that go beyond individual product choices and transform food systems to become more sustainable.

From our literature review on food label effectiveness, we therefore derive consumer-related dimensions of the food system which are relevant for the transformational potential of an ERL. These dimensions are a) consumers' environmental concern and general attitude towards food labels, b) the proliferation of sustainability-related food labels, and c) the state of sustainable diets in the countries, including relevant food and dietary trends.

As our four study countries – France, Germany, Spain, and The Netherlands - differ across these dimensions, so does the prospect of the environmental rating label. The graphical abstract shown in Figure 5 visualises our results qualitatively. This means that the interpretation is limited to statements of comparison between the countries. For environmental awareness as well as sustainability of diets we use the comparative studies of D'Attoma et al. (2025) and Grant et al (2025) as major references, as these studies use the same methodological framework to compare the studies and therefore should be preferred over studies focusing on individual countries only.

*Figure 5: Visualisation of key findings on the transformational potential of a food ERL*




*Authors' – qualitative! - visualisation, based on extensive desk research on comparative studies from nutrition sciences, consumer sciences, and on food labels, as presented in this report.*

From our analysis follows that Spain, with a more Mediterranean diet, is at the same time characterised by a very low presence of food labels in general, a rather low environmental consciousness of consumers and a – unsurprisingly - rather low awareness for food labels. The only relevant sustainability related food label is the EU organic label and the regionalised Spanish organic labels. The market share of this label is rather low in Spain, as is consumer awareness.

For France, Germany, and The Netherlands, it can be stated that on the one hand there is good potential to improve the sustainability of diets and that, although sustainability is not the top criterion when shopping for food yet, consumers are overall very interested in consuming more environmentally friendly. The proliferation of other sustainability-related food labels, however, poses a threat to the effectiveness of a future environmental rating label. This is particularly important in Germany, where a "label jungle" can be observed that compromises the effectiveness of new labels. In Spain, while diets are better adapted to the Planetary Health Diet, consumers' lower environmental consciousness and unfamiliarity with food labels is a risk, although the low presence of other food labels in general can be an advantage in creating awareness for the new label. While the consumer-side analysis provides valuable insights, it is important to acknowledge the limitations of this perspective. The following section discusses key constraints that must be addressed in future research.

# 8 Limitations

It is important to note that this report – intendedly – is focused on the consumer side of label effectiveness. Nevertheless, food chain adaptations – through supplier programs aiming at reducing environmental impacts, or reformulations of products (Bauner et al., 2024; Steenbergen et al., 2024) to substitute or reduce ingredients with a higher environmental impact, need to be taken into account in future considerations.

Also, the ease of implementation will be crucial for a fast diffusion of the label. In the case of the German organic label in 2001, e.g., an important success factor for label adoption by producers is likely that the underlying regulation and control mechanisms had been already in place for a decade (Council Regulation (EEC) No 2092/91), and the history of organic associations at least in Germany dates back even longer. While the current analysis is limited to the consumer side, the next phase of the EcoFoodChoice project aims to bridge this gap by testing the real-world effectiveness of the ERL in controlled and natural settings.

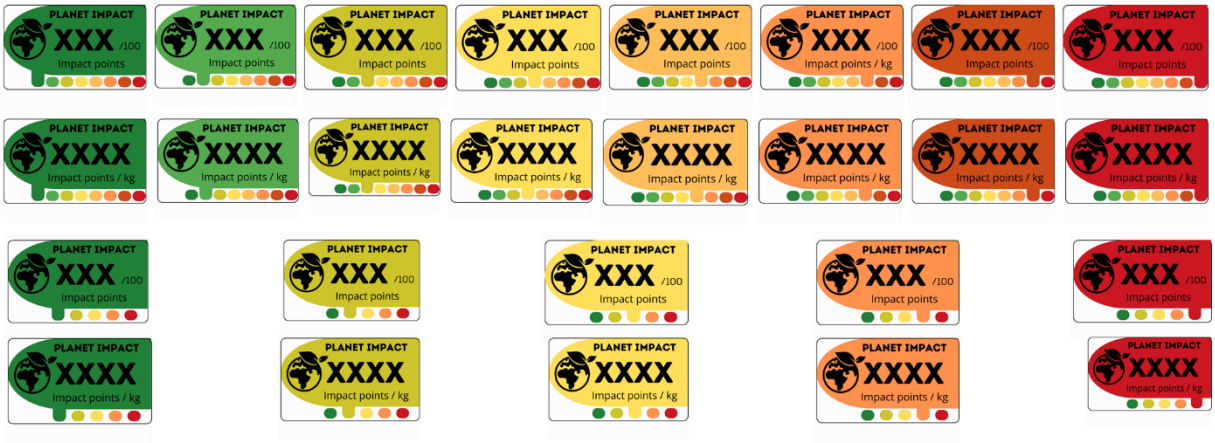
In summary, while this report focuses on consumer-side factors, future research must also consider food chain adaptations and implementation challenges. The upcoming validation studies in the EcoFoodChoice project will provide crucial evidence on the real-world effectiveness of the ERL. These findings will inform policy and practice, and the framework developed here can serve as a model for assessing the transformational potential of ERLs in other countries.

# 9 Outlook: next steps in the Eco Food Choice project

In the Eco Food Choice project, further empirical studies are planned to validate the impacts of a food eco-label. With the importance of an optimal label design in mind, we designed four different label types based on the research carried out for this report. These were tested regarding their effectiveness in consumer understanding, liking, and reduction of environmental impacts of consumers shopping baskets in France, Germany, Spain, and The Netherlands.

The development process of the visuals was based on a rich body of literature, that could only partially be reported in section 2 of this deliverable. The basic label designs were set equal across all visuals to be tested: colour-coded multilevel labels outperform other types of visuals (Dubois et al. 2019; Egnell et al., 2021). In addition, unpublished work from the EEKlim-Project that was recently concluded at Goettingen University (Schulze-Ehlers et al., 2025), clearly shows the advantage of a numeric score to go with the colour-code. Since the numeric scores tested in Germany (x impact points / 100) differ from those conceived in the French labelling process (impact points per kg), the two concepts were tested against each other.

*Figure 6 Label designs tested against each other in the Life EcoFoodChoice Project*




Results of these tests have delivered a “one best” label visual, that leads to the strongest reduction of food baskets’ environmental impact. A detailed report on the results will be issued in summer 2026. The label identified as the most effective will be further tested for its’ effectiveness under real market conditions. In the presence of a multitude of other labels, it remains to be seen whether the label still can contribute to a reduction of food baskets’ environmental impact. This final validation step is planned in the EcoFoodChoice project for the year 2026 in a series of laboratory as well as field experiments.

Against the background of this market analysis, the results of our future validation studies can be evaluated in a differentiated way: with different starting points along the path towards sustainable food consumption, each country holds its own current potential to benefit from an environmental rating label. It is the hope of the authors that the framework developed in this report will be used by scholars to analyse the transformational potential of environmental rating labels (and other interventions pursuing the goal of transforming dietary patterns) in other countries, too.

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