

ROSETTA

Reducing food waste due to marketing standards through alternative market access

From Farm
to Fork,
we link the
sustainable
way

D1.2 Analysis of EU, international and national marketing standards

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Abbreviations

Table 1: Abbreviations

MkSs	Marketing Standards
WoS	Web of Science
EU	European Union
F2F	Farm to Fork
GMS	General Marketing Standards
WTO	World Trade Organisation
SPS	Sanitary and Phyto-Sanitary
TBT	Technical Barriers to Trade
CAC	Codex Alimentarius Commission
IPPC	International Plant Protection Convention
WOAH	World Organisation for Animal Health
UNECE	United Nation Economic Commission for Europe
IOC	International Olive Council
OECD	Organisation for Economic Cooperation and Development
FAO	Food and Agriculture Organization

1. Executive Summary

The present deliverable focuses on analysing the public marketing standards and their impact on food waste. The aims of this report are: (1) understand the role, the purpose, and the classification of public marketing standards; (2) present and compare the regulated standards at EU, international, and national level; and (3) recognise how public marketing standards impact food waste along the supply chain. The present report focuses on four commodities (i.e., fruits & vegetables, meat, dairy, and cereal grains) in five countries (i.e., Denmark, Greece, Ireland, Poland, and Spain).

The report combines findings from a mixed methods approach including: (a) desk research, and (b) qualitative research using in-depth interviews. The interviewees include 50 actors along the food supply chain, which is a key performance indicator achieved.

Key findings include:

- Public marketing standards: they are developed by governments or governmental bodies, aiming to facilitate trade and ensure that the markets are supplied with standardized quality agricultural products that meet consumer expectations.
- Classification of public marketing standards: they are classified as EU, international or national according to the body that established them.
- National marketing standards: they are based on the EU marketing standards and provide some additional requirements.
- Impact on food waste: there is disagreement amongst those involved in the food supply chain over whether EU marketing standards increase food waste production. Some believe that marketing standards can positively impact on food waste. In addition, food supply chain actors have found new ways of repurposing food to reduce the amount of food wasted.
- Public and private marketing standards: many supply chain actors identify private marketing standards as public standards.
- Public Vs. private marketing standards: private standards are considered from food supply chain actors as more important in producing food waste.
- Consumers are aware of food waste, and some consciously try to reduce the amount of food they waste.

Overall, this analysis provides initial insights of the importance of the public marketing standards along the supply chain for policymakers, industry stakeholders, and regulators.

The deliverable is structured as follows:

- Chapter 2 and chapter 3: provide an overview of the deliverable, followed by explanation about the methodology and timeline regarding the work executed, outlining search methods, thematising and designing of study tools, as well as data collection and data analyses techniques.
- Chapter 4: focuses on the results of desk research discussing public marketing standards, their classification, their relation to food waste, as well as comparisons among EU, international and national standards for selected food commodities.
- Chapter 5: focuses on the in-depth analysis of interviews, providing key data and discussion about the public marketing standards imposed to supply chain actors, their regulation and implementation process, the implementation challenges, and their relation to food waste. Also, it focuses on consumer attitudes towards food waste.
- Chapter 6: summarises the main conclusions.

2. Introduction

2.1 Deliverable Overview and Report Structure

To understand which public marketing standards regulations have been and are currently in force at European, international, and national level, as well as the interactions among them and their impact on the food wasted along the supply chains of four commodities (i.e., fruits & vegetables, meat, dairy products, and cereals), the project began by undertaking a systematic review of the literature. Then interviews were conducted with a wide range of stakeholders from the private and public sectors (e.g., farmers/producers, processors/manufacturers, distributors, retailers, food service providers, regulatory organizations, and consumers). The core objectives were to: (a) identify the reasons for the establishment of the EU, international, and national marketing standards; (b) clarify how the EU marketing standards might influence the implementation of private standards; and (c) determine the relation of marketing standards to food waste.

3. Project Methodology

To achieve the task's objectives, the task was divided into two main parts: (a) desk research; and (b) semi-structured interviews.

3.1 Desk research

To provide a summary of the existing body of research in light of the public marketing standards (i.e., EU, international, national) and their relation to food waste, we performed a systematic literature review. We developed our literature review following a three-step approach: (a) sample identification and preparation for coding; (b) coding and analysis of the papers/articles; and (c) conduction of a bibliometric analysis.

3.1.1 Search methods

We accessed bibliographic data used in this study from the Scopus, Web of Science (WoS), and SSRN (i.e., work-in-progress articles) electronic databases, as well as the Google search engine. Specifically, for the latter, we utilized the incognito browser mode to lessen customization bias when conducting Google searches. The key research terms were 'marketing standards', 'marketing orders', 'product specifications', 'food standards', 'product standards', 'food norms', 'product norms', 'product quality standards', and 'product quality norms'. We collected data from several sources of information, such as peer-reviewed academic journal articles, scientific and grey literature reviews, research reports, academic books, research blogs, municipal, regional, and national governments, non-government organizations, as well as the private sector. Initially, we examined the title, the keywords and the abstract of each paper, and retained only those articles that mentioned public marketing standards. In the case of publications that did not include an abstract, we read the entire text. Next, we combined the results from the four databases, and we excluded duplicates and those sources that deal with marketing standards in sectors other than food. As a last step, and in order to ensure full coverage of the relevant literature, reference lists from the retained papers were reviewed to spot additional material. These steps yielded a final sample of 327 sources (i.e., 97 academic papers, and 230 non-academic sources).

3.1.2 Data analysis

After identifying data sources, we proceeded with the review and analysis of the articles. Content, thematic, and network analysis were used to identify the current public marketing standards and their relation to food waste. Content analysis involves coding the textual data and summarising and analysing the coded text.¹ It enables the examination of the papers in a meaningful, structured manner which could facilitate a more accurate assessment of the knowledge structure of the field.² Additionally, thematic analysis was used to present patterns related to the textual data.³ Thematic analysis is a qualitative research method for finding, investigating, organizing, defining, and producing themes found within a corpus of data,⁴ and it involves the identification of core themes via the careful reading, and rereading, of the articles.⁵ In this context, we analysed the content of the academic papers using the qualitative content analysis method. Furthermore, we undertook an inductive thematic analysis, where all the findings from the desk research were not predetermined towards any theory, but were grounded entirely in the data.⁶ No software was used during this process.

In addition, the network analysis software tool VOSviewer was used to explore the intellectual structure of the public food marketing standards in the literature. The use of network analysis allowed us to visualize the structure and dynamics of the academic literature⁷ in the field of public marketing standards. In this context, we adopted the procedures recommended by Van Eck and Waltman.^{8,9}

Finally, one of the primary goals of this report is to compare the disparities between the current EU and international standards for the four product categories under consideration (i.e., fruits & vegetables, meat, dairy products, cereals). To accomplish this, we decided to concentrate on a single commodity per product category. Specifically, we focus on the following commodities:

- Fruits & vegetables – Apples: they are considered as the most widely grown and consumed fruits in the EU^{10,11} and around the world.¹²
- Meat – Poultry (Chicken) meat: in 2023, poultry was the most widely consumed meat worldwide.¹³ Furthermore, according to data from 2024, the market shares of other meat types are declining, while the only meat consumption that is increasing throughout the continent is chicken.¹⁴
- Cereals – Durum wheat: it is the most widely produced and consumed cereal in the world.¹⁵

¹ Drisko, J.W., & Maschi, T. (2016). *Content analysis*. New York: Oxford University Press.

² Hiebl, M.R.W. (2023). "Sample Selection in Systematic Literature Reviews of Management Research", *Organizational Research Methods*, 26(2), 229-261.

³ Alhojailan, M.I. (2012). "Thematic Analysis: A Critical Review of its Process and Evaluation", *West East Journal of Social Sciences*, 1, 39-47.

⁴ Nowell, L.S., Norris, J.M., White, D.E., & Moules, N.J. (2017). "Thematic Analysis: Striving to Meet the Trustworthiness Criteria", *International Journal of Qualitative Methods*, 16(1).

⁵ Fereday, J., & Muir-Cochrane, E. (2006). "Demonstrating Rigor Using Thematic Analysis: A Hybrid Approach of Inductive and Deductive Coding and Theme Development", *International Journal of Qualitative Methods*, 5(1), 80-92.

⁶ Javadi, M., & Zarea, K. (2016). "Understanding Thematic Analysis and Its Pitfall", *Journal of Client Care*, 1, 33-39.

⁷ Van Eck, N. J., & Waltman, L. (2010). "Software Survey: VOSviewer, a Computer Program for Bibliometric Mapping", *Scientometrics*, 84(2), 523-538.

⁸ Van Eck, N. J., & Waltman, L. (2017). "Citation-based Clustering of Publications Using CitNetExplorer and VOSviewer", *Scientometrics*, 111(2), 1053-1070.

⁹ Van Eck, N., & Waltman, L. (2019). "VOSviewer Manual. Manual for VOSviewer version 1.6.11", Universiteit Leiden.

¹⁰ USDA – Food Availability and Consumption, Available at: <https://www.ers.usda.gov/data-products/ag-and-food-statistics-charting-the-essentials/food-availability-and-consumption/>

¹¹ Freshfel – Fresh Produce Consumption Remains Under Pressure to Europe, Available at: <https://freshfel.org/fresh-produce-consumption-remains-under-pressure-in-europe/#:~:text=The%20most%20consumed%20fruits%20in,such%20as%20Germany%20and%20Poland>

¹² Fresh Plaza – Global Market Overview Apples, Available at: <https://www.freshplaza.com/north-america/article/9593271/global-market-overview-apples/>

¹³ Statista – Meat consumption worldwide from 1990 to 2023 by meat, Available at: <https://www.statista.com/statistics/274522/global-per-capita-consumption-of-meat/>

¹⁴ Statista – Meat trends in Europe, Available at: <https://www.statista.com/study/70192/meat-trends-in-europe/>

¹⁵ OECD-FAO Agricultural Outlook 2024-2033, Available at: <https://www.oecd-ilibrary.org/docserver/de05b2c6-en.pdf?expires=1722849052&id=id&accname=guest&checksum=1AEC21811D57AAB4AB1063FB86963A2E>

- Dairy – Skimmed milk powder: in order to make comparisons easier, we made this decision based on the available data.

3.2 Semi-structured interviews

Following a **social constructionism approach**, we conducted in-depth interviews with several food industry stakeholders. The semi-structured interview method guides participants on what to talk about,¹⁶ enabling reciprocity between the interviewer and the participant,¹⁷ which makes it easy for the interviewer to improvise follow-up questions based on the participant's responses.¹⁸

To ensure the implementation of rigorous scientific practices throughout the qualitative interview investigation, we pursued the following steps:¹⁹ (1) thematizing: formulate the purpose of the investigation and the conception of the theme to be investigated; (2) designing: plan the design of the study; (3) interviewing: conduct the interviews based on the interview guide; (4) transcribing: prepare the interview material for analysis; (5) analysing: decide which modes of analysis are appropriate for the interviews; (6) verifying: ascertain the validity, reliability, and generalizability of the interview findings; and (7) reporting: communicate the findings of the study and the methods applied.

3.2.1 Thematising and designing

The qualitative study aims to obtain more insightful knowledge about the marketing standards (i.e., EU, international, national) imposed by or on the stakeholders, and their impact on food waste across the value chain. The study focuses on both stakeholders past experiences, and their explanations and beliefs in relation to marketing standards and food waste.

For the semi-structured interviews, we determined and formatted the questions using interview guides. An interview guide is described as a script which (tightly) structures the course of the interview.¹⁹ The quality of the interview guide is of great importance as it affects the implementation of the interview and the analysis of the collected data.¹⁹ Regarding its form, our interview guide was loose and flexible, allowing dialogue during the interview, the opportunity to change the order of the questions, and an easy movement from question to question.²⁰

To increase the consistency of the subjects covered by different interviewers, we created semi-structured interview guides, differentiating between regulators, consumers and other supply chain actors (i.e., farmers/producers, processors/manufacturers, distributors, retailers, food service providers). They aimed at gaining an understanding of the various public and private marketing standards imposed by or on the different supply chain actors, as well as their impact on food waste production in the different stages of the supply chain. Our interview guides were developed following **Brinkmann and Kvale**.¹⁹ They started with a general introduction to the topic and were divided into three parts (i.e., introductory questions, core questions, wrap-up questions). The core questions focused on the participant's role within the supply chain, and the public and private marketing standards imposed by or on the supply chain actor. Furthermore, the interview guides

¹⁶ Gill, P., Stewart, K., Treasure, E., & Chadwick, B. (2008). "Methods of Data Collection in Qualitative Research: Interviews and Focus Groups", *British Dental Journal*, 204, 291-295.

¹⁷ Galletta, A. (2012). *Mastering the Semi-structured Interview and Beyond: From Research Design to Analysis and Publication*. New York University Press, New York.

¹⁸ Rubin, H.J., & Rubin, I.S. (2005). *Qualitative Interviewing: The Art of Hearing the Data*, 2nd edition, Sage Publications, Thousand Oaks, CA.

¹⁹ Brinkmann, S., & Kvale, S. (2015) *Interviews: Learning the Craft of Qualitative Research Interviewing*. 3rd Edition, Sage Publications, Thousand Oaks, CA.

²⁰ Rabionet, S.E. (2011). "How I learned to Design and Conduct Semistructured Interviews: An Ongoing and Continuous Journey", *The Qualitative Report*, 16(2), 563-566.

consisted of three levels of questions (i.e., main themes, follow-up questions, probing questions). The main themes covered the main content of the research objectives and participants were encouraged to speak freely about their perceptions and experiences. On the other hand, the follow-up and probing questions were used to make it easier for the participants to understand the main themes, and to direct conversations towards the study subject.

In addition, an informed consent form was shared with the participants before the interview informing them about the overall purpose of the interview, the main features of the interview design, and informing them of their right to withdraw from the study at any time.

In May 2024, the draft versions of the interview guides were open to revisions from our partners, keeping in mind the task's objectives that needed to be addressed by the Grant Agreement. After implementing our partners' feedback, the interview guides were pilot tested with potential participants to confirm the coverage and relevance of the content with the task objectives, to identify the possible need to reformulate the questions, and to clarify how much time was needed for the interview. The final interview guides were available in June 2024, after making the required changes and adjustments to the interview questions. Simultaneously, the partners in charge of conducting the interviews received recorded guidance. In this way we ensured that the interview guides were of high quality, and that interviews should provide reproducible, reliable knowledge about the marketing standards implementation and their impact on food waste across the food value chain.

3.2.1.1 Selection of interview participants

We identified seven types of key actors of the food industry as relevant to answering the interview questions (i.e., farmers/producers, processors/manufacturers, distributors, retailers, food service providers, consumers, regulatory organisations). These actors represent the four different commodities (i.e., fruits & vegetables, meat, dairy, cereals), and five EU countries (i.e., Denmark, Greece, Ireland, Poland, Spain) constituting ROSETTA's use cases.

In the selection process of the interviewees, our use case partners were asked to suggest stakeholders involved in the production, buying, selling, or regulation of food commodities in focus and to be knowledgeable of marketing standards. The stakeholders were identified and contacted via email by the use case partners.

Overall, we conducted 50 expert interviews with one or two interviewees each, between July and October 2024. We conducted interviews in Denmark (N=10), Greece (N=10), Ireland (N=10), Poland (N=10), and Spain (N=10) to avoid drawing conclusions that would apply uniquely to a single country. The participants consisted of 8 farmers/producers, 6 processors/manufacturers, 4 distributors, 9 retailers, 6 food service businesses, 11 consumers, and 6 regulatory organisations. The interviews took around 55 minutes and were recorded with the permission of the interviewees.

Food industry – Key Actors identification

The supply chain is a coordinated system composed of various actors who cooperate with and influence each other.²¹ To enable a systemic change in the food industry, all the relevant supply chain actors must be considered.²² Therefore, representatives from all supply chain actor categories have been included as

²¹ Guirong, P., Bing, P., & Hongchun, S. (2022). "An Optimization Model And Method For Supply Chain Equilibrium Management Problem", *Mathematical Foundations of Computing*, 5(2), 145-156.

²² Galli, F., Prosperi, P., Favilli, E., D'Amico, S., Bartolini, F., & Brunori, G. (2020). "How Can Policy Processes Remove Barriers To Sustainable Food Systems In Europe? Contributing To A Policy Framework For Agri-Food Transitions", *Food Policy*, 96, 101871.

participants in our interviews (i.e., farmers/producers, processors/manufacturers, distributors, retailers, food service providers, consumers).

By farmers/ producers we refer to value chain stakeholders that engage in primary production. Specifically, in the ROSETTA project, the farmers/producers considered are focusing on one of the following activities: (a) fruits and vegetables farming; (b) livestock raising for meat production; (c) cow milking; or (d) cereals farming. The processors/ manufacturers turn the raw farm produce into processed (finished) products (e.g., dairies). A processor receives the raw materials, sorts them, stores them, and packages them. The distributors store the products until they are ready for distribution, and the retailers intermediate between consumers and producers and directly sell the products to the consumers. Furthermore, the food service businesses consist of restaurants, hotels, canteens, cafés, bars, health care centres, leisure & entertainment, businesses, etc. Consumers, and food marketing standards regulatory organisations have also been considered participants in the project's interviews as their insights are important in maintaining a bigger picture of the purposes and the impacts of marketing standards. Lastly, it is important to note that different actors may also perform activities of other steps of the food value chain, which we took into consideration when selecting the interview participants.

3.2.2 Interviewing

Interviews took place in months 7-10 (July to October 2024) of Task 1.2. In total 50 interviews were held, across the five EU member states that represent the cases of the ROSETTA project (i.e., Denmark, Greece, Ireland, Poland, Spain). The interviews were conducted by the use case partners, in the mother tongue of the participants to ensure that there are no disparities in language use, gestures, and cultural norms due to the cross-cultural differences. ROSETTA engaged with stakeholders in all stages of the supply chain of the main food commodities, for which marketing standards exist, including farmers, manufacturers, retailers, restaurants & food services providers, and consumers, to get qualitative insights and quantitative data on the extent of waste generated at each stage, when food is not sold, bought or used because it does not fulfil the specifications of the marketing standards and/or the consumer expectations.

Following Brinkmann and Kvale's¹⁹ suggestions, the interview was introduced by a briefing in which the interviewer defined the subject and the objectives of the interview, and informed the participant about the interview recording, confidentiality, and who will have access to the interview or other material. Before starting the interview, the interviewer also asked the participants whether they had any questions, and they obtained their written informed consent to participate in the study, securing confidentiality. Then they went on with the semi-structured interview following the interview guide. Additionally, in the end of the interview the interviewer made a debriefing by mentioning some of the main points they learned from the interview, while also asking whether the participant had anything more to say and by asking about their experience of the interview and their final comments.

3.2.3 Transcribing, analysing and verifying

The interviews were recorded, and measures were taken to avoid background noise. Afterward, the interviews were transcribed from an oral to a written mode by the use case partners, which is a form amendable to closer analysis.¹⁹ We asked our case partners, who interviewed the participants, to analyse the transcripts and to send a report including respondents' answers to every question mentioned in the interview guide. The use of quotes was also suggested. However, since the interviews treated a sensitive topic, we protected the participants' confidentiality by only mentioning their role in the food value chain and not providing further information.

Next, we focused on the analysis of the interview data. The purpose of the analysis is to uncover the meaning of the question, to make explicit its presuppositions and thereby the implicit conceptions of qualitative research it implies.¹⁹ In analysing the data from the interviews, we adopt a **narrative approach**, which goes back to the original story told by the interviewee and aims to emphasize the individual narrators and their individual-oriented narratives. In addition, we use the **induction mode of analysis** since we are looking for similarities across the various cases to identify the patterns in the interview data, formulate potential explanations of these patterns, and structure the findings.

Furthermore, for the interview data analysis we followed both the **Gioia methodology**²³ and the steps indicated by Giorgi²⁴: (1) read the complete interview to get a sense of the whole; (2) determine the natural 'meaning units' of the text, as they are expressed by the participants; (3) restate in a simple manner the theme that dominates a natural meaning unit, thematizing the statements from the participant's viewpoint as understood by the researcher; (4) interrogate the meaning units in terms of the specific purpose of the study; (5) tie together into a descriptive statement the essential, nonredundant themes of the entire interview. In other words, our analysis involves coding the interviews, developing the meaning of the interviews, bringing the subject's own understanding into the light, and providing new perspectives from the researcher. Coding was data-driven, meaning that codes were developed through reading the interview transcripts. We followed the following steps of coding: (1) identifying initial categories based on readings of transcripts; (2) writing codes alongside the transcripts; (3) reviewing the codes and revisiting the categories, accordingly; and (4) looking for themes and findings in each category.²⁵ Manual coding was performed by the research team.²⁶ The results of the independent coders were compared to test the consistency and validity of the initial codebook and ensure inter-coder reliability.^{27,28} Finally, the reliability and validity of the interview findings were also secured, by ensuring: (a) the prevention of including leading questions in our interview guides; and (b) the sound logic of the data interpretation.

²³ Kaspar Roost – The Gioia Methodology, Available at: <https://roostkaspar.com/the-gioia-methodology/>

²⁴ Giorgi, A. (1975). *An Application of Phenomenological Method in Psychology*. In: Giorgi, A., Fischer, C. and Murray, E., Eds., *Duquesne Studies in Phenomenological Psychology*, Duquesne University Press, Pittsburgh, 82-103.

²⁵ Harding, J. (2013). *Qualitative data analysis from start to finish*. SAGE, London.

²⁶ Short, J.C., & Palmer, T.B. (2008). "The Application of DICTION to Content Analysis Research in Strategic Management", *Organizational Research Methods*, 11(4), 727-752.

²⁷ ATLAS.ti – Inter-rater Reliability and Inter-coder Agreement, Available at: <https://atlasti.com/research-hub/measuring-inter-coder-agreement-why-cohen-s-kappa-is-not-a-good-choice>

²⁸ Delve – Intercoder Reliability, Available at: <https://delvetool.com/blog/intercoder>

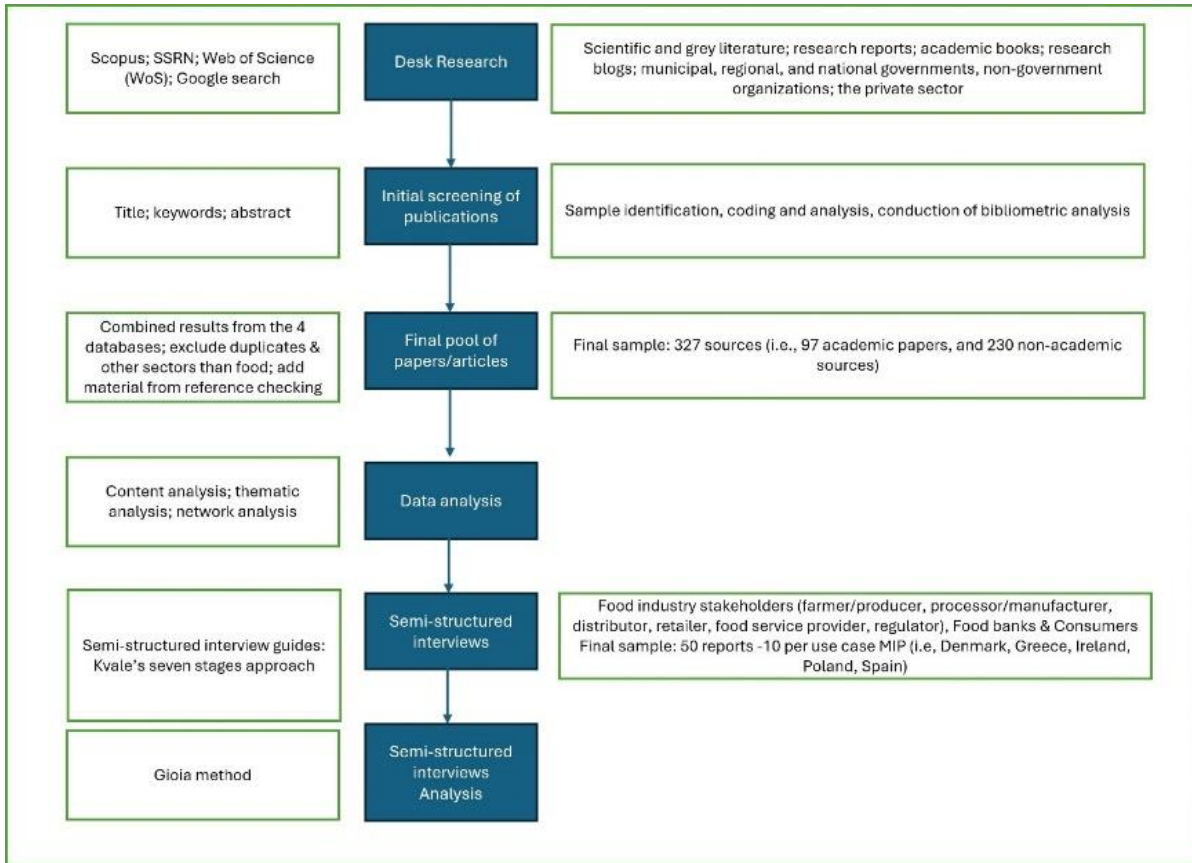


Figure 1: Overview of the ROSETTA Task 1.2 Methodology

4. Desk Research Overview

4.1 Marketing Standards: Definition, Purpose and Classification

A norm or standard is a document containing approved commitments, specifications or criteria on a given product, laid down by a consortium of organisations or by recognised standardisation bodies. These norms or standards include compulsory quality requirements, which may deal with hygiene or food security, but also with cosmetic aspects of products.²⁹ Standards are used in all realms of human activity to specify the characteristics of a product or its manufacture. In the process, they fulfil a range of functions, such as lowering risks, increasing trust, and facilitating predictability in each market.³⁰

Marketing standards are defined as a set of obligatory rules or optional reserved terms aimed to ensure that the single market is supplied with standardized quality agricultural products that meet consumer expectations.^{31,32} The main characteristics of marketing standards are: (a) they vary by product and sector; (b) they rely on technical product specifications to define uniform trade characteristics; (c) they specify the characteristics of products sold using specific terms; (d) they define uniform trade characteristics through technical specifications of products and processes.³¹ Stakeholders refer to marketing standards as a ‘common

²⁹ Flanders summary report (2017), Available at: www.vlaanderen.be/landbouw/studies

³⁰ Maidana-Eletti, M. (2014). “International Food Standards and WTO Law”, *Deakin Law Review*, 19(2).

³¹ EU Commission (2020): Commission Staff Working Document – *Executive Summary of the Evaluation of Marketing Standards*, Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020SC0231>

³² EU Commission (2021): *Code of Conduct on Responsible Food Business and Marketing Practices. A Common Aspirational Path towards Sustainable Food Systems*, Available at https://ec.europa.eu/food/horizontal-topics/farm-fork-strategy/sustainable-food-processing/code-conduct_en

language', which helps operators and consumers to lower transaction costs, while ensuring fair competition and high product quality. Just as any language evolves over time, so do the needs and habits of the stakeholders in the food supply chain, explaining why marketing standards need to be revised.³³

The objectives of marketing standards are to: (a) improve the economic conditions for the production and marketing of agricultural and food products (i.e., levelling the playing field/ facilitating trade); (b) improve the quality of products in the interests of producers, traders and consumers; (c) take into account the expectations of consumers on receiving adequate and transparent product information; and (d) enable the market to be easily supplied with products of a standardised and satisfactory quality.³⁴

One criterion by which marketing standards can be classified is the origin of the standard (i.e., who creates the standard and whose interests are being considered when the standard is set and enforced),³⁵ according to which marketing standards can be classified into public and private standards. Public standards are set by public institutions (regulatory agencies), and compliance is obligatory in the legal sense. Private standards are voluntary consensus standards which arise from a formal coordinated process involving participants in a market with or without the participation of government. Public marketing standards are of interest to all actors of the value chain. Private standards, on the other hand, only consider the profits and interests of businesses, producers or private bodies. They can be expected to reflect consumer expectations, but only to the extent that these correspond to those of the private actors.³⁵ Moreover, public and private standards mechanisms are complementary, meaning that one mechanism reinforces the functionality of the other, or compensates for its weaknesses.^{36,37} Specifically, private standards often emerge when public marketing standards are lacking.³³ A more in-depth comparison between public and private marketing standards can be found in **D1.3 Analysis of private food marketing standards**.

Marketing standards can further be classified according to the body of their establishment in the following categories: (a) European – established by the European Union; (b) international – establish by an international organisation; and (c) national – established by individual countries. Figure 2 presents a **marketing standards framework**.



Figure 2: Framework of marketing standards

³³ EU Commission (2023): Commission Staff Working Document – *Revision of EU Marketing Standards for Agricultural Products to Ensure the Uptake and Supply of Sustainable Products*, Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52023SC0097>

³⁴ EU Commission (2020): Commission Staff Working Document – *Evaluation of Marketing Standards s (contained in the CMO Regulation, the 'Breakfast Directives' and CMO secondary legislation)*, Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020SC0230>

³⁵ Smith, G. (2009-02-01). "Interaction of Public and Private Standards in the Food Chain", OECD Food, Agriculture and Fisheries Papers, No. 15, OECD Publishing, Paris.

³⁶ Höpner, M. (2005). "What Connects Industrial Relations and Corporate Governance? Explaining Institutional Complementarity", *Socio-Economic Review*, 3, 331-358.

³⁷ Campbell, J. (2011). "The US Financial Crisis: Lessons for Theories of Institutional Complementarity", *Socio-Economic Review*, 9, 211-234.

4.1.1 Public marketing standards: context and benefits

Public marketing standards play a dominant role in establishing basic grades and standards for mass markets composed of largely homogenous agricultural products to ensure minimum standards of a safe food supply as well as to prevent fraud or quality deception of consumers. Public marketing standards have evolved over time in most countries around the world and have become even more stringent and complex as consumers demand specific attributes or disclosure of information about certain attributes of food.³⁸

Specifically, public marketing standards offer the following benefits:³⁹

- Reduce information asymmetries: public marketing standards ensure that all operators in the market share the same set of information and thus they reduce information asymmetries. Marketing standards may support efficient coordination (e.g., easier orders, easier testing, production planning).
- Facilitate trade and promote transparency: public marketing standards facilitate trade by removing technical barriers and improve market access both within a single market and in EU countries. Additionally, the mandatory nature of public marketing standards promotes transparency, facilitates public monitoring and control, and establishes a uniform set of regulations that all participants in the industry must abide by, so levelling the playing field.
- Improving the average food quality: the mandatory nature of public marketing standards may make quality testing and control easier, enabling the production of consistent, high-quality food and protecting it from unfair imitation based on inaccurate or misleading labelling.

4.1.2 EU marketing standards and the Farm to Fork (F2F) strategy

EU marketing standards constitute a set of regulations that aim to ensure that the market is supplied with standardised quality agricultural products that meet consumer expectations, facilitate trading and ensure a level playing field for EU producers. They are designed to facilitate the proper functioning of the internal market and the efficient transfer of products on the domestic or international market. The current EU marketing standards are defined by obligatory rules for specific sectors or products and optional reserved terms on a sectoral or product basis.⁴⁰ They apply to both EU and non-EU products imported on the EU's internal markets⁴¹ and they concern the external qualities of products (e.g., fruits & vegetables) and the non-visible qualities that result from particular production processes (e.g., fruits content on jams). In particular, the EU marketing standards requirements lay down: technical definitions, classification, presentation, marking and labelling, packaging, production method, conservation, storage, transport, related administrative documents, certification and time limits, restrictions of use and disposal.³⁹

EU marketing standards are set in the following main bodies of legislation:³³

- Regulation (EU) No. 1308/2013⁴⁰, establishing a Common Market Organisation for agricultural products, laying down rules concerning marketing standards for: olive oil and table olives; fruits & vegetables; processed fruits and vegetable products; bananas; live plants; eggs; poultry meat; beef and veal; milk and milk products intended for human consumption; spreadable fats intended for human consumption; hops; wine.

³⁸ Josling, T., Roberts, D., & Orden, D., (2004). "Food Regulation and Trade: Towards a Safe and Open Global System", *Institute for International Economics*, Washington D.C.

³⁹ Russo, C., Sansone, M., Colamatteo, A., Pagnanelli, M.A., & Twum, K.E. (2022). *Benefits and Costs of EU Marketing Standards for Agri-food Products*. Available at: <https://publications.jrc.ec.europa.eu/repository/handle/JRC128162>

⁴⁰ Regulation (EU) No. 1308/2013, Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32013R1308>

⁴¹ EU Parliament (2024): *Legislative train*, Available at: <https://www.europarl.europa.eu/legislative-train/carriage/al-legislative-proposal-to-the-commission-on-the-right-to-disconnect/report?sid=7701>

- Secondary Commission rules, laying down detailed rules on specific marketing standards for specific sectors: olive oils; fresh and processed fruits & vegetables; bananas; eggs; hatching eggs and poultry chicks; poultry meat; bovine meat; hops; spreadable fats; milk and milk products.
- EP and Council 'Breakfast Directives', establishing specific rules on the description, definition, characteristics and labelling of coffee and chicory extracts; cocoa and chocolate products; sugars intended for human consumption; fruits jams, jellies, marmalades and sweetened chestnut purée intended for human consumption; dehydrated milk; fruits juices; honey.

The overlaying objectives of these standards are fourfold:⁴² (a) improve the economic conditions for the production and marketing of agricultural and food products; (b) improve the quality of products in the interest of producers, traders, and consumers; (c) take into account the expectations of consumers about receiving adequate and transparent product information; and (d) enable the markets to be easily supplied with products of a standardized and satisfactory quality. As a result, when EU marketing standards are effective, they help shape the international food trade by assuring fair competition for EU producers. They also facilitate trade with third countries because they are consistent international standards established since the 1950s.⁴³

In 2021 the European Commission recognised that since food production methods evolve over time, the EU marketing standards should also change to remain coherent with changing consumer needs, expectations, and preferences. Also, they identified that such standards need to complement the Farm to Fork strategy (F2F), as implemented by the EU. The F2F Strategy's ambition is to make the food system more sustainable by imposing restrictions on fertiliser and pesticides and covering at least 25% of the EU's agricultural land under organic farming by 2030.³¹ It aims to create a fair, healthy, and environmentally friendly food system and in this direction, it includes a Draft Action Plan with 27 specific proposals for actions and a timeframe. Among others, the action plan proposes the revision of EU marketing standards to support sustainability of production, mandatory origin indications on food, and sustainable labelling.⁴² The revision of the marketing standards was also considered important as outdated marketing standards could prevent operators in the food supply chain from harnessing technological progress, making use of innovations in production or marketing, and addressing changing consumer demand.³³

In 2023, after consultation of food supply chain stakeholders, the European Commission decided to update the marketing standards of agri-food products. They believed that the proposed revisions could help consumers make more informed choices for a healthier diet and contribute to preventing food waste. Among others, the Commission focused on the following proposals:⁴⁴

- Origin labelling: Clearer, mandatory origin labelling standards for honey, nuts and dried fruits, ripened bananas, and trimmed, processed, and chopped fruits and vegetables (such as packaged salad leaves). The country, or countries of origin in the case of blends or mixes, must appear on the label. Listing the nations of origin will provide greater transparency to consumers. This should also increase the EU production of these products.
- Food waste: The suggested revisions address both food and packaging waste. For example, so-called 'ugly' fruits and vegetables (with exterior flaws but still fit for local/direct eating) sold locally and directly by producers to consumers would be excluded from marketing standards. Valorising them in their 'fresh' state could provide consumers with more options to purchase fresh fruits and vegetables at lower rates, as well as help farmers in short supply chains. Certain products that have been affected

⁴² EU Commission (2020): Communication from the commission - *A Farm to Fork Strategy for a fair, healthy and environmentally-friendly food system*, Available at: https://eur-lex.europa.eu/resource.html?uri=cellar:ea0f9f73-9ab2-11ea-9d2d-01aa75ed71a1.0001.02/DOC_1&format=PDF

⁴⁴ EU (2023): Commission updates marketing standards of agri-food products to better address consumer needs and sustainability, Available at: https://ec.europa.eu/commission/presscorner/detail/en/ip_23_2366

by natural catastrophes or other extraordinary conditions may be marketed provided they are safe to consume.

- Packaging: Products meant for donation may be exempt from the primary labelling requirements. This will remove red tape and labels, allowing operators to engage in donation activities more easily.

The revision of EU marketing standards provided certain benefits to consumers and food businesses. The benefits for citizens and consumers include: (a) clearer information (better product identification), allowing consumers to make informed, healthy and sustainable food choices; and (b) environmental benefits from better resource utilisation (lower waste). Furthermore, the benefits for businesses include: (a) higher product valorisation; (b) increased legal clarity and standards updated to reflect contemporary advances; (c) fair playing field and facilitated business to business transactions and trade within and beyond the EU; (d) lower administrative costs for businesses by aligning or merging some rules; and (e) the introduction of EU marketing standards for cider and perry will harmonize rules across the EU, lowering recurring administrative costs for businesses to complying with standards.³³

4.1.2.1 Food general marketing standards

Currently, the general marketing standards for food produced and/or traded in the EU are mostly focusing on food packaging and labelling, and are regulated in the following legislation:

- Regulation (EU) No. 1169/2011⁴⁵: its aim is to achieve a high level of consumer protection in relation to food information and guarantee their right to information. It establishes the general principles, requirements and responsibilities governing food information, and in particular food packaging and labelling.
- Regulation (EU) No. 1308/2013⁴⁶: it establishes and provides the content of marketing standards to the following sectors and products: (a) olive oil and table olives; (b) fruits and vegetables; (c) processed fruits and vegetable products; (d) bananas; (e) live plants; (f) eggs; (g) poultry meat; (h) spreadable fats intended for human consumption; (i) hops; and (j) cereals. Its aim is to ensure that products comply with hygiene and health standards and to protect animal, plant and human health.
- Commission Delegated Regulation (EU) 2016/1238⁴⁷: it lays down rules as regards the buying-in and selling from public intervention, and the granting of aid for private storage for a variety of products. The products on focus are: (a) cereals; (b) milk products (i.e., butter and skimmed milk powder); and (c) meat (i.e., beef).
- Regulation (EU) No. 2019 No000⁴⁸: it lays down additional requirements for marketing for: (a) fresh and processed fruits & vegetables; (b) milk and milk products; (c) meat; and (d) hops.

In particular, in accordance to EU food general marketing standards, food labels must include the following information: (a) the name of the food; (b) the list of ingredients; (c) any ingredient or processing aid causing allergies or intolerances used in the manufacture or preparation of a food and still present in the finished product, even if in an altered form; (d) the quantity of certain ingredients or categories of ingredients; (e) the net quantity of the food; (f) the date of minimum durability or the 'use by' date; (g) any special storage conditions and/or conditions of use; (h) the name or business name and address of the food business operator; (i) the country of origin or place of provenance; (j) instructions for use where it would be difficult to make appropriate use of the food in the absence of such instructions; (k) with respect to beverages containing more than 1,2% by volume of alcohol, the actual alcoholic strength by volume; and (l) a nutrition declaration.

⁴⁵ Regulation (EU) No. 1169/2011, Available at: <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2011:304:0018:0063:en:PDF>

⁴⁶ Regulation (EU) No. 1308/2013, Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32013R1308>

⁴⁷ Commission Delegated Regulation (EU) 2016/1238, Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32016R1238>

⁴⁸ Regulation (EU) No. 2019 No000, Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32019R1020>

Additionally, the list of ingredients may be omitted for the following products: fresh fruits & vegetables including peeled potatoes, carbonated water, fermentation vinegars derived exclusively from a single basic product, cheese/butter/fermented milk and cream to which no ingredient has been added, foods consisted of a single ingredient. Regarding the language requirements, the mandatory food information shall appear in a language easily understood by the consumers of the Member States where a food is marketed.⁴⁵

Furthermore, food labels may voluntarily provide information on: (a) the possible and unintentional presence in food of substances or products causing allergies or intolerances; (b) the suitability of a food for vegetarians or vegans; and (c) the indication of reference intakes for specific population groups.⁴⁵

Lastly, the food general marketing standards regulation also focuses on fair information practices, stating that food information shall be accurate, clear and easy to understand for the consumer, as well as not be misleading. In particular misleading information should be avoided, including: (a) characteristics of the food and, in particular, its nature, identity, properties, composition, quantity, durability, country of origin or place of provenance, method of manufacture or production; (b) attributing to the food effects or properties which it does not possess; (c) suggesting that the food possesses special characteristics when in fact all similar foods possess such characteristics, in particular by specifically emphasising the presence or absence of certain ingredients and/or nutrients; (d) suggesting, by means of the appearance, the description or pictorial representations, the presence of a particular food or an ingredient, while in reality a component is naturally present or an ingredient normally used in that food has been substituted with a different component or a different ingredient.⁴⁵

4.1.2.2 Fresh fruits and vegetables

In the fresh fruits and vegetables sector, the current legal basis and legislation for marketing standards includes the following:

- Regulation (EU) No. 1308/2013⁴⁶: it establishes and provides the content of marketing standards to the following sectors and products: (a) olive oil and table olives; (b) fruits and vegetables; (c) processed fruits and vegetable products; (d) bananas; (e) live plants; (f) eggs; (g) poultry meat; (h) spreadable fats intended for human consumption; (i) hops. Its aim is to ensure that products comply with hygiene and health standards and to protect animal, plant and human health.
- Regulation (EU) No. 2019 No000⁴⁸: it lays down additional requirements for marketing for, among others, fresh and processed fruits and vegetables.
- Commission Delegated Regulation (EU) 2023/2429⁴⁹: it supplements Regulation (EU) No. 1308/2013⁴⁶ as regards marketing standards for the fruits and vegetables sector, certain processed fruits and vegetable products and the bananas sector. This regulation should apply as from 1 January 2025.
- Commission Implementing Regulation (EU) 2023/2430⁵⁰: it lays down rules concerning checks on conformity to marketing standards for the fruits and vegetables sector, certain processed fruits and vegetable products and the bananas sector mostly focusing on conformity checks and methods of food inspection carried out by Member States.

The legislation applies at all stages of the food value chain and establishes the general marketing standards (GMS) and the specific marketing standards for various products in the fresh fruits and vegetables sector. Products covered by the specific marketing standards cannot be sold for fresh consumption unless they meet the relevant standards. Since 2009, the number of specific marketing standards for fruits and vegetables

⁴⁹ Commission Delegated Regulation (EU) 2023/2429, Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:L_202302429&qid=1734353836190

⁵⁰ Commission Implementing Regulation (EU) 2023/2430, Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:L_202302430

decreased from thirty-six to the following eleven: (a) apples; (b) citrus fruits; (c) kiwifruits; (d) lettuces, curled leaved and broad-leaved endives; (e) peaches and nectarines; (f) pears; (g) strawberries; (h) sweet peppers; (i) table grapes; (j) tomatoes; (k) bananas.

In particular, the GMS defines the quality requirements for fruits and vegetables, after preparation and packaging, and it regulates the following:⁴⁹

- Minimum quality standards: fruits and vegetables must be intact, sound, clean -practically free of any visible foreign matter, practically free from pests, free from damage caused by pests affecting the flesh, free of abnormal external moisture, free of any foreign smell and/or taste. Also, the condition of the products must be such as to enable them to withstand transportation and handling and arrive in satisfactory condition at the place of destination.
- Minimum maturity requirements: fruits and vegetables must be sufficiently developed but not over-developed, and fruits must display satisfactory ripeness and must not be overripe. Also, the development and state of maturity of the products must be such as to enable them to continue their ripening process and to reach a satisfactory degree of ripeness.
- Tolerance: a tolerance of 10% by number or weight of product not satisfying the minimum quality requirements shall be permitted in each lot. Within this tolerance not more than 2% in total may consist of produce affected by decay.
- Labelling: each package of fruits and vegetables must bear the following particulars, in letters grouped on the same side, legibly and indelibly marked, and visible from the outside.
 - Identification: the name and physical address of the packer and/or the dispatcher should be visible. However, this information may be replaced (except for pre-packages), by the officially issued or accepted code mark representing the packer and/or the dispatcher, indicated in close connection with the reference 'Packer and/or Dispatcher' (or equivalent abbreviations). The code mark shall be preceded by the ISO 3166 (alpha) country/area code of the recognising country, if not the country of origin. For pre-packages this information may be replaced by the name and the address of a seller established within the EU indicated with the mention 'Packed for:' or an equivalent mention. In latter, the labelling shall also include a code representing the packer and/or the dispatcher. Packages need not to bear this information, when they contain sales packages, clearly visible from the outside, and all bearing these particulars. These packages shall be free from any indications that could mislead the consumer. When these packages are palletised, the particulars shall be given on a notice placed in an obvious position on at least two sides of the pallet.
 - Origin: the full name of the country of origin should be visible. For products originating in a Member State this shall be in the language of the country of origin or any other language understandable by the consumers of the country of destination. For other products, this shall be in any language understandable by the consumers of the country of destination.

The GMS are required to be followed for fresh produce, with the exception of: non-cultivated mushrooms, capers, bitter almonds, shelled almonds, shelled hazelnuts, shelled walnuts, pine nuts, pistachios, macadamia, pecans, other nuts, dried plantains, dried citrus, mixtures of tropical nuts, mixtures of other nuts, and saffron.⁴⁹

Additionally, the EU legislation covers the following aspects:⁴⁹

- Packaging information: the information particulars required by marketing standards should be clearly displayed on the packaging and/or on the label. To avoid fraud and cases of misleading consumers, the information particulars required by the marketing standards should be available to consumers

before purchase, including in the case of distance selling, where experience has shown the risks of fraud and avoidance of the consumer protection offered by the standards.

- Country of origin: to avoid misleading consumers regarding the origin of the products, the indication of the country of origin should be more visible than the indication of the country of the packer.
- Labelling: for products for which EU standards have not been adopted this can be ensured by recourse to general provisions. Labelling requirements should therefore be laid down for mixes of different products or species of products in the same package.
- Imports from third countries: imports of fruits and vegetables from third countries are to conform to the marketing standards or to standards equivalent to them. Therefore, the conditions under which imported products are considered to have an equivalent level of conformity to the EU marketing standards should be laid down.
- Information along the supply chain: the information particulars required shall be shown legibly and obviously on one side of the packaging. For goods shipped in bulk and loaded directly onto a means of transport, the information particulars shall be given in a document accompanying the goods or shown on a notice placed in an obvious position inside the means of transport. Furthermore, invoices and accompanying documents, excluding receipts for the consumer, shall indicate the name and the country of origin of the products and, where appropriate, the class, the variety or commercial type if required in a specific marketing standard, or the fact that it is intended for processing.
- Information at retailing stage: the information particulars required by the marketing standards shall be legible and conspicuous. Products may be presented for sale provided the retailer displays prominently, adjacent to and legibly, the information particulars relating to country of origin and, where appropriate, class, size and variety or commercial type in such a way as not to mislead the consumer. Additional terms which suggest better/superior quality may not be included. In particular, the label may not include any descriptor of quality except the information specified.
- Product mixes: the marketing of packages of a net weight of 10 kg or less containing mixes of different products or species of products covered by marketing standards shall be allowed, provided that: (a) the products and species of products are of uniform quality and each one complies with the relevant specific marketing standard or, where no specific marketing standard exists for a particular product, the general marketing standard; (b) the package is labelled in accordance with this Regulation and the applicable provisions of Regulation (EU) No 1169/2011⁴⁵; and (c) the mix of different products is not such as to mislead the consumer. If the products in a mix of different products or species of products covered by the marketing standards originate in more than one Member State or third country, the names of the countries of origin may be replaced with one of the following indications, as appropriate: 'EU', 'non-EU' or 'EU and non-EU'.

Interestingly, the legislation specifies that the following products are not required to comply with marketing standards: (a) products intended for industrial processing, or for animal feed or other non-food use; (b) products transferred by the producer on their holding to consumers for their personal use; (c) products recognised in a Commission Decision taken at the request of a Member State as products of a given region which are sold by the retail trade of that region or, in exceptional and duly justified cases, of that Member State, in case of well-established traditional local consumption; (d) products having undergone a trimming or cutting making them 'ready to eat' or 'kitchen ready'; (e) products marketed as edible sprouts, following germination of seeds of plants classified as fruits and vegetables; (f) products sold or delivered by the grower to preparation and packaging stations or storage facilities, or shipped from their holding to such stations; and (g) products shipped from storage facilities to preparation and packaging stations.⁴⁹

4.1.2.3 Meat

In the meat sector, the current legal basis and legislation for marketing standards includes the following:

- Regulation (EC) No. 1760/2000⁵¹: establishes a system for the identification and registration of bovine animals and regarding the labelling of beef and beef products.
- Commission Regulation (EC) No. 1825/2000⁵²: lays down detailed rules for the application of Regulation (EC) No. 1760/2000⁵¹ regarding labelling of beef and beef products.
- Commission Regulation (EC) No. 543/2008⁵³: lays down detailed rules as regards the marketing standards for poultry meat. It also forms the basis for the mandatory labelling of the method of production for poultry meat.
- Commission Implementing Regulation (EC) No. 563/2013⁵⁴: lays down detailed rules as regards the marketing of the meat of bovine animals (i.e., beef and veal, pigmeat, sheep meat and goatmeat, poultry meat) aged 12 months or less.
- Regulation (EU) No. 1308/2013⁴⁶: it establishes and provides the content of marketing standards to, among others, the poultry meat sector. Its aim is to ensure that products comply with hygiene and health standards and to protect animal, plant and human health.
- Commission Delegated Regulation (EU) 2016/1238⁴⁷: it supplements Regulation (EU) No. 1308/2013⁴⁶ of the European Parliament and of the Council regarding public intervention and aid for private storage of, among others, beef.
- Commission Delegated Regulation (EU) 2017/1182⁵⁵: it supplements Regulation (EU) No. 1308/2013⁴⁶ as regards the EU scales for the classification of beef, pig and sheep carcasses reporting of market prices of certain categories of carcasses and live animals.
- Regulation (EU) No. 2019 No000⁴⁸: it lays down additional requirements for marketing for, among others, meat.

In general, the product categories and particular products in the meat sector covered by EU marketing standards regulation are the following⁵³:

- Beef and veal products: (a) live animals of the domestic bovine species, other than pure-bred breeding animals; meat of bovine animals, fresh or chilled; meat of bovine animals, frozen; thick skirt and thin skirt, fresh or chilled; thick skirt and thin skirt, frozen; meat of bovine animals, salted, in brine, dried or smoked; thick skirt and thin skirt, salted, in brine, dried or smoked; edible flours and meals of meat or meat offal; other prepared or preserved meat or meat offal of bovine animals, uncooked; mixtures of cooked meat or offal and uncooked meat or offal; other prepared or preserved meat containing bovine meat or offal, uncooked: mixtures of cooked meat or offal and uncooked meat or offal; (b) live bovine pure-bred breeding animals; edible offal of bovine animals excluding thick skirt and thin skirt, fresh or chilled, other than for the manufacture of pharmaceutical products; edible offal of bovine animals excluding thick skirt and thin skirt, frozen, other than for the manufacture of pharmaceutical products; edible meat offal of bovine animals, salted, in brine, dried or smoked, other than thick skirt and thin skirt; fats of bovine animals other than those mentioned before; other prepared or preserved meat or meat offal, of bovine animals, other than uncooked meat or meat offal and mixtures of cooked meat or offal and uncooked meat or offal; other prepared or preserved meat containing bovine meat or offal other than uncooked, and mixtures of cooked meat or offal and uncooked meat or offal.

⁵¹ Regulation (EC) No. 1760/2000, Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32000R1760>

⁵² Commission Regulation (EC) No. 1825/2000, Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32000R1825>

⁵³ Commission Regulation (EC) No. 543/2008, Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32008R0543>

⁵⁴ Commission Implementing Regulation (EC) No. 563/2013, Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32013R0563>

⁵⁵ Commission Delegated Regulation (EU) 2017/1182, Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32017R1182>

- Pigmeat: (a) live swine, of domestic species, other than pure-bred breeding animals; (b) meat of domestic swine, fresh, chilled, or frozen; edible offal of domestic swine, other than for the manufacture of pharmaceutical products, fresh, chilled or frozen; pig fat, free of lean meat, not rendered or otherwise extracted, fresh, chilled, frozen, salted, in brine, dried or smoked; meat and edible meat offal of domestic swine, salted, in brine, dried or smoked; pig fat (including lard); (c) sausages and similar products, of meat, meat offal or blood; food preparations based on these products; homogenised preparations of meat, meat offal or blood; preparations or preserves of liver of any animal, other than goose or duck; other preparations and preserves containing meat or offal of domestic swine; preparations of blood of any animal; other preparations or preserves containing meat or meat offal of domestic swine; stuffed pasta, whether or not cooked or otherwise prepared, containing more than 20% by weight of sausages and the like, of meat and meat offal of any kind, including fats of any kind or origin.
- Sheep meat and goat meat: (a) lambs (up to one year old); live sheep other than pure-bred breeding animals and lambs; live goats other than pure-bred breeding animals; meat of sheep or goats, fresh, chilled or frozen; meat of sheep and goats, with bone in, salted, in brine, dried or smoked; meat of sheep and goats, boneless, salted, in brine, dried or smoked; (b) live sheep: pure-bred breeding animals; live goats: pure-bred breeding animals; edible offal of sheep and goats, fresh or chilled, other than for the manufacture of pharmaceutical products; edible offal of sheep and goats, frozen, other than for the manufacture of pharmaceutical products; edible offal of sheep and goats, salted, in brine, dried or smoked; fats of sheep or goats, other than those mentioned before; (c) other prepared or preserved meat or meat offal of sheep or goats, uncooked; mixtures of cooked and uncooked meat or offal; (d) other prepared or preserved meat or meat offal of sheep or goats, other than uncooked or mixtures of cooked and uncooked meat or off.
- Poultry meat: (a) live poultry, that is to say, fowls of the species *Gallus domesticus*, ducks, geese, turkeys and guinea fowls; (b) meat and edible offal, of fresh, chilled or frozen poultry, excluding livers falling within point (c); (c) poultry livers, fresh, chilled or frozen; poultry livers, salted, in brine, dried or smoked; (d) poultry fat, not rendered or otherwise extracted, fresh, chilled, frozen, salted, in brine, dried or smoked; (e) poultry fat; (f) goose or duck livers, otherwise prepared or preserved; meat or meat offal of poultry other the ones mentioned before, otherwise prepared or preserved.

4.1.2.4 Dairy

In the dairy sector, the current legal basis and legislation for marketing standards includes the following:

- First Commission Directive 79/1067/EEC⁵⁶: it lays down Community methods of analysis for testing certain partly or wholly dehydrated preserved milk for human consumption.
- First Commission Directive 87/524/EEC⁵⁷: it focuses on methods of sampling for chemical analysis for the monitoring of preserved milk products.
- Council Directive 2001/114/EC⁵⁸: it relates to certain partly or wholly dehydrated preserved milk for human consumption.
- Commission Regulation (EC) No. 445/2007⁵⁹: it lays down certain detailed rules for establishing standards for spreadable fats, and on the protection of designations used in the marketing of milk and milk products.

⁵⁶ First Commission Directive 79/1067/EEC, Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:31979L1067>

⁵⁷ First Commission Directive 87/524/EEC, Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:31987L0524>

⁵⁸ Council Directive 2001/114/EC, Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32001L0114>

⁵⁹ Commission Regulation (EC) No. 445/2007, Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32007R0445>

- Commission Decision 2010/791/EU⁶⁰: it provides descriptions of milk and milk products the exact nature of which is known because of traditional use and/or when the designations are clearly used to describe a characteristic quality of the product.
- Regulation (EU) No. 1308/2013⁴⁶: it establishes and provides the content of marketing standards to, among others, spreadable fats intended for human consumption. Its aim is to ensure that products comply with hygiene and health standards and to protect animal, plant and human health.
- Commission Delegated Regulation (EU) 2016/1238⁴⁷: it supplements Regulation (EU) No. 1308/2013⁴⁶ of the European Parliament and of the Council regarding public intervention and aid for private storage of, among others, butter and skimmed milk powder.
- Regulation (EU) No. 2019 No000⁴⁸: it lays down additional requirements for marketing for, among others, milk, milk products, and spreadable fats.

In general, the EU marketing standards regulations in the dairy sector cover the following products: (a) milk and cream, not concentrated nor containing added sugar or other sweetening matter; (b) milk and cream, concentrated or containing added sugar or other sweetening matter; (c) buttermilk, curdled milk and cream, yogurt, kephir and other fermented or acidified milk and cream, whether or not concentrated or containing added sugar or other sweetening matter not flavoured nor containing added fruits, nuts or cocoa; (d) whey, whether or not concentrated or containing added sugar or other sweetening matter; products consisting of natural milk constituents, whether or not containing added sugar or other sweetening matter, not elsewhere specified or included; (e) butter and other fats and oils derived from milk, dairy spreads of a fat content of more than 75% but less than 80%; (f) cheese and curd; (g) lactose and lactose syrup not containing added flavouring or colouring matter, containing by weight less than 99% lactose, expressed as anhydrous lactose, calculated on the dry matter; (h) flavoured or coloured lactose syrup; and (i) preparations of a kind used in animal feeding.⁶¹

4.1.2.5 Cereals

In the cereals sector, the current legal basis and legislation for marketing standards includes the following:

- Regulation (EU) No. 1308/2013⁴⁶: it establishes and provides the content of marketing standards for, among others, cereals. Its aim is to ensure that products comply with hygiene and health standards and to protect animal, plant and human health.
- Commission Delegated Regulation (EU) 2016/1238⁴⁷: it lays down rules as regards the buying-in and selling from public intervention, and the granting of aid for private storage for, among others, cereals.

Marketing standards for cereals are classified as general marketing standards and specific marketing standards. GMS indicate that cereals should: (a) be of the typical colour of the cereal in question; (b) be free from abnormal smell and live pests (including mites) at every stage of their development; (c) meet the minimum quality requirements; and (d) have levels of contaminants, including radioactivity, that do not exceed the maximum levels permitted under Union food safety legislation.⁴⁷

The cereal products covered GMS regulations are: (a) sweetcorn, fresh or chilled; dried sweetcorn, whole, cut, sliced, broken or in powder, but not further prepared, other than hybrid for sowing; common wheat and meslin seed; spelt, common wheat and meslin other than for sowing; rye; barley; oats; maize (corn) seed other than hybrid; maize other than seed; grain sorghum, other than hybrids for sowing; buckwheat, millet and canary seed; other cereals; (b) durum wheat; (c) wheat or meslin flour; rye flour; groats and meal of wheat;

⁶⁰ Commission Decision 2010/791/EU, Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32010D0791>

⁶¹ Council Regulation (EC) No 1234/2007, Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32007R1234>

malt, whether or not roasted; (d) manioc, arrowroot, salep, Jerusalem artichokes, sweet potatoes and similar roots and tubers with high starch or inulin content, fresh, chilled, frozen or dried, whether or not sliced or in the form of pellets; sago pith; (e) cereal flours other than of wheat or meslin: maize (corn) flour, barley flour, oat flour, other; (f) cereal groats, meal and pellets with the exception of groats and meal of wheat, groats and meal of rice and pellets of rice; (g) cereal grains otherwise worked (for example, hulled, rolled, flaked, pearled, sliced or kibbled), except rice of heading 1006 and flaked rice of subheading 1104 19 91; (h) germ of cereals, whole, rolled, flaked or ground; (i) flour, meal and powder of sago or of roots or tubers; (j) starches: wheat starch, maize (corn) starch, potato starch, manioc (cassava) starch, other starches; (k) wheat gluten, whether or not dried; (l) other sugars, including chemically pure lactose, maltose, glucose and fructose, in solid form; (j) sugar syrups not containing added flavouring or colouring matter; (k) artificial honey, whether or not mixed with natural honey; and (l) caramel: glucose and glucose syrup.⁴⁶

Additionally, specific standards in cereals sector are applied for: (a) durum wheat; (b) common wheat; (c) barley; and (d) maize.

4.1.3 International marketing standards

To facilitate a smooth trade among businesses and countries, harmonisation of the wide variety of marketing standards is essential. The harmonisation is promoted with the development of international marketing standards, which act as a benchmark for better forms of governance of international trade while avoiding the adoption of trade-distorting measures. International marketing standards are those developed by one or more international organisations and are voluntary in nature.³⁰ To be placed on the EU markets and sold to consumers, most agri-food products must comply with EU marketing standards and/or standards established at international level.³⁹ Therefore, the EU Food Law should be followed where the international standards exist.⁶² The rise and spread of standards have triggered vigorous debates on the impacts on international trade. The literature identifies two characteristics of standards which affect trade. On the one hand, they can be trade facilitating by reducing transaction and information costs. On the other hand, they can be trade constraining: many trade economists consider them as non-tariff barriers to trade. As international trade agreements have contributed to a global reduction in tariffs, it is often argued that countries have turned to standards as new instruments to shield their domestic markets from foreign competition. It is in the area of government mandated product and process standards where the greatest concern exists about possible adverse effects on trade.⁶³ Standards can generate efficiency gains by solving (or reducing) externalities or asymmetric information problems and reduce transaction costs, but they also involve implementation costs and affect trade.⁶⁴

The World Trade Organisation (WTO), the only international organisation that deals with the rules of trade between nations, has played an important role in this respect. Its main goals are to: (a) improve the welfare of people around the world by raising standards of living, ensuring full employment and increasing real income while allowing for the optimal use of world's resources; (b) ensure non-discrimination among countries; (c) lower trade barriers; (d) promote predictability and transparency in trade; (e) promote fair competition; (f) support less developed countries; (g) protect the environment; and (h) build a more inclusive trading system.⁶⁵ In order to do so the WTO tries to ensure that trade flows as smoothly, predictably and freely as possible.⁶⁶ The WTO has 166 members and accounts for 98% of global trade. All members entered the system by

⁶² Regulation (EC) No 178/2002, Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32002R0178>

⁶³ WTO (2005). Trade, Standards and the WTO, World Trade Report. World Trade Organisation, Geneva.

⁶⁴ Meloni, G., & Swinnen, J.F.M. (2017). "Standards, Tariffs and Trade: The Rise and Fall of the Raisin Trade between Greece and France in the Late 19th Century and the Definition of Wine", LICOS Discussion Paper Series No. 386/2017.

⁶⁵ WTO, Available at: https://www.wto.org/english/thewto_e/whatis_e/what_stand_for_e.htm

⁶⁶ WTO, Available at: https://www.wto.org/english/thewto_e/whatis_e/inbrief_e/inbr_e.htm

negotiation; therefore, membership entails a balance of rights and responsibilities. More than 20 countries are currently negotiating to join the organisation.⁶⁷

The Agreements on Sanitary and Phytosanitary (SPS) Measures and Technical Barriers to Trade (TBT), which were negotiated and signed by the majority of the world's trading nations and passed in their parliaments, are crucial to the WTO. These agreements represent the most comprehensive attempt to address the impact of food standards on trade, and they have resulted in increased transparency in the execution of some types of national standards. The SPS agreement has established specific disciplines for the regulation of food safety attributes, with the primary goal of determining a multilateral framework of rules and disciplines to guide the development, adoption and enforcement of sanitary and phytosanitary measures to minimise their negative effects on trade.⁶⁸ The TBT agreement covers technical regulations standards, including packaging, marking and labelling and conformity assessment procedures. In the agrifood sector, the TBT agreement applies to all rules other than those relating to animal, plant and human life and health which are the focus of the SPS agreement. Food quality issues, such as nutrition labelling are also covered by the TBT agreement.⁶⁹

The European Union and its member countries actively participate in the operations of the following international organisations that set standards for food and feed:⁷⁰

1. Codex Alimentarius Commission (CAC): a governmental organisation with the objective to set international food standards for the protection of public health and the promotion of fair practice in food trade.
2. International Plant Protection Convention (IPPC): an international treaty which works to prevent the spread and introduction of pests of plants and plant products, and to promote appropriate measures for their control.
3. World Organisation for Animal Health (WOAH): a reference organisation for international standards relating to animal health and zoonoses. WOAH's primary objective is to protect the health of animals and to determine a safe and fair trade in animals and animal products worldwide, by ensuring transparency in the global animal disease situation and by publishing health standards for international trade. It also sets guidelines for animal welfare although this mandate does not fall under the WTO SPS agreement.

Other international organisations that create international marketing standards are:

1. United Nation Economic Commission for Europe (UNECE)⁷¹: a European organisation that sets out norms, standards and conventions in the fruits and vegetables sector to facilitate international cooperation within and outside the region.⁷²
2. International Olive Council (IOC): the world's only international intergovernmental organisation in the field of olive oil and table olives.⁷³
3. Organisation for Economic Cooperation and Development (OECD): a unique forum where governments work together to set standards to specify what internationally traded fruits and vegetables should look like.⁷⁴

CAC is the most influential food standard-setting body, and Member States must ensure that fruits and vegetable exports to third countries adhere to its marketing standards. Furthermore, Member States must

⁶⁷ WTO, Available at: https://www.wto.org/english/thewto_e/whatis_e/who_we_are_e.htm

⁶⁸ WTO, Available at: https://www.wto.org/english/tratop_e/sps_e/spsagr_e.htm

⁶⁹ WTO, Available at: https://www.wto.org/english/res_e/publications_e/ai17_e/ai17_e.htm

⁷⁰ International Standards Setting Bodies, Available at: https://food.ec.europa.eu/horizontal-topics/international-affairs/international-standards_en

⁷¹ UNECE, Available at: <https://unece.org/>

⁷² UNECE – Mission, Available at: <https://unece.org/mission>

⁷³ IOC – Mission, Available at: <https://www.internationaloliveoil.org/about-ioc/mission-basic-text/>

⁷⁴ OECD, Available at: <https://www.oecd.org/en.html>

certify compliance with the Geneva Understanding on standardisation of fresh fruits and vegetables, concluded within the UNECE standards and the OECD Scheme.⁵⁰ As a result, in the following section, we will focus on these three international marketing standards.

4.1.3.1 Codex Alimentarius Commission (CAC)

CAC is the most influential food standard-setting body at the international level introduced in 1963. The Codex Alimentarius is a collection of internationally adopted food standards codes of practice, guidelines, and related texts, primarily aiming at: (a) protecting the health of the consumers and ensuring fair practices in the food trade; (b) promoting coordination of all food standards work undertaken by international governmental and non-governmental organisations; and (c) facilitating international trade.⁷⁵ These standards are voluntary in nature and are neither substitutes nor alternatives to national legislation-based standards.⁷⁵ For many decades, the legal relevance of CAC standards was dismissed because of their non-binding nature, and merely advisory role. It was only upon the adoption of the WTO agreements that the Codex Alimentarius was upgraded to semi-binding status.⁷⁶ The CAC develops and adopts standards according to its strategic six-year plan, which acts as a benchmark for submitted individual proposals. The strategic plan is reviewed every two years to adjust to current demands.⁷⁵

Codex standards and related documents contain food requirements aimed at guaranteeing that the consumer receives a safe, wholesome food product that is free of adulteration, accurately labelled and presented. It includes standards for all the principal foods, whether processed, semi-processed or raw, providing provisions in respect of food hygiene, food additives, residues of pesticides and veterinary drugs, contaminants, compulsory and optional ingredients, quality of the raw material, provisions on taste, odour, colour, and texture, labelling and presentation, methods of analysis and sampling, and import and export inspection and certification. In the context of CAC, food means any substance, whether processed, semi-processed or raw, which is intended for human consumption, and includes drink, chewing gum and any substance which has been used in the manufacture, preparation or treatment of 'food'. It does not include cosmetics or tobacco, or substances used only as drugs.

By 2023, the total output of CAC stands at 235 food standards, 87 guidelines, 57 codes of practice, and 17 maximum levels for contaminants in foods. CAC includes general and specific standards. The general standards are the core Codex texts that apply to all products and product categories, and they include standards for labelling of prepackaged foods, labelling of food additives when sold as such, labelling of and claims for prepackaged foods for special dietary uses, labelling of claims for foods for special medical purposes, and labelling of non-retail containers of foods. On the other hand, specific standards refer to a specific product, including standards for fresh fruits and vegetables, fresh and frozen fishery, olive oils, dried fruits, processed fruits and vegetables, processed cereal-based food, chocolate and chocolate products, fresh and processed meat, cocoa, nuts, cereal grains, dairy products, bottled/package drinking waters, instant noodles, fat spreads and blended spreads, ware potatoes, dried oregano, sugar, salt. They also contain numerous maximum residue limits for pesticides in food and animal feed, residue levels for veterinary drugs in food of animal origin, and acceptable levels of food additives and contaminants.

The Codex standard is published and issued to all members and associate members of Food and Agriculture Organisation (FAO) and/or WTO and to the international organisations concerned. All EU countries are members of the Codex Alimentarius Commission.⁷⁷ Table 2 presents the 189 Member States of the CAC.⁷⁵

⁷⁵ CAC Procedural manual, Available at: <https://openknowledge.fao.org/server/api/core/bitstreams/cdb4b110-b8bf-45dc-9c53-4ea9fca1fc8/content>

⁷⁶ Herdegen, M. (2001). "Biotechnology and Regulatory Risk Assessment", in Bermann, G., Herdegen, M., & Lindseth, P. (eds), *Transatlantic Regulatory Cooperation: Legal Problems and Political Prospects*, 301-317, Oxford University Press.

⁷⁷ CAC, Available at: https://food.ec.europa.eu/horizontal-topics/international-affairs/international-standards/codex-alimentarius_en

Table 2: International MkSs – Member States

International MkSs	Member States
CAC	Afghanistan, Albania, Algeria, Angola, Antigua and Barbuda, Argentina, Armenia, Australia, Austria, Azerbaijan, Bahamas, Bahrain, Bangladesh, Barbados, Belarus, Belgium, Belize, Benin, Bhutan, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, Brunei Darussalam, Bulgaria, Burkina Faso, Burundi, Cabo Verde, Cambodia, Cameroon, Canada, Central African Republic, Chad, Chile, China, Colombia, Comoros, Congo, Cook Islands, Costa Rica, Cote d'Ivoire, Croatia, Cuba, Cyprus, Czech Republic, Democratic People's Republic of Korea, Democratic Republic of Congo, Denmark, Djibouti, Dominica, Dominican Republic, Ecuador, Egypt, El Salvador, Equatorial Guinea, Eritrea, Estonia, Eswatini, Ethiopia, European Union, Fiji, Finland, France, Gabon, Gambia, Georgia, Germany, Ghana, Greece, Grenada, Guatemala, Guinea, Guinea-Bissau, Guyana, Haiti, Honduras, Hungary, Iceland, India, Indonesia, Iran, Iraq, Ireland, Israel, Italy, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Kiribati, Kuwait, Kyrgyzstan, Lao People's Democratic Republic, Latvia, Lebanon, Lesotho, Liberia, Libya, Lithuania, Luxembourg, Madagascar, Malawi, Malaysia, Maldives, Mali, Malta, Mauritania, Mauritius, Mexico, Micronesia, Mongolia, Montenegro, Morocco, Mozambique, Myanmar, Namibia, Nauru, Nepal, Netherlands, New Zealand, Nicaragua, Niger, Nigeria, Norway, Oman, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Portugal, Qatar, Republic of Korea, Republic of Moldova, Romania, Russian Federation, Rwanda, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Samoa, San Marino, Sao Tome and Principe, Saudi Arabia, Senegal, Serbia, Seychelles, Sierra Leone, Singapore, Slovakia, Slovenia, Solomon Islands, Somalia, South Africa, South Sudan, Spain, Sri Lanka, Sudan, Suriname, Sweden, Switzerland, Syrian Arab Republic, Tajikistan, Thailand, The Republic of North Macedonia, Timor-Leste, Togo, Tonga, Trinidad and Tobago, Tunisia, Türkiye, Turkmenistan, Uganda, Ukraine, United Arab Emirates, United Kingdom of Great Britain and Northern Ireland, United Republic of Tanzania, United States of America, Uruguay, Uzbekistan, Vanuatu, Venezuela, Viet Nam, Yemen, Zambia, Zimbabwe.
UNECE	Albania, Andora, Armenia, Austria, Azerbaijan, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, Canada, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Georgia, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Kazakhstan, Kyrgyzstan, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Monaco, Montenegro, Netherlands, Norway, Poland, Portugal, Republic of Moldova, North Macedonia, Romania, Russian Federation, San Marino, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Tajikistan, Türkiye, Turkmenistan, Ukraine, United Kingdom of Great Britain and Northern Ireland, United States of America, Uzbekistan. However, all interested United Nations member States may participate in the work of UNECE.
OECD	Australia, Austria, Belgium, Canada, Chile, Colombia, Costa Rica, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Latvia, Lithuania, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Türkiye, United Kingdom, United States.

4.1.3.2 United Nations Economic Commission for Europe (UNECE)

UNECE was set up in 1947 and it is one of five regional commissions of the United Nations. Its primary objective is to promote pan-European economic integration by facilitating the international trade, encouraging high quality production, improving profitability and protecting consumer interests. UNECE includes 56 member States in Europe, North America and Asia.⁷² Table 2 presents the Members States of UNECE.

UNECE closely collaborates with WTO, CAC and the Organization for Economic Cooperation and Development (OECD), and it hosts over 100 agricultural quality standards. The standards focus on the following product categories: (a) fresh fruits and vegetables; (b) dry and dried produce; (c) meat; (d) seed potatoes; (e) cut flowers; and (f) eggs and egg products. UNECE marketing standards are based on existing national standards,

industry and trade practices. They are published in three official languages (i.e., English, French and Russian), and they include obligatory indication of the country of origin and the name and address of the packer and/or dispatcher on each package, as well as optional indication of the region of growing.

Recently, a key partner in UNECE's work on Agricultural Quality Standards, the OECD, presented the preliminary results of a joint UNECE-OECD study estimating the impact of marketing standards and explanatory brochures on trade in selected fruits and vegetables. This is the first attempt to quantify the impact of the marketing standards, and the initial results show that marketing standards have a significant and positive impact on trade, increasing trade flows by up to 50% in some cases.

4.1.3.3 Organisation for Economic Cooperation and Development (OECD)⁷⁸

The OECD is a unique organisation where governments work together to address the economic, social and environmental challenges of globalisation.⁷⁹ The OECD Member States are presented in Table 2. The Commission of the European Union takes part in the work of the OECD.

OECD provides a setting where governments can compare policy experiences, seek answers to common problems, and identify good practice and work to co-ordinate domestic and international policies.⁷⁹ Its primary goal is to deliver greater well-being worldwide by advising governments on policies that support resilient, inclusive and sustainable growth. Accordingly, because of evidence-based policy analysis and recommendations, standards, and global policy networks, the OECD has aided in the advancement of reforms and multilateral solutions to global concerns. Since the creation of the OECD in 1961, more than 500 substantive legal instruments have been developed within its framework in a variety of areas, from consumer protection and chemical testing to responsible business conduct and safeguarding the environment.⁸⁰

OECD sets international standards to specify (fresh and dried) fruits and vegetables production, trade and marketing conditions, while simultaneously promoting uniform quality control procedures and disseminating quality assurance guidelines.⁸¹ These standards range from legally binding decisions and international agreements, such as the 1997 Anti-bribery Convention⁸², to non-binding recommendations and declarations, such as the 2019 Artificial Intelligent Recommendation.⁸³ OECD standards aim to level the playing field, facilitate transfers across borders and improve wellbeing and outcomes for citizens. They are one of the most visible ways in which the OECD has a concrete impact in co-ordinating positive outcomes for Member States and their citizens.⁸⁰

In the last few years, OECD closely collaborates with UNECE, forming a 'Scheme' for the application of international standards for fruits and vegetables. The 'Scheme' has the primary objective to facilitate international trade in fruits and vegetables sector through the harmonisation of implementation and interpretation of international marketing standards, and OECD does so by applying the UNECE fresh fruits and vegetables standards to 47 products. The International marketing standards include obligatory information

⁷⁸ OECD (2024): Decision of the Council revising the OECD Scheme for the Application of International Standards for Fruits and Vegetables, Available at: <https://legalinstruments.oecd.org/en/instruments/OECD-LEGAL-0088>

⁷⁹ OECD Fruitss and Vegetables Scheme (2020): Guidelines on the Verification of the Country of Origin via Conformity Checks on Marketing Standards for Fruits and Vegetables, Available at: https://www.oecd.org/content/dam/oecd/en/topics/policy-sub-issues/fruitss-and-vegetables/guidelines-on-the-verification-of-the-country-of-origin.pdf/_jcr_content/renditions/original./guidelines-on-the-verification-of-the-country-of-origin.pdf

⁸⁰ OECD – History, Available at: <https://www.oecd.org/en/about/history.html>

⁸¹ OECD Fruitss and Vegetables Scheme (2022): Guidelines for the Implementation of Quality Controls in the Event of Pandemics and Other Disruptive Events, Available at: https://www.oecd.org/content/dam/oecd/en/topics/policy-sub-issues/fruitss-and-vegetables/guidelines-implementation-of-quality-controls-in-the-event-of-pandemics-and-other-disruptive-events.pdf/_jcr_content/renditions/original./guidelines-implementation-of-quality-controls-in-the-event-of-pandemics-and-other-disruptive-events.pdf

⁸² OECD – Fighting Foreign Bribery, Available at: <https://www.oecd.org/en/topics/sub-issues/fighting-foreign-bribery.html#:~:text=The%20Anti%2DBribery%20Convention%20is%20the%20only%20international%20agreement%20that,bribe%20in%20business%20transactions%20abroad.>

⁸³ OECD – Recommendation of the Council on Artificial Intelligence, Available at: <https://legalinstruments.oecd.org/en/instruments/oecd-legal-0449>

about the country of origin and the name and address of the packer and/or dispatcher on each package, as well as optional indication of the region of growing.

4.1.4 Comparisons between EU, and international marketing standards

One of the main objectives of Task 1.2 in the ROSETTA project was to compare EU marketing standards of specific products, one for each food commodity (i.e., fruits & vegetables, meat, dairy, cereals), both with the EU and internationally.

We have chosen to focus on one commodity per product category to achieve this goal, as stated in session 2.1.2 of the current report: (a) Apples (fruits & vegetables sector); (b) Poultry meat (meat sector); (c) Skimmed milk powder (dairy sector); and (d) Durum wheat (cereals sector). This indicates that a key performance indicator has been achieved.

4.1.4.1 Fruits and vegetables

The commodities in the fruits and vegetables sector that are subject to EU and international marketing standards are listed in Table 3. Compared to EU marketing standards, international marketing standards typically include specific marketing standards for a wider range of commodities.

With an emphasis on apples marketing standards, Table 4 outlines the main similarities and differences between EU and international regulations pertaining to apples. Surprisingly, both UNECE and OECD international marketing standards follow the same guidelines as the EU marketing standards. However, it seems that CAC international marketing standards requirements differ in a few areas, such as minimum quality requirements, classification, colour, sizing, presentation, and labelling, even though they are based on EU marketing standards. Above all, the CAC criteria address sanitation and apple-related contaminants that are not addressed by the EU marketing standards requirements.

Table 3: Fruits and vegetables commodities – EU Vs. International MkSs

COMMODITY	EU ⁴⁹ MkSs	INTERNATIONAL MkSs		
		UNECE	OECD	CAC
Apples	x	x	x	x
Bananas	x	-	x	x
Citrus fruits	x	x	x	x
Kiwifruits	x	x	x	x
Lettuces, curved-leaved endives & broad-leaves endives	x	x	x	-
Peaches & nectarines	x	x	x	-
Pears	x	x	x	x
Strawberries	x	x	x	-
Sweet peppers	x	x	x	-
Table grapes	x	x	x	x
Tomatoes	x	x	x	x
Additional	-	Ananas; Apricots; Artichokes; Asparagus; Aubergines; Avocados; Beans; Berry fruits; Broccoli; Brussels sprouts; Headed cabbages; Carrots; Cauliflower; Ceps; <u>Certain small fruits</u> ; Chanterelles; Cherries; Chicory; Chili peppers*; Chines cabbages; Courgettes; Cucumbers; <u>Cultivated mushrooms</u> ; Fennel; Fresh figs; Garlic; Leafy vegetables; Leeks; Mangoes; Melons; Onions; Peas; <u>Persimmons</u> ; Pineapples; Plums; Pomegranates*; Potatoes; <u>Quince</u> ; Rhubarb; Ribbed celery*; Root & tubercle vegetables; Shallots; Sweet chestnuts; Truffles; Watermelons	Ananas; Apricots; Artichokes; Asparagus; Aubergines; Avocados; Beans; Berry fruits; Broccoli; Brussels sprouts; Headed cabbages; Carrots; Cauliflower; Celery*; Ceps; Chanterelles; Cherries; Chicory; Chines cabbages; Courgettes; Cucumbers; <u>Dates</u> ; Fennel; Fresh figs; Garlic; Leafy vegetables; Leeks; Mangoes; Melons; Onions; <u>Papaya</u> ; <u>Passion Fruits</u> ; Peas; Pineapples; Plums; Potatoes; Rhubarb; Root & tubercle vegetables; Shallots; Truffles; Watermelons	Asparagus; Aubergines; Avocados; <u>Baby corn</u> ; Berry Fruits; <u>Bitter Cassava</u> ; <u>Black, White, Green peppers</u> ; <u>Carambola</u> ; Chanterelles; <u>Chayotes</u> ; Chili peppers*; <u>Culantro Coyotte</u> ; <u>Durian</u> ; <u>Fungi</u> ; Garlic; <u>Ginger</u> ; <u>Gooseberry</u> ; <u>Guavas</u> ; <u>Harissa</u> ; <u>Longans</u> ; <u>Lucuma</u> ; Mangoes; <u>Okra</u> ; Onions; <u>Oranges</u> ; Papaya; Passion Fruits*; Pineapples; <u>Pitahayas</u> ; Pomegranates*; Potatoes; <u>Pummelos</u> ; <u>Rambutan</u> ; <u>Sweet Cassava</u> ; <u>Tannia</u> ; <u>Yam</u>

Note 1: underline only appeared on this international standard

Note 2: star appeared on international but not EU

Table 4: Apples – EU Vs. International MkSs

CHARACTERISTICS	EU MkSs ⁴⁹	INTERNATIONAL MkSs	
		UNECE = OECD	CAC
Definition of produce	This standard applies to apples of varieties grown from <i>Malus domestica</i> Borkh, to be supplied fresh to the consumer. Apples for industrial processing are excluded.	<i>Same as EU</i>	<i>Same as EU</i>
Minimum quality requirements	<ul style="list-style-type: none"> The apples must be: intact; sound -(i.e., produce affected by rotting or deterioration such as to make it unfit for consumption is excluded); clean (i.e., practically free of any visible foreign matter); practically free from pests; free from damage caused by pests affecting the flesh; free from serious water core- except for varieties marked with 'V'; free of abnormal external moisture; free of any foreign smell and/or taste. The development and condition of the apples must be such as to enable them to: (a) withstand transportation and handling; and (b) arrive in satisfactory condition at the place of destination. 	<i>Same as EU</i>	<p><i>Very similar to the EU: They are more specific on the general quality, and they also include colour.</i></p> <ul style="list-style-type: none"> The apples must be: whole, the stalk (stem) may be missing, provided the break is clean and the adjacent skin is not damaged; sound, produce affected by rotting or deterioration such as to make it unfit for consumption is excluded; fir; clean, practically free of any visible foreign matter; practically free of pests and damage caused by them affecting the general appearance of the produce; free of abnormal external moisture, excluding condensation following removal from cold storage; free of any foreign smell and/or taste; free of damage caused by low and/or high temperatures; practically free of signs of dehydration. The apples must have colour that is characteristic of the variety and the area in which they are grown. The development and condition of the apples must be such as to enable them: to withstand transport and handling; and to arrive in satisfactory condition at the place of destination.

CHARACTERISTICS	EU MkSs ⁴⁹	INTERNATIONAL MKSs	
		UNECE = OECD	CAC
Provisions concerning quality: Maturity requirements	The apples must be sufficiently developed and display satisfactory ripeness. The development and state of maturity of the apples must be such as to enable them to continue their ripening process and to reach the degree of ripeness required in relation to the varietal characteristics. In order to verify the minimum maturity requirements, several parameters may be considered (e.g., morphological aspect, taste, firmness and refractometric index).	Same as EU	Same as EU
Provisions concerning quality: Classification	<p>The apples are classified in the following three classes</p> <p>1. 'Extra' Class - superior quality – Apples must be characteristic of the variety and with the stalk which must be intact.</p> <p>Apples must express the following minimum surface colour characteristic of the variety:</p> <ul style="list-style-type: none"> • 3/4 of total surface red coloured in case of colour group A • 1/2 of total surface mixed red coloured in case of colour group B • 1/3 of total surface slightly red coloured, blushed or striped in case of colour group C • no minimum colour requirement in case of colour group D <p>The flesh must be perfectly sound. They must be free from defects with the exception of very slight superficial defects provided these do not affect the general appearance of the produce, the quality, the keeping quality and presentation in the package:</p> <ul style="list-style-type: none"> • very slight skin defects • very slight russeting (e.g., brown patches that may not go outside the stem cavity and may not be rough) • slight isolated traces of russeting <p>2. Class I - good quality. They must be characteristic of the variety.</p> <p>Apples must express the following minimum surface colour characteristic of the variety:</p> <ul style="list-style-type: none"> • 1/2 of total surface red coloured in case of colour group A • 1/3 of total surface mixed red coloured in case of colour group B • 1/10 of total surface slightly red coloured, blushed or striped in case of colour group C • no minimum colour requirement in case of colour group D 	Same as EU	<p><i>Parameters of classification are more general than EU</i></p> <ul style="list-style-type: none"> • Extra class: superior quality • Class I: good quality • Class II: satisfy the minimum quality requirements; defects allowed: in shape and development; in colouring; skin or other defects

CHARACTERISTICS	EU MkSs ⁴⁹	INTERNATIONAL MkSs	
		UNECE = OECD	CAC
	<p>The flesh must be perfectly sound. The following slight defects, however, may be allowed, provided these do not affect the general appearance of the produce, the quality, the keeping quality and presentation in the package:</p> <ul style="list-style-type: none"> • a slight defect in shape • a slight defect in development • a slight defect in colouring • slight bruising not exceeding 1 cm² of total surface area and not discoloured • slight skin defects which must not extend over more than: 2 cm in length for defects of elongated shape, 1 cm² of total surface area for other defects, except for scab (<i>Venturia inaequalis</i>), which must not extend over more than 0,25 cm², cumulative, in area • slight russeting, such as: brown patches that may go slightly beyond the stem or pistil cavities but may not be rough, and/or thin net-like russeting not exceeding 1/5 of the total fruits surface and not contrasting strongly with the general colouring of the fruits, and/or dense russeting not exceeding 1/20 of the total fruits surface, while thin net-like russeting and dense russeting taken together may not exceed a maximum of 1/5 of the total surface of the fruits. The stalk may be missing, provided the break is clean and the adjacent skin is not damaged <p>3. Class II - This class includes apples which do not qualify for inclusion in the higher classes but satisfy the minimum requirements. The flesh must be free from major defects. The following defects may be allowed, provided the apples retain their essential characteristics as regards the quality, the keeping quality and presentation:</p> <ul style="list-style-type: none"> • defects in shape • defects in development • defects in colouring • slight bruising not exceeding 1,5 cm² in area which may be slightly discoloured • skin defects which must not extend over more than: 4 cm in length for defects of elongated shape, 2,5 cm² of total surface area for other defects, except for scab (<i>Venturia inaequalis</i>), which must not extend over more than 1 cm², cumulative, in area • slight russeting, such as: brown patches that may go beyond the stem or pistil cavities and may be slightly rough, and/or thin net-like russeting not exceeding 1/2 of the total fruits surface and not contrasting strongly with the general colouring of the fruits, and/or dense russeting not 		

CHARACTERISTICS	EU MkSs ⁴⁹	INTERNATIONAL MkSs	
		UNECE = OECD	CAC
	exceeding 1/3 of the total fruits surface, while thin net-like russeting and dense russeting taken together may not exceed a maximum of 1/2 of the total surface of the fruits		
Provisions concerning quality: Colouring	<p style="text-align: center;"><i>Not separate amendment (as in the case of CAC)</i></p> Colouring is part of classification	Same as EU	In all classes, in the absence of national legislation, the following colour codes may be applied except for green and yellow apple varieties (percentage of colour): <ul style="list-style-type: none"> • A 75% or more • B 50% or more • C 25% or more • D Less than 25%
Provisions concerning Sizing	<ul style="list-style-type: none"> • Size is determined either by the maximum diameter of the equatorial section or by weight. • The minimum size shall be 60 mm, if measured by diameter or 90 gr, if measured by weight. Fruits of smaller sizes may be accepted, if the Brix level of the produce is equal to or greater than to 10,5° Brix and the size is not smaller than 50 mm or 70 gr. • To ensure the uniformity in size, the range in size between produce in the same package shall not exceed: <ul style="list-style-type: none"> (a) For fruits sized by diameter: <ul style="list-style-type: none"> 5 mm for “Extra” Class fruits and for Classes I and II fruits packed in rows and layers 10 mm for Class I fruits packed in sales packages or loose in the package (b) For fruits sized by weight: <ul style="list-style-type: none"> For “Extra” Class and Class I and II fruits packed in rows and layers: 70-90 mm, 15 gr difference; 91-135 mm, 20 gr; 136-200 mm, 30 gr; 201-300 mm, 40 gr; >300 mm, 50 gr For Class I fruits packed in sales packages or loose in the package: 70-135 mm, 35 gr; 136-300 mm, 70 gr; >300 mm, 100 gr There is no sizing uniformity requirement for Class II fruits packed in sales packages or loose in the package 	Same as EU	<p style="text-align: center;"><i>Same as EU but less specific</i></p> <ul style="list-style-type: none"> • Size is determined by maximum diameter of the equatorial section or by weight of each apple. • For all varieties and all classes, the minimum size is 60 mm if measured by diameter or 90 gr if measured by weight. Fruits of smaller sizes may be accepted provided the Brix level of the produce meets or exceeds 10.5° Brix and the size is not smaller than 50 mm or 70 gr.

CHARACTERISTICS	EU MkSs ⁴⁹	INTERNATIONAL MkSs	
		UNECE = OECD	CAC
	<ul style="list-style-type: none"> Varieties of miniature apples, marked with an 'M', are exempted from the sizing provisions. Those miniature varieties must have a minimum Brix level of 12°. 		
Provisions concerning Tolerances	<p>At all marketing stages, tolerances in respect of quality and size shall be allowed in each lot for produce not satisfying the requirements of the class indicated.</p> <p>1. Quality tolerances:</p> <ul style="list-style-type: none"> “Extra class”: 5% by number or weight of apples not satisfying the requirements of the class, but meeting those of Class I or, exceptionally, coming within the tolerances of that class. Included therein shall be allowed not more than 1% for apples affected by decay or internal breakdown Class I: 10% by number or weight of apples not satisfying the requirements of the class, but meeting those of Class II or, exceptionally, coming within the tolerances of that class. Included therein shall be allowed not more than 1% for apples affected by decay or internal breakdown Class II: 10% by number or weight of apples satisfying neither the requirements of the class nor the minimum requirements, with the exception of apples affected by decay or internal breakdown that should not be more than 2%. Included therein shall be allowed, a maximum of 2% by number or weight of fruits which may show the following defects: cork like blemishing (bitter pit); slight damage or unhealed broken skin/cracks; presence of internal feeding insects/pests or damage to the flesh caused by pests. <p>2. Size tolerances: For all classes of fruits subjected to rules of uniformity, 10% by number or weight of apples not meeting the size indicated on the package. This tolerance may not be extended to include produce with a size below 50 mm or 10 gr or more below the minimum weight</p>	Same as EU	Same as EU
Provisions concerning Presentation	<p>1. Uniformity: The contents of each package must be uniform and contain only apples of the same origin, variety, quality and size (if sized) and the same degree of ripeness. In the case of the 'Extra' Class, uniformity also applies to colouring. However, a mixture of apples of distinctly different varieties may be packed together in a sales package provided they are uniform in quality and, for each variety concerned, in origin. Uniformity in size is not required. The visible part of the contents of the package must be representative of the entire contents. Information lasered on single fruits should not lead to flesh or skin defects.</p>	Same as EU	Same as EU. However, the following additional information is provided:

CHARACTERISTICS	EU MkSs ⁴⁹	INTERNATIONAL MkSs	
		UNECE = OECD	CAC
	<p>2. Packaging: The apples must be packed in such a way as to protect the produce properly. Sales packages of a net weight exceeding 3 kg shall be sufficiently rigid to ensure proper protection of the produce. The materials used inside the package must be clean and of a quality such as to avoid causing any external or internal damage to the produce. The use of materials, particularly of paper or stamps bearing trade specifications is allowed provided the printing or labelling has been done with non-toxic ink or glue. Stickers individually affixed on the produce shall be such that, when removed, they neither leave visible traces of glue, nor lead to skin defects. Packages must be free of all foreign matter.</p>		<ul style="list-style-type: none"> • Sales packages (of a net weight not exceeding 5 kg) may contain mixtures of varieties and sizes provided they are uniform in quality, and for each variety concerned, its origin. The visible part of the contents of the package must be representative of the entire contents except for mixed sizes and varieties. • Packaging: Apples shall be packed in each container in compliance with the Code of Practice for Packaging and Transport of Fresh Fruits and Vegetables (CXC 44-1995). • Containers: The containers shall meet the quality, hygiene, ventilation and resistance characteristics to ensure suitable handling, shipping and preserving of the apples.
Provisions concerning Marking (Labelling)	<p>Each package must bear the following particulars, in letters grouped on the same side, legibly and indelibly marked, and visible from the outside.</p> <p>1. Identification: Name and physical address of the packer and/or the dispatcher (e.g., street/city/region/postal code and, if different from the country of origin, the country). This mention may be replaced, for all packages apart from pre-packages, by the officially issued or accepted code mark representing the packer and/or the dispatcher, indicated in close connection with the reference ‘Packer and/or Dispatcher’ (or equivalent abbreviations). The code mark shall be preceded by the ISO 3166 (alpha) country/area code of the recognising country, if not the country of origin; for pre-packages only, by the name and the address of a seller established within the Union indicated in close connection with the mention ‘Packed for:’ or an equivalent mention. In this case, the labelling shall also include a code representing the packer and/or the dispatcher. The seller shall give all information deemed necessary by the inspection body as to the meaning of this code.</p> <p>2. Nature of produce: Mention the word ‘Apples’ if the contents are not visible from the outside; Name of the variety. In the case of a mixture of apples of distinctly different varieties, names of the different varieties; The name of the variety may be replaced by a synonym. A trade name may only be given in addition to the variety or the synonym; In the case of mutants with varietal protection, this variety name may replace the basic variety name. In case of mutants without varietal protection, this mutant name may only be indicated in addition to the basic variety name; ‘Miniature variety’, where appropriate.</p>	Same as EU	<p><i>Same as EU. However, the following additional information is provided:</i></p> <ul style="list-style-type: none"> • Non-retail packages: name and address of exporter, name of produce and of variety, country of origin and voluntary district of produce, commercial identification: size, class, colour code. And official inspection marks.

CHARACTERISTICS	EU MkSs ⁴⁹	INTERNATIONAL MkSs	
		UNECE = OECD	CAC
	<p>3. Origin of produce: Country of origin and, optionally, district where grown, or national, regional or local place name. In the case of a mixture of distinctly different varieties of apples of different origins, the indication of each country of origin shall appear next to the name of the variety concerned.</p> <p>4. Commercial specifications: Class; Size, or for fruits packed in rows and layers, number of units. If identification is by the size, this should be expressed: (a) for produce subject to the uniformity rules, as minimum and maximum diameters or minimum and maximum weights; (b) optionally, for produce not subject to the uniformity rules, as the diameter or the weight of the smallest fruits in the package followed by 'and over' or equivalent denomination or, where appropriate, followed by the diameter or weight of the largest fruits in the package.</p> <p>5. Official control mark (optional): Packages, when they contain sales packages, clearly visible from the outside, and all bearing these particulars shall be free from any indications such as could mislead. When these packages are palletised, the particulars shall be given on a notice placed in an obvious position on at least two sides of the pallet.</p>		
Additional	-	-	<p>1. Contaminants:</p> <ul style="list-style-type: none"> The produce covered by this Standard shall comply with the maximum levels of the General Standard for Contaminants and Toxins in Food and Feed (CXS 193-1995). The produce covered by this Standard shall comply with the maximum residue limits for pesticides established by the Codex Alimentarius Commission. <p>2. Hygiene:</p> <ul style="list-style-type: none"> It is recommended that the produce covered by the provisions of this Standard be prepared and handled in accordance with the appropriate sections of the General Principles of Food Hygiene (CXC 1-1969), Code of Hygienic Practice for Fresh Fruits and Vegetables (CXC 53-2003), and other relevant Codex texts such as Codes of Hygienic Practice and Codes of Practice.

CHARACTERISTICS	EU MkSs ⁴⁹	INTERNATIONAL MkSs	
		UNECE = OECD	CAC
			<ul style="list-style-type: none"> The produce should comply with any microbiological criteria established in accordance with the Principles and Guidelines for the Establishment and Application of Microbiological Criteria related to Foods (CXG 21-1997).

4.1.4.2 Meat

The meat industry's commodities that are subject to EU and international regulations are listed in Tables 5 and 6. Since the OECD standards, as previously stated, solely address the fruits and vegetables industry, only the UNECE and CAC international marketing standards were taken into consideration in this instance. In contrast to the EU marketing standards, the international marketing standards contain specific marketing rules for a wider range of commodities. According to the analysis (Table 5), CAC requirements are only defined for processed meat products (i.e., cooked, dried, or refrigerated), whereas UNECE criteria are only issued for fresh meat products at the international level. Furthermore, fresh meat products are the only ones subject to EU marketing requirements. As a result, we went on to compare the EU with the international standards set by UNECE (Tables 5 and 6).

Table 5: Meat commodities – International MkSs

COMMODITY	FRESH MEAT	CHILLED – PROCESSED MEAT	DRIED MEAT
General meat	UNECE	CAC	CAC
Beef products	UNECE	CAC	-
Veal products	UNECE	-	-
Pigmeat products	UNECE	CAC	-
Sheep meat/goatmeat products	UNECE	-	-
Poultry meat products	UNECE	-	-
Deer meat products	UNECE	-	-
Duck meat products	UNECE	-	-
Llama/alpaca meat	UNECE	-	-
Rabbit meat	UNECE	-	-
Horse meat	UNECE	-	-

In contrast to EU marketing standards, UNECE international marketing standards control a wide range of items, as Table 6 illustrates.

Table 6: Meat commodities – EU Vs. International MkSs

COMMODITY	EU MkSs ⁴⁸	INTERNATIONAL MkSs UNECE
Pig meat	x	x
Sheep meat & goatmeat	x	x
Poultry meat	x	x
		(distinguish between chicken & turkey & goose)
Beef & veal	x	x
Additional	-	Deer meat; Duck meat; Llama/alpaca meat; Rabbit meat; Horse meat

With an emphasis on meat marketing standards, Table 7 outlines the main similarities and differences between EU and international regulations pertaining to chicken meat. EU and UNECE international

requirements seem to be slightly different. Above all, the UNECE requirements address packing, storage, transport and provisions of conformity assessment requirements that are not addressed by the EU marketing guidelines. Additionally, the EU requirements address chicken-meat related water content as well as absorption of water at the slaughterhouse, which are not addressed by UNECE requirements.

Table 7: Chicken meat – EU Vs. International MkSs

CHARACTERISTICS	EU MkSs ⁴⁸	INTERNATIONAL MkSs UNECE
Scope and Definitions	This standard regulates fresh, prepackaged frozen & quick-frozen poultry cuts. It shall not apply to: (a) poultry meat for export from the Community; and (b) delayed eviscerated poultry as referred to in Regulation (EC) No 853/2004 laying down specific hygiene rules for food of animal origin.	<p style="text-align: center;"><i>More general than the EU</i></p> <p>In particular: This standard recommends an international language for raw (unprocessed) chicken (<i>Gallus domesticus</i>) carcasses and parts (or cuts) marketed as fit for human consumption. Products with added ingredients or “chicken preparations” are not included. It only regulates processed poultry meat.</p>
Minimum requirements	<p>1. Poultry carcasses shall be: (a) intact, considering the presentation; (b) clean, free from any visible foreign matter, dirt or blood; (c) free of any foreign smell; (d) free of visible bloodstains except those which are small and unobtrusive; (e) free of protruding broken bones; (f) free of severe contusions. In the case of fresh poultry, there shall be no traces of prior chilling.</p> <p>2. Quality and weight grading: Poultry meat shall be graded by quality as either Class A or Class B according to the conformation and appearance of the carcasses or cuts. This classification shall take account of flesh development, the presence of fat and the amount of damage and contusions. To be graded as Class A, poultry carcasses and cuts shall in addition satisfy the following criteria: (a) they shall be of good conformation. The flesh shall be plump, the breast well developed, broad, long and fleshy, and the legs shall be fleshy. On chickens, there shall be a thin regular layer of fat on the breast, back and thighs. On cocks, hens, ducks and young geese a thicker layer of fat is permissible; (b) a few small feathers, stubs (quill ends) and hairs (filoplumes) may be present on the breast, legs, back, foot joints and wing tips; (c) some damage, contusion and discoloration are permitted if it is small and unobtrusive and not present on the breast or legs. The wing tip may be missing. A slight redness is permissible in wing tips and follicles; (d) in the case of frozen or quick-frozen poultry there shall be no traces of freezer-burn except those that are incidental, small and unobtrusive and not present on the breast or legs. Prepackaged frozen or quick-frozen poultry meat may be classified by weight category.</p>	<p style="text-align: center;"><i>Compared to the EU, it is more specific regarding carcasses, and it also concerns origin. However, it does not include any criteria regarding quality and weight grading</i></p> <p>1. Poultry carcasses must be: Free from any foreign material (e.g. glass, rubber, plastic, metal); Free of foreign odours; Free of faecal contamination; Free of improper bleeding; Free of viscera, trachea, oesophagus, mature reproductive organs, and lungs; Practically free of feathers and haemorrhaging; Free of freezer-burn; Free of gall discoloration.</p> <p>2. Origin: All meat must originate from animals slaughtered in establishments regularly operated under the applicable regulations pertaining to food safety and inspection.</p>

CHARACTERISTICS	EU MkSs ⁴⁸	INTERNATIONAL MkSs UNECE
Specific requirements of production	<p>1. Poultry cuts: a) half: half of the carcasses; (b) quarter: leg quarter or breast quarter; (c) unseparated leg quarters: both leg quarters united by a portion of the back, with or without the rump; (d) breast: the sternum and the ribs, or part thereof, distributed on both sides of it, together with the surrounding musculature; (e) leg; (f) chicken leg with a portion of the back: the weight of the back does not exceed 25 % of that of the whole cut; (g) thigh: the femur together with the surrounding musculature; (h) drumstick: the tibia and fibula together with the surrounding musculature; (i) wing; (j) unseparated wings: both wings united by a portion of the back, where the weight of the latter does not exceed 45 % of that of the whole cut; (k) breast fillet: the whole or half of the breast deboned, i.e. without sternum and ribs; (l) breast fillet with wishbone: the breast fillet without skin with the clavicle and the cartilaginous point of the sternum only, the weight of clavicle and cartilage not to exceed 3 % of that of the cut; (m) maigret: breast fillet of ducks and geese referred to in point (3) comprising skin and subcutaneous fat covering the breast muscle, without the deep pectoral muscle; (n) deboned turkey leg meat: turkey thighs and/or drumsticks, deboned, i.e. without femur, tibia and fibula, whole, diced or cut into strips. Products listed under (d) to (k) may be presented with or without skin. The absence of skin in the case of products listed under (d) to (j) or the presence of the skin in the case of the product listed under (k) shall be mentioned in the labelling.</p> <p>2. Conditions: Poultry meat shall be marketed as: (a) fresh; (b) frozen; or (c) quick frozen</p> <p>3. Sale: Poultry carcasses shall be presented for sale in one of the following forms: (a) partially eviscerated (refile 'roped'); (b) with giblets; (c) without giblets. Partially eviscerated carcasses are carcasses from which the heart, liver, lungs, gizzard, crop, and kidneys have not been removed. For all carcasses presentations, if the head is not removed, trachea, oesophagus and crops may remain in the carcasses.</p> <p>3. Frozen poultry meat production: The temperature of frozen poultry meat must be stable and maintained, at all points in the product, at - 12 °C or lower, with brief upward fluctuations of no more than 3 °C.</p> <p>4. Pre-packages of frozen or quick-frozen poultry meat classification by categories of nominal weights as follows: (a) carcasses: < 1100 gr: classes of 50 gr (1050 -1000 - 950, etc.), 1100 - < 2400 gr: classes of 100 gr (1100 - 1200 - 1300, etc.), ≥ 2400 gr: classes of 200 gr (2400 - 2600- 2800, etc.); (b) cuts: <</p>	<p><i>Compared to the EU, it is more general, regulating different aspects. It regulates traceability, chicken category, production, feeding and slaughter system, and anti-microbial treatment</i></p> <p>1.Traceability: requires a verifiable method of identification of products or batches of products at all relevant stages of production.</p> <p>2. Chicken category (very young: <28days; young: <=84 days & flexible tip of sternum; roasters: <=84 days & less flexible tip of sternum; Capons 1: surgically neutered <=120 days; Capons 2: surgically neutered <=140 days; Egg-laying hens; Breeding hens and roasters; other).</p> <p>3.Production system: (a) Conventional;(b) free-range; (c) or organic</p> <p>4.Feeding system</p>

CHARACTERISTICS	EU MkSs ⁴⁸	INTERNATIONAL MkSs UNECE
	<p>1100 gr: classes of 50 gr (1050 - 1000 - 950, etc.), ≥ 1100 gr: classes of 100 gr (1100 - 1200 - 1300, etc.).</p> <p>Pre-packages shall be made up in such a way that they satisfy the following requirements: (a) the actual contents shall not be less, on average, than the nominal weight; (b) the proportion of pre-packages having a negative error greater than the tolerable negative error shall be sufficiently small for batches of prepackages to satisfy the requirements of the tests; (c) no pre-package having a negative error greater than twice the tolerable negative error shall be marketed.</p> <p>The checking of pre-packages shall be carried out by sampling and shall be in two parts: a check covering the actual content of each pre-package in the sample, a check on the average actual contents of the pre-packages in the sample.</p> <p>In the case of pre-packaged poultry meat, the following tolerable negative errors are permitted: less than 1100 gr weight – tolerable negative error 25 carcasses 25 cuts; 1100 gr to 2400gr - 50 carcasses 50 cuts; 2400 gr and more 100 carcasses.</p> <p>5. Chilling system: (a) air chilling: chilling of poultry carcasses in cold air, (b) air-spray chilling: chilling of poultry carcasses in cold air interspersed with water haze or fine water spray, (c) immersion chilling: chilling of poultry carcasses in tanks of water or of ice and water, in accordance with the counterflow process.</p>	<p>5.Slaughter system: (a) stunned; (b) appropriate ritual</p> <p>6.Chilling system: Same as EU</p>

CHARACTERISTICS	EU MkSs ⁴⁸	INTERNATIONAL MkSs UNECE
	<p>6. Types of farming except for organic or biological farming: (a) ‘Fed with ... % ...’; (b) ‘Extensive indoor’ (‘Barn-reared’); (c) ‘Free range’; (d) ‘Traditional free range’; (e) ‘Free range - total freedom’.</p> <p>7. Slaughterhouses: 1. They shall keep a separate record, by type of farming of: (a) the names and addresses of the producers of such birds, who shall be registered following an inspection by the competent authority of the Member State; (b) at the request of this authority, the number of birds kept by each producer per turnround; (c) the number and total live or carcass weight of such birds delivered and processed; (d) details of sales, including names and addresses of purchasers, for a minimum of six months following dispatch. 2. They shall keep up-to-date records, for a minimum of six months following dispatch, of the number of birds by type of farming showing also the number of birds sold, the name and addresses of the purchasers, and quantities and source of feed supply.</p> <p>8. Marking by way of business or trade: The following fresh, frozen and quick-frozen poultry cuts may be marketed by way of business or trade within the Community only if the water content does not exceed the technically unavoidable values: a) chicken breast fillet, with or without wishbone, without skin; (b) chicken breast, with skin; (c) chicken thighs, drumsticks, legs, legs with a portion of the back, leg quarters, with skin; (d) turkey breast fillet, without skin; (e) turkey breast, with skin; (f) turkey thighs, drumsticks, legs, with skin; (g) deboned turkey leg meat, without skin.</p>	<p>7. Anti-microbial treatments (with or without)</p> <p>8. Quality level (minimum, highest, second)</p>
Labelling	<p>In the case of fresh poultry meat, the date of minimum durability shall be replaced by the ‘use by’.</p> <p>In the case of pre-packaged poultry meat, the following particulars shall also appear on the pre-packaging or on a label attached thereto: (a) the class; (b) the total price and the price per weight unit at the retail stage; (c) the condition in which the poultry meat is marketed in accordance and the recommended storage temperature; (d) the registered number of the slaughterhouse or cutting plant; (e) in the case of poultry meat imported from third countries, an indication of the country of origin.</p> <p>Where poultry meat is offered for sale without pre-packaging, except where cutting and boning take place at the place of sale provided such cutting and boning is carried out at the request and in the presence of the consumer.</p>	<p><i>Compared to the EU, it regulates additional aspects.</i></p> <p>1. Mandatory information (Name of the product; Health stamp/inspection stamp; Sell-by/use-by date as required by each country; Storage conditions: e.g. “Store at or below XX °C”; Appropriate identification of packer, distributor or dispatcher; Net weight in kg (and optionally lb); Percentage of additional water.)</p>

CHARACTERISTICS	EU MkSs ⁴⁸	INTERNATIONAL MkSs UNECE
	<p>Marking: In addition to complying with the national legislation adopted, the following further indications shall be shown on the accompanying commercial documents: (a) the class; (b) the condition in which the poultry meat is marketed and the recommended storage temperature.</p> <p>All pre-packages shall bear an indication of the weight of the product, known as 'nominal weight', which they are required to contain.</p>	<p>2. Other product claims as required from importing country's legislation (Country of birth; Country(ies) of raising; Country of slaughter; Country(ies) of processing/cutting; Country(ies) of packing; Country of origin: In this standard the term "country of origin" is reserved to indicate that birth, raising, slaughter, processing/cutting and packing have taken place in the same country; Production and feeding systems; Processing/packaging date; Quality/grade/classification; Slaughtering procedures; Chilling system.</p> <p>3. Product/part code</p> <p>4. Bone (not specified; not all the bones removed; all bones removed)</p> <p>5. Skin (not specified; with skin that is either whitish or yellowish in colour; with skin that has a whitish colour; with skin that has yellowish colour; all skin removed)</p> <p>6. Refrigeration (not specified; chilled: -2+4; chilled with ice added; chilled with dry ice added; deeply chilled: -12-2; frozen<=-12; deep frozen: <=-18; individually deep frozen; individually deep frozen with ice glazing; other)</p>
Additional standards	<ol style="list-style-type: none"> 1. Total water content of chicken 2. Checking the absorption of water at the slaughterhouse 	<ol style="list-style-type: none"> 1. Packing, storage, transport 2. Provisions concerning conformity assessment requirements

4.1.4.3 Dairy

The dairy industry's commodities that are subject to EU and international regulations are listed in Table 8. Since the OECD standards, as previously stated, solely address the fruits and vegetables industry, and the UNECE standards do not focus on dairy products, only the CAC international marketing standards were taken into consideration in this instance. In contrast to the EU marketing standards, the international marketing standards contain specific marketing rules for a wider range of cheese and milk types.

Table 8: Dairy commodities – EU Vs. International MkSs

COMMODITY	EU MkSs ^{46,47}	INTERNATIONAL MkSs
		CAC
Drinking milk and cream	x	x
Buttermilk	x	x
Yogurt	x	x
Kephir	x	
Milk powder	x	x
Butter and other fats and oils derived from milk	x	x
Cheese (general)	x	x
Lactose and lactose syrup	x	-
Additional	-	More specific compared to EU for cheese and different types of milk. Fermented milk; Blend of evaporated skimmed milk & vegetable fat; Dairy fat; Specific standards per cheese (Mozzarella; Cheddar; Denbo; Edam; Gouda; Havarti; Samsel; Emmental; Tilsiter; Saint-Paulin; Provolone; Cottage cheese; Coulommiers; Cream cheese; Camembert; Brie; Extra hard grading cheese; Whey cheeses); Milkfat products; Evaporated milk; Sweetened condensed milk; Cream & prepared creams; Dairy permeate powders; Dough.

Table 9 lists the key parallels and discrepancies between EU and international legislation concerning skimmed milk powder, with a focus on dairy marketing standards. International requirements appear to differ slightly between the EU and CAC. Above all, whereas EU rules are more stringent when it comes to food additives, CAC requirements are more stringent when it comes to labelling. Furthermore, EU marketing standards cover storage conditions requirements that are not covered by UNECE requirements, while CAC requirements cover sampling and analytical techniques that are not covered by EU marketing standards.

Table 9: Skimmed milk powder – EU Vs. International MkSs

CHARACTERISTICS	EU MkSs ^{46,47}	INTERNATIONAL MkSs CAC
Scope	Buying-in and selling from public intervention of products, including skimmed milk powder	This standard applies to milk powders and cream powder intended for direct consumption or further processing
Description/Definition	-	Milk powders (skimmed is included here) and cream powder are milk products which can be obtained by the partial removal of water from milk or cream
Minimum requirements	<p>Products shall be of sound, fair and marketable quality and meet the requirements laid down in Regulation (EU) No 1308/2013.</p> <p>The skimmed-milk powder must have been produced during the 31 days preceding the day on which the paying agency receives the offer to sell at fixed price or, in the case of tenders, during the 31 days preceding the closing date of the tendering sub-period. If the skimmed-milk powder is stored in silos containing the production of more than one day, it must have been produced during the three weeks preceding the week during which the offer to sell at fixed price is received or, in the case of tenders, during the four weeks preceding the closing date of the tendering sub-period.</p>	<p><i>Compared to the EU, it presents no minimum requirements. It mostly focuses on the composition and hygiene of the skimmed milk powder</i></p>
Composition	<p>1. Fat content: (a) the average fat content shall be declared without the use of decimals; (b) the average fat content may not differ by more than one percentage point from the percentage declared. Individual samples may not differ by more than two percentage points from the percentage declared; (c) in all cases, the average fat content must comply with the limits laid down in the Annex to Regulation (EC) No 2991/94.</p> <p>2. Compositional requirements for skimmed milk powder: (a) Protein content: minimum 34% of the non-fat dry matter; (b) Fat content: maximum 1%; (c) Water content: maximum 3.5%; (d) Tirable acidity in ml of decinormal sodium hydroxide solution: maximum 19.5 ml; (e)</p>	<p><i>Compared to the EU, it only regulates the maximum protein, fat and water content. The maximum protein content is same as EU, while maximum fat and water content are higher. Max fat content is 1.5%, and max water content 5%.</i></p>
Quality characteristics	<p>Lactate content: maximum 150 mg/100 gr; Phosphatase test: negative; Solubility index: maximum 0.5 ml (24 °C); Burnt-particles index: maximum 15 mg; Micro-organism content: maximum 40000 per gr; Detection of coliforms: negative in 0.1 gr; Detection of buttermilk: negative; Detection of rennet whey: none; Detection of acid whey: none; Taste and smell: clean; Appearance: White or slightly yellowish</p>	-

CHARACTERISTICS	EU MkSs ^{46,47}	INTERNATIONAL MkSs CAC
	colour, free from impurities and coloured particles; Antimicrobial substances: negative.	
Food additives	No additives are permitted	<p style="text-align: center;"><i>Less strict than EU</i></p> Additive functional classes indicated as technologically justified may be used for the product categories specified (acidity regulators; anticaking agents; antioxidants; emulsifiers; firming agents; stabilizers)
Contaminants	-	The milk used in the manufacture of the products covered by this standard shall comply with the maximum levels for contaminants and toxins specified for milk by the General Standard for Contaminants and Toxins in Food and Feed (CXS 193-1995) and with the maximum residue limits for veterinary drug residues and pesticides established for milk by the Codex Alimentarius Commission.
Hygiene	Each storage place shall fulfil the following requirements: (a) it has available the necessary technical equipment to take over the products; (b) it is able to remove quantities to comply with the removal period indicated in Article 37(2) of Implementing Regulation (EU) 2016/1240; (c) it has a minimum storage capacity as laid down in Article 3(1) of Implementing Regulation (EU) 2016/1240.	It is recommended that the products covered by the provisions of this standard be prepared and handled in accordance with the appropriate sections of the General Principles of Food Hygiene (CXC 1-1969), the Code of Hygienic Practice for Milk and Milk Products (CXC 57-2004) and other relevant Codex Alimentarius texts such as codes of hygienic practice and codes of practice. The products should comply with any microbiological criteria established in accordance with the Principles and Guidelines for the Establishment and Application of Microbiological Criteria Related to Foods (CXG 21-1997).
Labelling	The bags shall show the net weight. Compliance with the origin requirements.	<p style="text-align: center;"><i>Stricter compared to the EU</i></p> In addition to the provisions of the General Standard for the Labelling of Pre-packaged Foods (CXS 1-1985) and the General Standard for the Use of Dairy Terms (CXS 206-1999), it should also include the following information: (a) Name of food

CHARACTERISTICS	EU MkSs ^{46,47}	INTERNATIONAL MkSs CAC
		(=skimmed milk powder); (b) declaration of milk fat content; (c) declaration of milk protein; (d) list of ingredients
Additional	Aid for private storage shall only be granted for skimmed milk powder: (a) which contains no more than 1,5 % fat and 5 % water and has a protein content of the non-fat dry matter of at least 34 %; (b) has been produced during the 60 days preceding the day of application or the day of submission of the tender; (c) which is stored in bags with a net weight of 25 kg or in 'big bags' weighing no more than 1500 kg.	Methods of analysis and sampling

4.1.4.4 Cereals

The commodities in the cereals sector that are subject to EU and international marketing standards are listed in Table 10. Since the OECD standards, as previously stated, solely address the fruits and vegetables industry, and the UNECE standards do not focus on cereals, only the CAC international marketing standards were taken into consideration in this instance. In contrast to the EU marketing standards, the international marketing standards contain specific marketing rules for a wider range of cereals commodities.

Table 10: Cereals commodities – EU Vs. International MkSs

COMMODITY	EU MkSs ⁴⁷	International MkSs
		CAC
Sweetcorn (fresh or chilled)	x	-
Durum wheat	x	x
Wheat or meslin flour	x	x
Cereal flours other than wheat or meslin (corn, barley, oat)	x	x
Rice	x	x
Additional		Pearl millet grains; sorghum grains

Table 11 lists the main similarities and differences between EU and international regulations, with a focus on durum wheat marketing standards. The fact that CAC international marketing standards adhere to the same rules as EU marketing standards is noteworthy. But compared to the EU, it appears that CAC criteria are less detailed. Most importantly, EU does not include hygiene, packaging and labelling requirements for durum wheat, while the CAC requirements cover durum wheat analysis and sampling techniques that are not covered by EU marketing standards.

Table 11: Durum wheat – EU Vs. International MkSs

CHARACTERISTICS	EU MkSs ⁴⁷	INTERNATIONAL MkSs CAC
Scope	This Standard applies to wheat grains, durum wheat grains, barley and maize intended for processing for human consumption	This Standard applies to wheat grains and durum wheat grains intended for processing for human consumption. It does not apply to club wheat (<i>Triticum compactum</i> Host.), red durum wheat, durum wheat semolina or products derived from wheat
Description	Not identified	Durum wheat is the grains obtained from varieties of the species <i>Triticum durum</i>
General quality & safety factors	(a) durum wheat is of the typical colour; (b) durum wheat is free from abnormal smell and live pests (including mites) at every stage of their development; (c) durum wheat meets the minimum quality requirements.	<p style="text-align: center;"><i>Less specific than EU</i></p> (a) durum wheat shall be safe and suitable for processing for human consumption; (b) durum wheat shall be free from abnormal flavours, odours, living insects and mites.
Specific quality & safety factors	Presented as minimum quality requirements: <ol style="list-style-type: none"> 1. Moisture content: max level 14.5% m/m 2. Max percentage of matter which is not basic cereal of unimpaired quality 12%: (a) broken grains – 6%; (b) grain impurities – 8.5%: impurities other than mottled grains – 5% (no specific limit for shrivelled grains, grains damaged by pests and grains in which the germ is discoloured; 3% other cereals; 0.5% grains overheated during drying); mottled grains 3.5%; (c) sprouted grains – 4%; (d) miscellaneous impurities – 4.5% (noxious as extraneous seeds – 0.10%; grains damaged by spontaneous heating or too extreme heating during drying – 0.05%; grains affected with fusariosis – 1.5%; ergot - 0.05%; no specific limit for extraneous seeds other than noxious, other damaged grains, extraneous matter, husks, decayed grains, impurities for animal origin). 3. Max percentage of wholly or partially vitreous grains: 27% 4. Minimum specific weight: 78 Kg/hl 5. Minimum protein content (as percentage of dry matter): 11.5% 6. Hagberg falling number (seconds): 220 	<p style="text-align: center;"><i>Less specific than EU. Only focuses on:</i></p> <ol style="list-style-type: none"> 1. Moisture content – Same as EU 2. Ergot – Same as EU 3. Extraneous matter are all organic and inorganic materials other than wheat and durum wheat, broken kernels, other grains and filth 4. The products shall be free from the following toxic or noxious seeds in amounts which may represent a hazard to human health. – <i>Crotalaria</i> (<i>Crotalaria</i> spp.), Corn cockle (<i>Agrostemma githago</i> L.), Castor bean (<i>Ricinus communis</i> L.), Jimson weed (<i>Datura</i> spp.), and other seeds that are commonly recognized as harmful to health 5. Impurities of animal origin, (including dead insects): 0.1% m/m maximum (different than EU) 6. Other Organic extraneous matter: 1.5% m/m maximum

CHARACTERISTICS	EU MkSs ⁴⁷	INTERNATIONAL MkSs CAC
		7. Inorganic extraneous matter which is defined as any inorganic component (stones, dust, etc.): 0.05% m/m maximum
Contaminants	<p>Maximum levels of contaminants, including radioactivity, do not exceed the maximum levels permitted under Union legislation those permitted under Council Regulation (EEC) No 315/93 (1), including the requirements regarding the Fusarium-toxin level for common wheat and durum wheat laid down in Commission Regulation (EC) No 1881/2006</p> <p>Member States shall check levels of contaminants, including radioactivity, based on a risk analysis, taking account of the information supplied by the operator and the commitments of the latter regarding compliance with the standards set, especially in the light of the results of the analyses. In addition, in cases where analyses indicate that the Zeleny index of a batch of common wheat is between 22 and 30, for this wheat to be deemed sound, fair and of marketable quality, the dough obtained from it must be judged to be non-sticky and machinable</p>	<p style="text-align: center;"><i>Less specific than EU</i></p> <ul style="list-style-type: none"> • Free of heavy metals. • Pesticide residues: comply with those maximum residue limits established by the Codex Alimentarius Commission for this commodity
Hygiene	-	<ul style="list-style-type: none"> • Follow Codes of Practice recommended by the Codex Alimentarius Commission • Free from objectionable matter • Free from micro-organisms in amounts which may represent a hazard to health • Free from parasites which may represent a hazard to health • Not contain any substance originating from micro-organisms, including fungi, in amounts which may represent a hazard to health
Packaging	-	<ul style="list-style-type: none"> • Containers which will safeguard the hygienic, nutritional, technological, and organoleptic qualities of the product • Made of substances which are safe and suitable for their intended use • When the product is packaged in sacks, these must be clean, sturdy, and strongly sewn or sealed
Labelling	-	In addition to the requirements of the General Standard for the Labelling of Prepackaged Foods (CXS 1-1985), the following specific provisions apply: (a) name of product; (b) labelling of non-retail containers.
Additional	-	Methods of analysis and sampling

4.1.5 National marketing standards

National food standards represent the minimum requirements for food to enter the market. They are typically imposed by governments or other governmental bodies and are generally voluntary in nature. The government must be ready to enforce mandatory national marketing requirements in the event that sufficient food quality compliance with voluntary standards is not attained, nevertheless, if a voluntary standards approach is to be successful.⁸⁴ National standards are essential for guaranteeing the quality of food, and they may be implemented for food production, operation, inspection, import and export, supervision and administration. These indicators may consist of several elements, including the quantity of pollutants or adulterants present in a food product, the food's nutritional value, the existence of allergies, the precision of food labelling, and the overall cleanliness and hygiene of the food production and handling facilities.⁸⁵

The EU member states may only adopt or maintain additional national standards concerning matters not specifically harmonised with EU marketing standards regulations. These national requirements should adhere to the Food Law,⁶² specifically the free movement of products principle, and should not deviate from EU marketing standards.³³ Member states can, for instance, adopt mandatory measures of information derogating from (EC) No 1169/2011⁴⁵ in the case of milk and milk products presented in glass bottles.

It is interesting to note that the free flow of commodities, including discrimination against food from other member states, should not be restricted, hindered, or prohibited by national rules in other countries.⁴⁵ However, requirements under national standards might differ according to size dimensions, weight, composition, labelling, packaging and testing.⁸⁶ Also, the governments of EU countries are obliged to publish their national rules.

From a trade standpoint, national public marketing standards pose a major risk since they are supported by the power of the state and because governments may favour domestic producers over imports by requiring unique production and processing techniques.⁶³ Therefore, when the trade component is taken into account, national standards may have complex impacts.⁸⁷ On the one hand, companies that must meet food quality standards in their home markets that are different from those in other countries may find it more difficult to compete with domestic companies when selling in overseas markets. By the same token, the interests of exporters in nations that impose national standards may also be harmed by them. Because higher-quality food tends to have higher production costs, domestic exporters may be less competitive in global markets where their foreign rivals are exempt from meeting the same quality standards unless they can differentiate their products and secure a return for higher quality.⁶³

4.1.5.1 National standards in 10 European Countries

Finding national standards that may be used in ten EU countries was another goal of Task 1.2 of the ROSETTA project, and its accomplishment marked another key performance indicator achieved. In doing so, we focused on the countries that represent the ROSETTA use cases (i.e., Denmark, Greece, Ireland, Poland, Spain), as well as, Austria, France, Germany, Italy, and the Netherlands. These countries were primarily selected due to their significant influence within the EU market, as they represent major economies and diverse regulatory

⁸⁴ Josling, T., Roberts, D., & Orden, D. (2004). *Food Regulation and Trade: Towards a Safe and Open Global System*, Institute for International Economics, Washington D.C.

⁸⁵ Tang, S., Li, T., & Zheng, Y. (2023). "Effects of Higher Minimum Quality Standards on Food Safety: Evidence from Criminal Cases Found in China's Court Documents", *Journal of Food Protection*, 86(7), 100098.

⁸⁶ EU – Identifying Product Requirements, Available at: https://europa.eu/youreurope/business/product-requirements/compliance/identifying-product-requirements/index_en.htm

⁸⁷ Henson, S.J. (2004). "National Laws, Regulations, and Institutional Capabilities for Standards Development". *Proceedings of the World Bank training seminar on Standards and Trade*, Washington DC.

frameworks, offering comprehensive insights into national marketing standards. Additionally, the availability of reliable information and the language of the available information enhances the feasibility of thorough search and analysis of the national marketing standards in these European countries.

According to the assessment of national marketing standards, every nation complies with EU Food Law and EU marketing standards for the food commodities under consideration. Additionally, it was discovered that every nation, except for Greece, have national marketing standards. The marketing standards that are seen as national in Greece^{88,89} are essentially a reflection of EU standards, that is they simply translate EU Food Law and EU marketing standards into the local language without imposing any new requirements. Nevertheless, Greek government agencies have given a number of goods the Protected Designation of Origin (PDO) label in accordance with EU regulations. Furthermore, as shown in Table 12, the national marketing standards in each of selected countries (i.e., Austria^{90,91}, Denmark^{92,93}, France^{94,95}, Germany^{96,97,98}, Ireland^{99,100}, Italy^{101,102}, Netherlands^{103,104}, Poland^{105,106}, Spain¹⁰⁷) centre on labelling and packaging requirements. It's also noteworthy that Ireland¹⁰⁸ has national standards for potatoes, and Germany and Spain have trademarks requirements.

⁸⁸ USDA Food and Agricultural Import Regulations and Standards Certification – Greece (2017), Available at: <https://fas.usda.gov/data/greece-food-and-agricultural-import-regulations-and-standards-certification>

⁸⁹ USDA FAIRS Annual Country – Greece (2022), Available at: <https://fas.usda.gov/data/greece-fairs-annual-country-0>

⁹⁰ USDA FAIRS Annual Country – Austria (2024), Available at: <https://fas.usda.gov/data/austria-fairs-annual-country-report-9>

⁹¹ USDA Food and Agricultural Import Regulations and Standards Country Report – Austria (2022), Available at: <https://fas.usda.gov/data/austria-food-and-agricultural-import-regulations-and-standards-country-report>

⁹² Danish Agricultural & Food Council, Available at: <https://agricultureandfood.dk/danish-agriculture/agriculture/livestock/animal-welfare/>

⁹³ The Danish Product Standards, Available at: <https://pigresearchcentre.dk/DANISH-quality-assurance-scheme/The-DANISH-Product-Standard>

⁹⁴ USDA FAIRS Annual Country – France (2023), Available at: <https://fas.usda.gov/data/france-fairs-annual-country-report-9>

⁹⁵ USDA Food and Agricultural Import Regulations and Standards Country Report – France (2022), Available at: <https://fas.usda.gov/data/france-food-and-agricultural-import-regulations-and-standards-country-report>

⁹⁶ USDA FAIRS Annual Country – Germany (2024), Available at: <https://fas.usda.gov/data/germany-fairs-country-report-annual>

⁹⁷ USDA Food and Agricultural Import Regulations and Standards Country Report – Germany (2024), Available at: <https://fas.usda.gov/data/germany-food-and-agricultural-import-regulations-and-standards-country-report>

⁹⁸ USDA Food and Agricultural Import Regulations and Standards Country Report – Germany (2022), Available at: <https://fas.usda.gov/data/germany-food-and-agricultural-import-regulations-and-standards-country-report>

⁹⁹ Food Safety Authority of Ireland – Labelling of Meat Products, Available at: <https://www.fsai.ie/enforcement-and-legislation/legislation/food-legislation/meat-meat-products/labelling>

¹⁰⁰ USDA Exporter Guide – Ireland (2024), Available at: <https://fas.usda.gov/data/ireland-exporter-guide>

¹⁰¹ USDA FAIRS Annual Country – Italy (2023), Available at: <https://fas.usda.gov/data/italy-fairs-annual-country-report-annual>

¹⁰² USDA Food and Agricultural Import Regulations and Standards Country Report – Italy (2022), Available at: <https://fas.usda.gov/data/italy-food-and-agricultural-import-regulations-and-standards-country-report-0>

¹⁰³ USDA FAIRS Annual Country – Netherlands (2024), Available at: <https://fas.usda.gov/data/netherlands-fairs-export-certificate-report-annual>

¹⁰⁴ USDA Food and Agricultural Import Regulations and Standards Country Report – Netherlands (2023), Available at: <https://fas.usda.gov/data/netherlands-food-and-agricultural-import-regulations-and-standards-country-report-0>

¹⁰⁵ USDA Food and Agricultural Import Regulations and Standards Country Report – Poland (2022), Available at: <https://fas.usda.gov/data/poland-food-and-agricultural-import-regulations-and-standards-country-report-0>

¹⁰⁶ USDA FAIRS Annual Country – Poland (2024), Available at: <https://fas.usda.gov/data/poland-fairs-export-certificate-report-annual>

¹⁰⁷ USDA FAIRS Annual Country – Spain (2024), Available at: <https://fas.usda.gov/data/spain-fairs-country-report-annual>

¹⁰⁸ Food Safety Authority of Ireland – National Legislation, Available at: <https://www.fsai.ie/enforcement-and-legislation/legislation/food-legislation/food-standards>

Table 12: National marketing standards – Comparisons among countries

Country	National MkSs
Austria	Labelling: Mandatory information of origin for milk, meat, and eggs as primary ingredients in processed products and in public catering.
Denmark	Packaging: Ceramics that come in contact with food: Maximum limits for lead and cadmium, including requirements for migration from the mouth rind.
France	<p>Labelling: Regulations severely limit the use superlatives in food labelling. Product nomenclature may describe a product, but not promote it. For example, terms such as “great” cannot be used to describe a food product. The use of the word “natural” may depend upon its location on the label and the product, and this is strictly regulated by the Code de la Consommation. Labels may not imply that a food has certain properties when similar products possess the same properties. The country of origin must be indicated in letters not less than 4 millimetres in height on all product packaging (packing labels, etc.). For prepackaged food products, the manufacturer’s lot number must be listed on the packaging or on the commercial documents accompanying the product preceded by the letter “L” or “Lot.” This is required for purposes of traceability.</p> <p>Transparency of Information for Food Products: Applies to the labelling of meat products sold in restaurants and by institutional caterers. According to this, words traditionally used for products of animal origin, such as milk, cheese, sausage, filet, ham, bacon and steak, cannot be used for food products made from vegetable-sourced proteins. Furthermore, the law also prohibits the sale of wine that appears to be of French origin when it is made from grapes grown outside of France. The word, “butter” or “cream” may not be used on the label of certain foodstuffs, unless the only fat used is butter fat. Concentrated butter may be used instead of butter and the word “butter” may be used on the label provided the fatty acid composition of the concentrated butter has not been altered by any treatment by hydrogenation. Hydrogenated butter is a food fat and not butter. If concentrated butter is used in the product, the words “pure”, “fine”, “extra”, “fresh”, etc., in combination with the word “butter” cannot be used. In certain foodstuffs, the word “milk” or “milk products” may only be used if certain minimum quantities of milk solids are present in the product. Maximum storage temperature should be specified for frozen foods. If appropriate, the word “SURGELE” (quick frozen) should be in a very visible place in capital letters on the label. Ingredients, including herbs and spices, must be listed in descending order of their quantity in the product at the time of manufacturing or processing. The list of ingredients should be preceded by the word, “ingredients.” When ingredients are included in the name of the product, their weight, as a percentage of total net products, must be included in the ingredients list. Any product containing allergens is subject to mandatory labelling. The ingredient must appear on the labelling in the list of ingredients of the food with a clear reference to the name of the allergen. For example, if the food formulation includes lecithin from soy as an emulsifier, it must be noted as such in the list of ingredients “emulsifier: soy lecithin”, and not “emulsifier: lecithin” or “emulsifier: E322”. The specific allergen can be written in bold, italicized or underlined. Instructions for use or conservation (or any advice on preparation of a food product) are mandatory only when procedural steps are required before consumption. These should be clearly indicated and visible on the label to allow the appropriate use of the product, such as “à conserver dans un endroit sec”: “to be kept in a dry place.”</p> <p>Country of Origin Labelling (COOL) scheme -approved by the EU: inform consumers about the origin of meat and meat ingredients in processed foods. Applies to products containing more than 50% dairy ingredients and/or 8% meat ingredients. The scheme applies only to products that are manufactured and/or processed in France. Till today some producer and consumer groups are still pushing for a renewal of the scheme.</p> <p>Marking: A veterinary stamp or sanitary certificate is mandatory on products of animal origin (meat and meat products, milk and milk products, eggs and egg product, fish and seafood and products) with the EU approval number of the processing plant.</p>

Country	National MkSs
	<p>Packaging and container: France has its own packaging/container size requirements for a large variety of food products, including beers, fermented beverages, breakfast cereals, pre-packed fruits and vegetable, non-alcoholic beverages, coffee, milk, oil and vinegar, ice creams, frozen fish, frozen fruits and vegetables, dried fruits and vegetables, and pet foods. The Triman Logo is mandatory on the package of any product placed on the French market. The French Law on Circular Economy states that plastic packaging of fruits and vegetables must also be phased out. The law prohibits the use of PLU stickers on fresh fruits and vegetables unless the stickers are home compostable. Also, the use of food containers containing BPA in direct contact with the food have been banned for all foods products.</p>
Germany	<p>Labelling: Fresh fruits and vegetables that have been coated with food additives of the numbers E 445, E 471, E473, E474, E901 to E 905, and E 914, must be labelled with the word “gewachst” (German for “waxed”). Meat products that contain food additives of the numbers E 338 to E341, E343, and E 450 to E452 must be labelled “mit Phosphat” (German for “contains phosphate”). Also, a voluntary genetically engineered free (“Ohne Gentechnik”) labelling program has been introduced. Additionally, the Ministry for Food and Agriculture has introduced a national label to help consumers better identify products and to standardize the information consumers receive. A voluntary standard regarding the expanded nutrition label has been also introduced to fight obesity and help consumers make healthy food choices. Under certain conditions, the regional context of products produced in Germany may be labelled with a so called “regional window This voluntary private label provides information on: Origin; Location of processing; Percentage of regional ingredients (only applies to processed products).</p> <p>Packaging – Waste recycling: The Packaging Law (<i>Verpackungsgesetz</i> or <i>VerpackG7</i>) requires producers, importers, and distributors of consumer products, including food stuffs, to enter a contract for recycling of packaging material with a licensed recycling company. Manufacturers are obliged to register with the national authority, the “<i>Zentrale Stelle</i>,” before placing packaged products on the market.</p> <p>Contaminants: Germany put in place an additional maximum tolerance for aflatoxins, ochratoxin A, nitrate, halogenated solvents, and non-dioxin-like polychlorinated biphenyls (ndl-PCB) for products not regulated in the EU regulation.</p> <p>Trademarks: In Germany, the legal basis for trademarks is the Markengesetz (trademark law) and the Markenverordnung (trademark ordinance). Trademarks are granted for 10 years. Applications should be directed to the German Patent and Trademark Office</p>
Greece	<p>The national regulations in Greece reflect EU marketing standards: they simply translate EU Food Law and EU marketing standards into the local language without imposing any new requirements. Greek government agencies have given several goods the Protected Designation of Origin (PDO) label in accordance with EU regulations.</p>
Ireland	<p>Labelling: In addition to EU regulation, specific legislation has been set down regarding the labelling of beef products. This labelling system for beef consists of two elements, a compulsory beef labelling system and a voluntary beef labelling system, with the objective of providing maximum transparency during the marketing of beef. Compulsory beef labelling requires operators or organisations to label beef with specific information at all stages of marketing up to and including the point of sale to the consumer.</p> <p>Potatoes Marketing Standards: Additional standards to the EU, which among others regulates that small potatoes cannot be sold other than separately from medium potatoes and large potatoes. Also, according to this, the container should bear a notice or inscription which is easily visible without removing or opening any container and states clearly and legibly whether the potatoes are small potatoes, medium potatoes or large potatoes.</p>

Country	National MkSs
Italy	<p>Labelling: NutrInform Battery labelling system has been enforced. It is a voluntary front of pack nutrition labelling that the Italian Ministries of Agriculture, Health, and Economic Development notified to the European Commission. NutrInform Battery uses battery symbols to indicate the percentages of energy, fats, saturated fats, sugars, and salt in a food portion compared to the recommended daily intake.</p>
Netherlands	<p>Labelling: Food companies can, voluntarily, mention on their product label that a product is “produced without using genetically engineered technology” (in Dutch: “bereid zonder gentechniek”). If food companies want to mention this on their product label, they must comply with the Dutch regulation Warenwetbesluit nieuwe voedingsmiddelen en genetisch gemodificeerde levensmiddelen (in Dutch). Also, vegetarian products can, voluntarily, carry the green V-label vegetarian logo, a label widely used in Europe. The V-label vegan logo can also be used for vegan products.</p>
Poland	<p>Labelling: Poland uses national voluntary labelling schemes for a “Made-in-Poland” label, “GMO-free” label, and “Lactose-free” label. Made-in-Poland mark foodstuffs with the words "Produkt Polski" (Made in Poland). Manufacturers can place the "Produkt Polski" logo on products produced in Poland with the use of Polish raw materials and containing no more than 25 percent of components derived from imported ingredients (this percent does not include water content). Meat marketed with the "Produkt Polski" label should be derived from animals born in Poland and whose breeding and slaughter took place in Poland. GMO-free indicates food products as free from genetically modified organisms (GMOs). GMO-free labelling is entirely voluntary and applies to the following product groups: (a) foods of plant origin, but only those that have genetically modified counterparts approved for the EU market that have been entered in the European Commission’s register of genetically modified food and feed (i.e., corn, canola, soybeans, sugar beets, and cotton); (b) food of animal origin (e.g., meat, milk, eggs) obtained from animals or from animals fed with GMO-free feed during the grace period preceding its acquisition, and the feeding process of these animals was documented; (c) multi-ingredient food, all whose ingredients are products of animal and plant origin will meet the conditions specified for labelling them as GMO-free, representing at least 50% of the total weight of all ingredients at the time of use, not counting the weight of water used as an ingredient for production; (d) feed. The law does not cover labelling as GMO-free seed, fertilizers, cosmetics, or crop protection products used in plant production. In the case of food that contains, consists of, or was produced from GMOs listed in the GMO food and feed register, it is allowed to be labelled as GMO-free if the content of genetic modification in that GMO is no more than 0.1% and the presence of GMOs in that food is accidental or technically unavoidable. Additionally, Poland takes a stricter approach than other EU countries regarding dietary supplement labelling. Specifically, Polish regulations require the term “dietary supplement” (supplement diet) to be used along with the brand name wherever the brand name is mentioned on the product label. Detailed requirements regarding the composition and labelling of dietary supplements are specified in the Regulation of the Minister of Health on the Composition and Labelling of Dietary Supplements (Polish Journal of Laws of 2018, item 1951, as amended). The provisions of this regulation state that dietary supplements placed on the market should be labelled with the following information on the packaging: (a) the phrase "dietary supplement"; (b) the names of the categories of nutrients or substances that characterize the product or an indication of the nature of these substances ; (c) recommended daily dose of the product; (d) warning about not exceeding the recommended daily dose; (e) statement that dietary supplements cannot be used as a substitute (replacement) for a varied diet; and (f) statement that dietary supplements should be stored outside of small children reach .</p> <p>Packaging: In Poland the Act on Food Safety and Nutrition is in force, which serves as the basis for Poland’s regulatory framework for food safety and nutrition, including sanitation and hygiene conditions applicable to food products, packaging and materials, and products that have contact with food.</p>

Country	National MkSs
Spain	<p>Labelling - Country of origin: It requires companies to provide details of the origin of milk used in a product and the country where it has been processed. Dairy industry operators must have appropriate documents, systems, or procedures to demonstrate to the competent authority the country of origin of the milk used in the preparation of milk and milk products falling within the scope of the Royal Decree and conforming to the labelling of these products. Dairy industry operators are also allowed to expand on the obligatory country of origin labelling with more precise information on regional or territorial origin if it comes entirely from the indicated source.</p> <p>Trademarks: The trademark protection is granted for 10 years after which it can be renewed.</p>

4.2 Research in Academia – Public Marketing Standards

In the present report, the bibliometric overview of the literature is presented in the forms of **network and content analysis**. These methods enable the identification of important connections, revealing the current and emerging terms in the study of public marketing standards that have not received extensive attention in literature.

4.2.1 Visualisation of academic research

The VOSviewer software was utilized to perform the network analysis by creating maps based on network data and visualising these maps.¹⁰⁹ VOSviewer uses items, links and weights to visually represent the nodal network. The objects of interest are the *items*. There is typically only one type of item on a map. A *link* is a relationship or connection that exists between two items. Typically, a map has one type of link. Additionally, there can only be one link between any two items. Every link has a *strength*, which is denoted by a positive number. The stronger the relationship between the items, the higher this value. A network is made up of links and items. A *network* is, therefore, a set of items together with the links between the items. In the network, the *weight* and *score* attributes are very significant. An item with a higher weight is regarded as more important than an item with a lower weight. In the visualisation of a map, items with a higher weight are shown more prominently than items with a lower weight.¹⁰⁹

For building the network on public marketing standards, we adopted the steps suggested from Van Eck and Waltman.¹¹⁰ First, we prepared the data of 97 papers in a TXT file as an input for analysis. The file contained the academic papers retrieved from the three scientific databases (i.e., Scopus, SSRN, and WoS). However, from each paper we excluded information related to authors (i.e., name, country, university, department, email address), and journals (i.e., name, issue, volume, page numbers, DOI, etc.). Next, we checked the terms identified by VOSviewer according to their appearance in the papers with the five-times threshold, and we excluded those related to each paper's structure and were not useful for analysis (i.e., abstract, keywords, literature review, methodology, future research, practical implication, etc.). Then VOSviewer established the relations among the remaining terms to build the network of key terms within the public marketing standards literature (Figure 3).

¹⁰⁹ Van Eck, N. J., & Waltman, L. (2023). *VOSviewer manual version 1.6.20*. Leiden, The Netherlands: Universiteit Leiden.

¹¹⁰ Van Eck, N., & Waltman, L. (2019). *VOSviewer manual*. Manual for VOSviewer version 1.6.11. Universiteit Leiden. Available at: https://www.vosviewer.com/documentation/Manual_VOSviewer_1.6.11.pdf

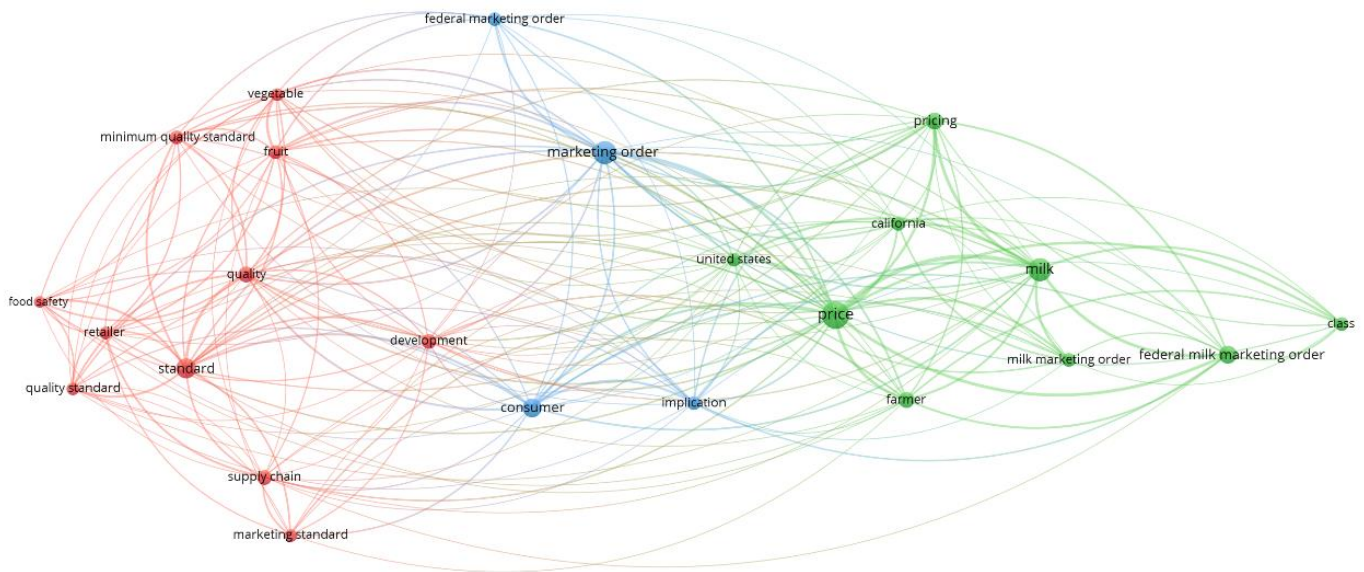


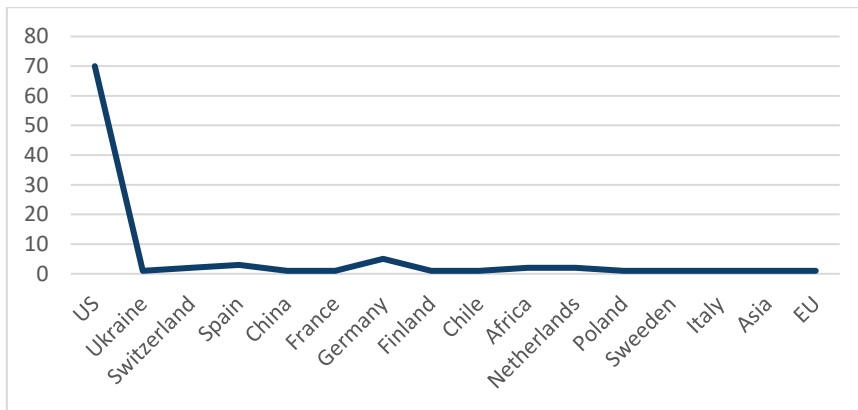
Figure 3: Network visualization of public marketing standards literature.

As presented in Figure 3, in the public marketing standards network visualization, the items were categorized into 3 distinct groups (clusters), determined by different colours. A cluster is a set of nodes that share a common theme; the number of clusters was determined by resolution parameters: there are more clusters when the parameter value is higher.^{110,111} Items with greater weight are displayed more prominently than smaller-weight items. The network, also, considered the links between the items and the overall strength of the links. The former shows how many ties an item has to other items. The latter shows how strongly an item is linked to other items. The lines between items represent these links. By default, at most 1000 lines are displayed, representing the 1000 strongest links between items. In general, the closer two terms are located to each other, the stronger their relatedness.

4.2.2 Focus of academic research

To better understand and illustrate the specific issues within the current literature, we conducted a content analysis of the academic publications focusing on the investigation of public marketing standards. We identified and clustered major research streams of public marketing standards, such as the type of regulations, actors, and commodities, as well as the nations where public marketing standards are more prevalent.

¹¹¹ Van Eck, N. J., & Waltman, L. (2014). *Visualizing bibliometric networks*. In Y. Ding, R. Rousseau, & D. Wolfram (Eds.), *Measuring scholarly impact* (pp. 285-320). Cham: Springer, Available at: https://doi.org/10.1007/978-3-319-10377-8_13



Note: Some papers focus on more than one country

Figure 4: Public MkSs research - Nations

The importance of public marketing standards for a significant advanced economy is highlighted by the fact that the great bulk of academic study in this area is conducted in the United States, as seen in Figures 4 and 5. Additionally, it is revealed that the primary focus of research in this area is on the price discrimination of food commodities, to ensure that food is sold at a price that accurately reflects its quality while also providing some financial benefits for the producer and that consumers can afford to purchase them. For instance, a pricing mechanism for dairy products is established by one of the most important government rules in the US, which uses weekly wholesale prices and volumes to determine the prices of dairy products.¹¹²

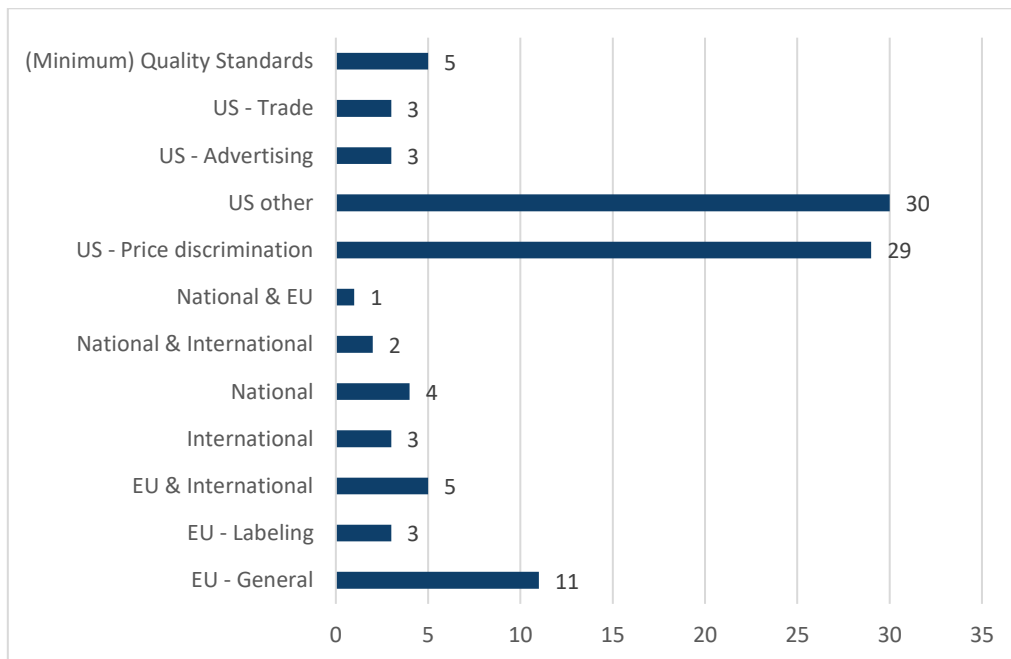
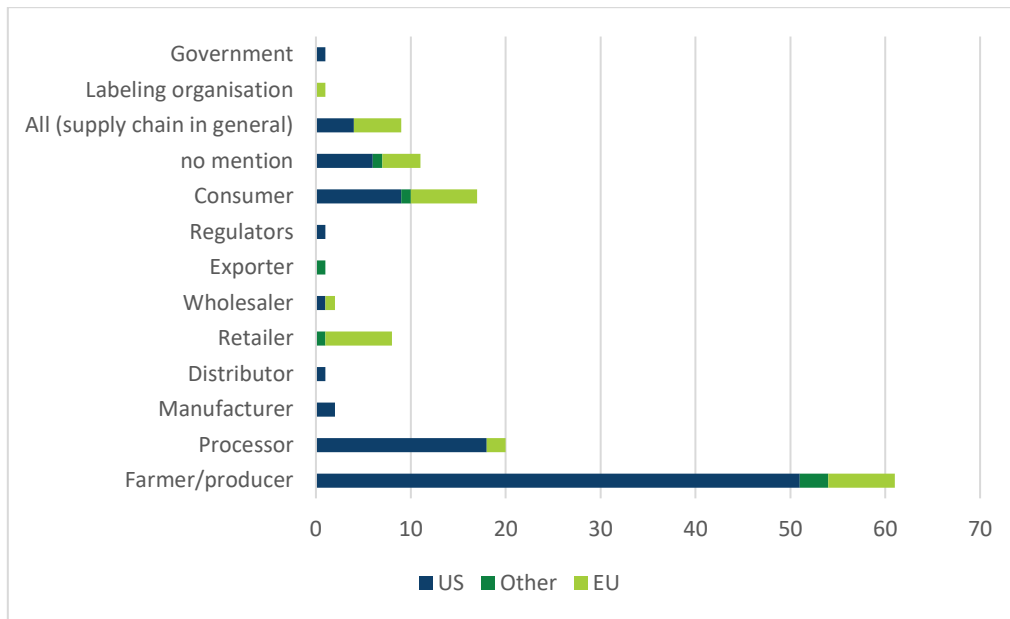


Figure 5: Public MkSs research - Regulations

¹¹² Fan, Z., Jump, J., Tse, Y., & Yu, L. (2023). "Volatility in US dairy futures markets", *Journal of Commodity Markets*, 100309.



Note: Some papers focus on more than one supply chain actors

Figure 6: Public MkSs research - Actors

The production, retailing, and consumption stages of the value chain are the primary focus of the current literature on public marketing standards at the EU level (Figure 6). This illustrates the actual situation, particularly the primary effects of the public marketing standards. Specifically, the EU marketing standards, are introduced following consumers demands, not producers. Producers have actually frequently resisted their introduction.¹¹³ Standards benefit consumers as they guarantee that the products are of a certain quality preferred by them. However, the implementation of public marketing standards raises the cost of production.¹¹⁴ Furthermore, retailers play a crucial role in the food value chain, as they possess extensive knowledge of trends in consumer purchasing behaviour and existing standards.¹¹⁵

¹¹³ Swinnen, J., & Vandemoortele, T. (2023). "When are Private Standards more Stringent than Public Standards?", *Journal of Agricultural Economics*, 62(2), 259-280.
¹¹⁴ Swinnen, J. (2007). *Global Supply Chains, Standards and the Poor: How the Globalization of Food Systems and Standards Affects Rural Development and Poverty*. Oxon, UK: CABI Publishing.
¹¹⁵ Schulze, C., & Matzdorf, B., Rommel, J., Czajkowski, M., García-Llorente, M., Gutiérrez-Briceño, I., Larsson, L., Zagórska, K., & Zawadzki, W. (2024). "Between Farms and Forks: Food Industry Perspectives on the Future of EU Food Labelling", *Ecological Economics*, 217, 108066.

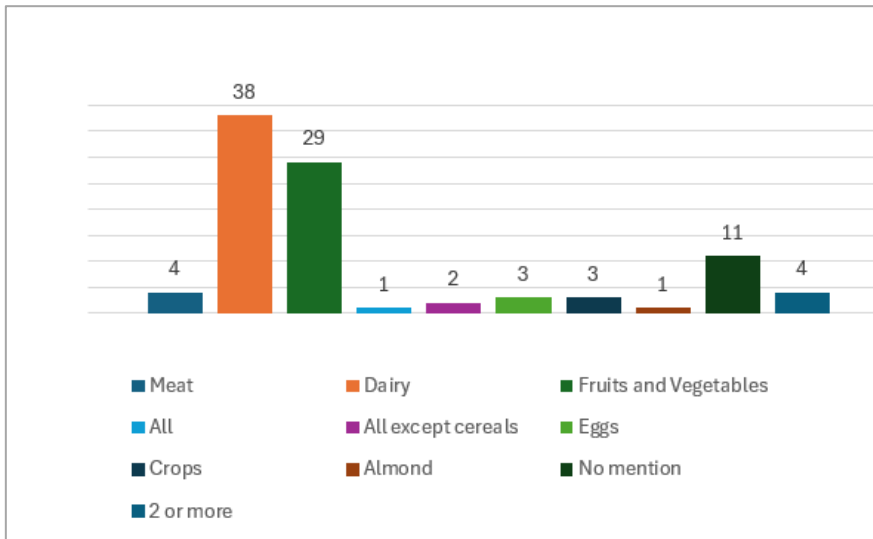


Figure 7: Public MkSs research – Commodities

Figure 7 reveals that the subject of most international studies on marketing standards is the dairy industry, followed by fruits and vegetables. The fact that the US dairy industry is subject to more government regulation and involvement than most other domestic industries lend credence to this.¹¹⁶ One more intriguing finding is that the cereal industry has not been the subject of any investigation.

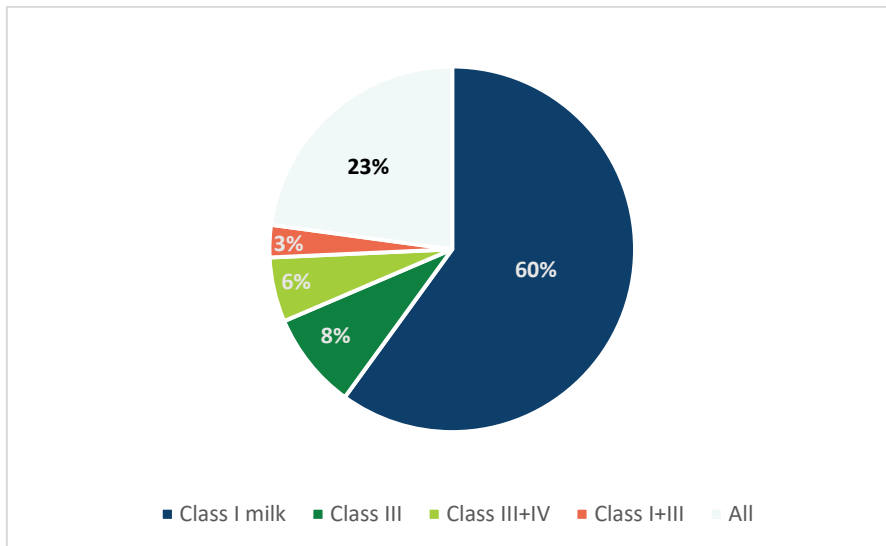


Figure 8: Public MkSs research – Dairy products

Focusing on the dairy industry (Figure 8), Class I milk has been the subject of most studies on public marketing standards, with Class III milk coming second. Interestingly, Class II milk has not been the subject of any investigation. Class I specifically includes any milk used in the form of fluid milk products (i.e., bottled milk); Class II includes milk used to produce soft manufactured dairy products (i.e., cottage cheese, ice cream, frozen

¹¹⁶ Chouinard, H., Davis, D., LaFrance, J. & Perloff, J. (2010). "Milk Marketing Order Winners and Losers", *Applied Economic Perspectives and Policy*, 32(1), 59-76.

desserts, cream products, yogurt, infant formulas, and other intermediate products that use dried milk such as candies and pancake mix); Class III includes milk used to produce cream cheese and defined hard manufactured cheese, plastic cream, anhydrous milk fat, butter oil, evaporated or sweetened condensed milk in consumer-type packages; and Class IV includes milk used to produce butter and any dried milk product.¹¹⁷

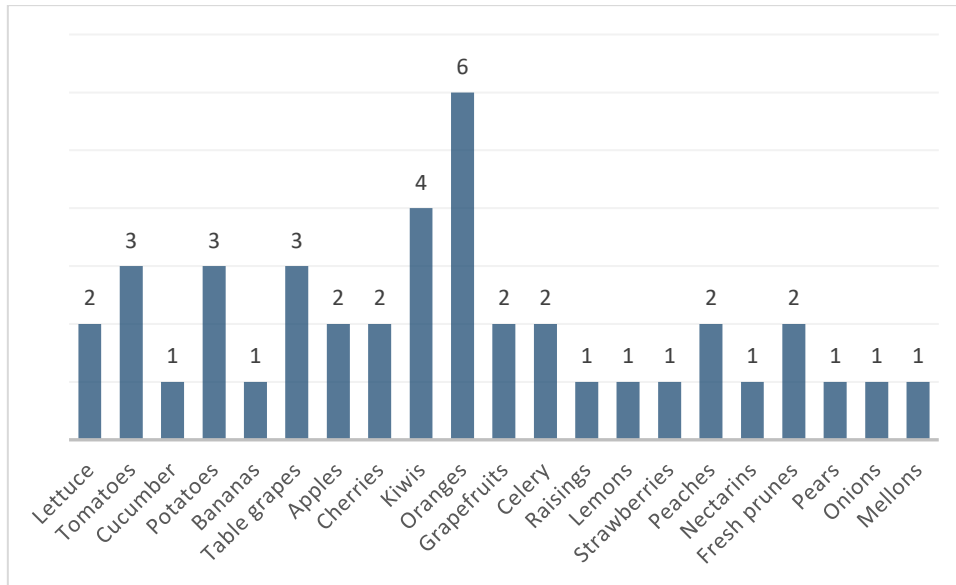


Figure 9: Public marketing standards research - Fruits & Vegetables

Finally, the fruits & vegetables and meat sectors are the subject of Figures 9 and 10, respectively. Oranges and pork are the main subjects of investigation.

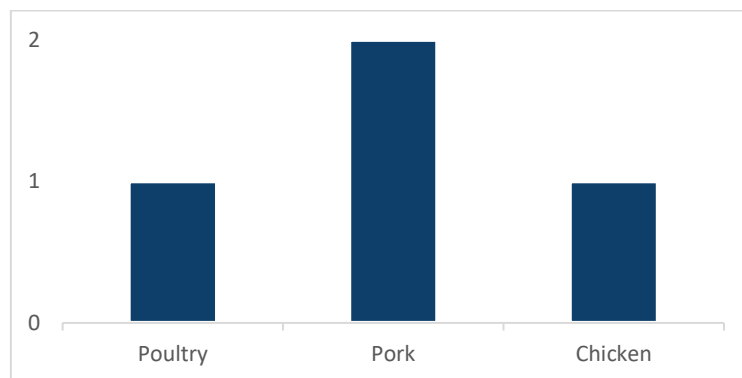


Figure 10: Public marketing standards research - Meat

¹¹⁷ Bailey, K., & Tozer, P. (2001). "An Evaluation of Federal Order Reform", *Journal of Dairy Science*, 84, 974-986.

4.3 Public marketing standards and food waste

4.3.1 Definition of food waste

Food waste is defined as “food intended for human consumption, either in edible or inedible status, removed from the production or supply chain to be discarded, including at primary production, processing, manufacturing, transportation, storage, retail and consumer levels, with the exception of primary production losses”.¹¹⁸ Because it damages the environment, wastes money and resources, deteriorates the landscapes, and exacerbates climate change, food waste is one of the most challenging sustainability concerns facing modern society.¹¹⁹ Accordingly, one of the primary objectives of the circular economy is to address food waste.¹²⁰

4.3.2 How public marketing standards impact on food waste

It is challenging to determine the precise environmental and economic consequences of food waste resulting from public marketing standards since production statistics rarely document the quantities of produce lost within the supply chain because of non-compliance.¹²⁰ Nonetheless, our analysis of the literature showed that there is disagreement amongst those involved in the food supply chain over whether EU marketing standards raise or lower the quantity of food wasted in the supply chain.

On the one hand, according to a number of food chain stakeholders, the presence of product standards or cosmetic specifications for food products significantly increases food waste.^{121,122,123,124,125,126,127} In supply chains, product specifications are a crucial instrument for controlling the quality levels of products that are sold to consumers. Cosmetic specifications regulate the product's appearance, weight, shape, and size but not its inherent quality or safety.^{128,123} In this dispute, they primarily argue that food products would be thrown away owing to cosmetic specifications simply because their shape, size, weight, or colour is different from usual aesthetic standards.^{129,119} The authors emphasize that lowering such standards may result in reduced food waste and, thus, lower emissions. In this line, they propose that policy interventions should be used to

¹¹⁸ EU Parliament – Report on Initiative on Resource Efficiency: Reducing Food Waste, Improving Food Safety, Available at: https://www.europarl.europa.eu/doceo/document/A-8-2017-0175_EN.html

¹¹⁹ de Hooge, I., van Dulm, E., & Trijp, H. (2018). “Cosmetic specifications in the food waste issue: Supply chain considerations and practices concerning suboptimal food products”, *Journal of Cleaner Production*, 183, 698-709

¹²⁰ Borrello, M., Caracciolo, F., Lombardi, A., Pascucci, S., & Cembalo, L. (2017). “Consumers’ perspective on circular economy strategy for reducing food waste”, *Sustainability*, 9(1).

¹²¹ Aschemann-Witzel, J., De Hooge, I.E., Amani, P., Bech-Larsen, T., & Oostindjer, M., (2015). “Consumer-related food waste: causes and potential for action”, *Sustainability*, 7, 6457-6477.

¹²² Beretta, C., Stoessel, F., Baier, U., & Hellweg, S. (2013). “Quantifying food losses and the potential for reduction in Switzerland”, *Waste Management*, 33, 764-773.

¹²³ Halloran, A., Clement, J., Kornum, N., Bucatariu, C., & Magid, J. (2014). “Addressing food waste reduction in Denmark”, *Food Policy*, 49, 294-301.

¹²⁴ Jaeger, S.R., Machin, L., Aschemann-Witzel, J., Antúnez, L., Harker, F.R., & Ares, G. (2018). “Buy, Eat or Discard? A Case Study with Apples to Explore Fruits Quality Perception and Food Waste.” *Food Quality & Preference*, 69, 10-20.

¹²⁵ Lebersorger, S., & Schneider, F. (2014). “Food loss rates at the food retail, influencing factors and reasons as a basis for waste prevention measures”, *Waste Management*, 35(11), 1911-1919.

¹²⁶ Porter, S.D., Reay, D.S., Bomberg, E. & Higgins, P. (2018). “Avoidable Food Losses and Associated Production-Phase Greenhouse Gas Emissions Arising from Application of Cosmetic Standards to Fresh Fruits and Vegetables in Europe and the UK.” *Journal of Cleaner Production*, 201, 869-78.

¹²⁷ Waarts, Y.R., Eppink, M., Oosterkamp, E.B., Hiller, S.R., van der Sluis, A.A., & Timmermans, T. (2011). *Reducing food waste; Obstacles experienced in legislation and regulations*. Tech. rep., LEI, part of Wageningen UR.

¹²⁸ Göbel, C., Langen, N., Blumenthal, A., Teitscheid, P., & Ritter, G. (2015). “Cutting Food Waste Through Cooperation along The Food Supply Chain”, *Sustainability*, 7, 1429-1445.

¹²⁹ de Hooge, I.E., Oostindjer, M., Aschemann-Witzel, J., Normann, A., Mueller Loose, S., & Almlí, V.L. (2017). “This Apple is Too Ugly For Me! Consumer Preferences For Suboptimal Food Products In The Supermarket And At Home”, *Food Quality & Preference*, 56, 80-92.

critically evaluate the need for EU marketing standards for specific fruits and vegetables to decrease the quantity of food wasted in the value chain.¹³⁰

On the other hand, several stakeholders in the food supply chain back up the argument that eliminating public marketing standards isn't always a good way to reduce waste.¹³¹ Remarkably, food waste across the supply chain did not decrease after the European Union's cosmetic specifications for many of the fruits and vegetables were abolished in 2009.¹³² There are two reasons for this train of thought. First, by giving all market actors similar expectations for every market, grading standards can facilitate trade and reduce transaction costs in the supply chains, thereby levelling the playing field between actors across the EU single market. Similarly, eliminating standards could have a detrimental impact on the economic pillar of sustainability by increasing transaction costs for consumers. Second, according to the food stakeholders, dropping the grading standards might not reduce food waste since consumers might not want to eat 'ugly' produce.¹³³ According to this prevailing view, public marketing standards tend to decrease waste in the supply chain because they give all businesses and all markets in the supply chain consistent expectations regarding product characteristics, which can ease trade and lower transaction costs.¹³⁴

Overall, the counterfactual between public and private marketing standards determines whether marketing standards increase or decrease food waste. On the one hand, the introduction of standards may increase waste since they remove products with certain characteristics (such as products with defects or an unattractive shape) from the market, if the counterfactual is the absence of standards (both private and public). However, when (private and public) standards are absent, the introduction of public standards may eliminate the mismatch between firms' expectations regarding product characteristics demanded in different markets, which could lead to waste reduction.¹³⁴ The waste-reducing effect may occur if public standards are more effective than private ones at lowering transaction costs or if they give businesses better indicators of products that consumers want to see on the market.¹³⁵ A more in-depth comparison between public and private marketing standards can be found in **D1.3 Analysis of private food marketing standards**.

4.3.3 Food waste due to public marketing standards in different levels of the food supply chain

Food waste happens throughout the entire food supply chain, including consumer households.¹³⁶ Food waste amounts vary between industries and regions, according to research, with variations in infrastructure, cultural norms, and practices influencing waste production.¹³⁷ In more industrialized nations like in the EU, most of the food waste occurs at the second stage of the food supply, which is the retail and consumption stages. In contrast, in less-developed nations most of the food waste usually happens at the primary stage, during production, harvesting, storage and transportation.¹³⁸

¹³⁰ Herzberg, R., Schneider, F., & Banse, M. (2023). "Policy Instruments To Reduce Food Loss Prior To Retail – Perspectives Of Fruits And Vegetable Supply Chain Actors In Europe", *Waste Management*, 170, 354-365.

¹³¹ Foundation for European Progressive Studies (2018) – Why Food Waste is a Big Deal and How to Scale-up Preventive Action, Available at: <https://feeps-europe.eu/wp-content/uploads/2018/10/Food-Waste-Not-Want-Not-Book.pdf>

¹³² Loebnitz, N., Schuitema, G., & Grunert, K. (2015). "Who Buys Oddly Shaped Food And Why? Impacts Of Food Shape Abnormality And Organic Labelling On Purchase Intentions", *Psychology & Marketing*, 32(4), 408-421.

¹³³ Nes, K., Ciaian, P., & Di Marcantonio, F. (2022). "EU Marketing Standards And Sustainability", *Applied Economic Perspective & Policy*, 44, 1844-1863.

¹³⁴ Nes, K., Ciaian, P., & Di Marcantonio, F. (2021). "Economic Determinants of Differences in the Composition of Seemingly Identical Branded Food Products in the EU" *Food Policy*, 100, 102020.

¹³⁶ Kirci, M., Isaksson, O., & Seifert, R. (2022). "Managing Perishability in the Fruits and Vegetable Supply Chains", *Sustainability*, 14, 5378.

¹³⁷ Brennan, J. (2024). "Regenerative Food Innovation: Strategies To Mitigate Food Waste", *Foods*, 13(2), 150-165.

¹³⁸ Garrone, P., Melacini, M., & Perego, A. (2014). "Opening The Black Box Of Food Waste Reduction", *Food Policy*, 46, 129-139.

In the literature, the primary reasons for food waste, generally, at each stage of production have already been outlined.¹³⁹ In light of the literature review findings, we identify the following reasons for food waste at each stage of the supply chain, concentrating primarily on food wasted because of public marketing standards:¹³⁵

- Production stage: Products that are either not harvested or are discarded right away after harvesting due to noncompliance with regulatorily mandated quality standards, including weight, size, colour, and shape. At this point, agronomic practices, diseases, and education have a significant impact on the quality of the final product. Thus, inadequate practices may lead to a significant amount of food waste.
- Handling and storage: Fresh products, such as meat and fruits, can be spoiled due improper transportation vehicles and inadequate transportation infrastructure. Additionally, the food must be kept on the retail shelf for an extended period if precise scheduling is not accomplished. Food deterioration from inadequate storage facilities and improper temperature during storage are examples of incorrect storage.¹⁴⁰ All the above contribute to food waste by lowering the food's quality or reduce its expiration date. Because deterioration processes occur when the temperature is too high or too low, fruits and vegetables are typically inedible in the event of temperature failure during storage. The colour of the fruits and vegetables is another important factor that might be affected when they are being stored, particularly when the conditions are not ideal.¹⁴¹
- Processing and packaging: Due to legislation constraints on the appearance of fruits and vegetables, mistakes made during the washing, inspection, processing, and packaging processes result in defects in the final product, such as incorrect shape, size, weight, or packaging damage, which causes significant food waste. Food processors have a very small impact on food waste.¹²³

Finally, it's worth noting that the UNECE and OECD have been collaborating to decrease food waste in the fruits and vegetables supply chain for the past few years. In this regard, UNECE has launched a digital blockchain-powered solution called "FeedUp@UN" that is intended to identify, quantify, and trace food wasted in each stage of the supply chain. Additionally, they have introduced a methodology for measuring food waste in the fruits and vegetables industry, at every stage of the supply chain.¹⁴²

5. Marketing Standards and Food Waste along the supply chain – Analysis of Interviews

Given the lack of prior research on marketing standards and their relation to food waste, the current study used a qualitative approach to present some key insights from the in-depth interviews carried out under Task 1.2. In this part we analyse the information gathered from in-depth interviews with food businesses, regulatory bodies and consumers along the food value chain. Overall, we conducted 50 expert interviews in Denmark (N=10), Greece (N=10), Ireland (N=10), Poland (N=10), and Spain (N=10). The participants consisted of 8 farmers/producers, 6 processors/manufacturers, 4 distributors, 9 retailers, 6 food service businesses, 11 consumers, and 6 regulatory organisations. Some participants were focusing on more than one commodities.

¹³⁹ Ishangulyyev, R., Kim, S., & Lee, S.H. (2019). "Understanding Food Loss and Waste—Why Are We Losing and Wasting Food?", *Foods*, 8, 297.

¹⁴⁰ Corrado, S., Ardente, F., Sala, S., & Saouter, E. (2017). "Modelling Of Food Loss Within Life Cycle Assessment: From Current Practice Towards A Systematisation", *Journal of Cleaner Production*, 140, 847-859.

¹⁴¹ Gnanasekharan, V., Shewfelt, R.L., & Chinnan, M.S. (1992). "Detection Of Colour Changes In Green Vegetables", *Journal of Food Science*, 57(1), 149-154.

¹⁴² UNECE – Agricultural Quality Standards boost trade and support shift towards sustainable food systems, Available at: <https://unece.org/sustainable-development/press/unece-agricultural-quality-standards-boost-trade-and-support-shift>

The interviews were held online, in the mother tongue of the interviewees. Therefore, the quotes used in the analysis are translated into English.

The information presented is limited to the four commodities under discussion and the five EU member states (Denmark, Greece, Ireland, Poland, and Spain) that comprise ROSSETA's use cases.

5.1 Food Business and regulatory organisations

5.1.1 Food waste

Food waste is a significant problem that has caught the attention of scholars and professionals. This viewpoint is also supported by some of the respondents. In fruits and vegetables industry, for instance, a farmer stated that: *"We believe that food waste is one of the biggest challenges in agricultural sector today"* (Farmer Spain), and a distributor that: *"Food waste is a massive problem that hasn't been sufficiently addressed"* (Distributor Greece), both stressing the importance of food waste in the industry.

Furthermore, preliminary findings from our analysis indicated the main reasons why food is wasted in various businesses. The main causes, namely, are the surplus of production that is left in the field and consumer trends in fruits and vegetables industry, consumer trends in meat industry, and product contamination from damaged packaging in the cereals industry. It's interesting to note that there is virtually no food waste in the dairy sector. As a manufacturer put it, *"In the dairy industry you wouldn't survive if you had food waste"* (Processor/Manufacturer Denmark).

5.1.1.1 What happens to products not sold?

According to the analysis of the interviews, supply chain actors have discovered different methods to handle goods that cannot be sold before they expire because they are now more conscious of the problem of food waste and its effects on the environment. Seldom do they return the goods to the producer and/or their suppliers. For example, a distributor notes that *"[we] never return products to producers because we know that it is a waste of resources"* (Distributor, Spain). They only take this action in extreme cases where the delivered goods are inedible. A processor, for instance, reports that *"when an accident occurs, such as mixing two different fruits for fruit yoghurt, the product is disposed"* (Processor/manufacturer Denmark). However, this never occurs in the cereals industry, where the products are never returned to the manufacturer, primarily because they have a two-year shelf-life, and they can be repurposed.

As mentioned before, supply chain actors today use their products in alternative ways to ensure that no food is wasted. There aren't many differences between industries in these aspects. For example, in the fruits and vegetables industry, products are mostly sold to businesses for processing and production of juice and other processed products, sold for animal feed, donated to families in need/food banks/food clouds, or given to staff members. Other options include offering them to customers that have placed large orders, selling them as imperfect foods, offering them at discount, selling them to staff at reduced prices or to local ranchers, and using anaerobic digestion to produce energy. Intriguingly, a food service provider stated that *"...we use them in staff meals or incorporate them in new dishes"* (Food service provider Spain). In the cereal industry, the most common use of these products is to give them to charities or offer a discount in order to sell them before they go bad or be processed into new goods. Other options include giving them to staff members or selling them as animal feed. The two most common practices in the dairy industry are donating to charities/food banks or using milk to produce cheese. Additional options include sending to biogas, selling them in reduced

prices and feeding farm calves. Finally, in the meat industry, the majority of the products not sold are sold to businesses for processing into other products, such as burgers and sausages, and are given to staff members or charity.

5.1.1.2 Type of marketing standards contributing more to food waste

The respondents were asked to determine which type of marketing standards - public or private- are primarily responsible for food waste. The general consensus according to the interviewees across all the industries that ROSETTA focuses on is that the primary causes of food waste are private marketing standards.

A comparison of public and private standards was used by some of the respondents who supported this viewpoint. In fruits and vegetables industry, for instance, a farmer stated that: *“Private marketing standards are more strict than public and, therefore, they contribute more to food waste”* (Farmer Greece), a food service provider stated that: *“Private standards contribute more to food waste because they are stricter than public about quality, appearance, and sustainability”* (Food service provider Spain), and a retailer stated that: *“Private standards contribute more to food waste. Public standards do not have any requirements regarding appearance, which is the main reason of food waste in fruits and vegetables sector”* (Retailer Spain).

Other actors emphasised the requirements of private marketing standards in order to bolster their viewpoint. In the cereals industry, for instance, a food service provider stated that: *“Private standards are definitely more relevant as public primary regulate food safety which is justified and understandable. Private standards, especially when they are excessively strict, can lead to significant waste, particularly when awareness is low. In the hotel, for example, if a package is damaged, the product is checked for contamination and can still be used, either in the hotel's operations or by employees. The same applies to fruits and vegetables that have low aesthetic value. However, this is a matter of awareness, respect for food, and common sense”* (Food service provider Poland). Also, an actor in the fruits and vegetables sector indicated that: *“Private standards contribute more to food waste because they are extremely specific and harsh to comply with, so a great amount of food waste is generated”* (Distributor Spain).

It's interesting to note that opinions in the cereals industry are divided. On the one hand, a producer and manufacturer stated that: *“Public marketing standards contribute more to food waste as the food safety regulations regarding composition of wheat are strict”* (Producer/Manufacturer Poland), while on the other hand, another stated that: *“Private standards impact more on food waste, as public standards are important for food safety and must exist. However, private standards are sometimes redundant’ increasing the quantity of food wasted”* (Processor/Manufacturer Poland). Additionally, in support of the latter a regulatory organisation indicated that: *“The influence of public marketing standards in food waste is minimal and it seems to stem from the lack of standards and disorganisation of the market”* (Regulatory organisation Poland). Notwithstanding these divergent views, the vast majority of the actors in the cereals industry also support the opinion that private marketing standards increase food waste more than public marketing standards.

5.1.1.3 Stage in the production process contributing more to food waste

The interviewees were also asked to identify the production phases that are largely to blame for each sector's high levels of food waste. There is no consensus for each industry that ROSETTA focuses, since various supply chain actors hold varying views.

Focusing on the food supply chain in general, there are some interesting insights provided by a regulatory organisation in Greece. According to them: *“...food waste mainly occurs in retailing stage, primarily due to*

inventory management, and consumer, who do not buy food products when they are close to the 'use by' date. This mostly affects products with short shelf-life, such as milk, fish, and meat. In producing and processing stages, food waste is minimal as products are directed to other market channels, such as making juice from fruits. This happens because any waste in these stages has economic impact to producers” (Regulatory organisation Greece).

Many stakeholders agree that the majority of food waste in the supply chain happens during the retailing and the consumption stages of products with short shelf-life, such as fruits and vegetables, meat and milk. Additionally, they indicate that the primary reason for waste in the retail stage is the expiration dates of products, and in consumption stage the fact that consumers forget to use the products, which leads to spoiling. Moreover, it has been shown that food waste in restaurants is likewise very high while, on the other hand, food waste in distribution stage is very low because during distribution only delegated products that are sensitive to temperature changes can be wasted. Regarding cereals, the majority of food is wasted during storage, followed by transit, and processing.

However, stakeholders in the food supply chain have different perspectives when focusing on the marketing standards in fruits and vegetables industry. They indicate that the production and packaging stages account for most food waste brought on by marketing standards. Weather is the primary cause of waste throughout the production stage. Bad weather can result in spoiled food left in the field in the pre-harvesting stage, as well as overripe, hail-damaged, and bruised products in the harvesting stage. Additionally, the main reason of waste during packaging is the fact that they must follow the standards that retailers have set.

5.1.1.4 Consumer and/or customers expectations and food waste

The respondents were also asked to determine what proportion of the products provided to consumers and/or customers fall short of their expectations. According to the interview data, a minimal percentage, less than 5% of products in the targeted industries fail to meet consumer and/or customer expectations each year. The stakeholders also noted that this amount remains constant from year to year, indicating that they consider the constantly shifting preferences of their customers. One excellent example is when a food service company stated that: *“Almost 0% of our products do not satisfy customer expectations. This is low due to the well-established relationships with our suppliers and the fact that we are familiar with each-others’ expectations”* (Food service provider Poland).

5.1.2 Public marketing standards and food waste

5.1.2.1 Regulation of national standards

National marketing standards are used by EU member states to facilitate trade in their countries and are mostly focus on food quality. Since national marketing standards are not required, some nations’ requirements are, as presented in Chapter 4.1.5, just adaptations of EU marketing standards with some minor changes, mostly in terms of language (e.g., Greece), while other nations impose additional standards compared to the EU (e.g., Denmark). In this part of the report, our focal point is the regulation of national marketing standards, particularly the: (a) focus; (b) way that supply chain actors are informed about them; (c) revision; and (d) monitoring and enforcing.

In all EU member states, national marketing standards appear to be in close relationship with EU marketing standards which, therefore, are perceived as the *“... foundation of national marketing standards...”* (Regulatory organisation Denmark). Also, in all member states national marketing standards are subject to

constant revision, often in line with EU, to adjust on the evolving lifestyle. For example, in an effort to reduce food waste, Denmark has recently placed less emphasis on product aesthetic criteria, while they have been working on offering more flexible solutions on food safety and food quality by improving date management, optimizing in-house production in stores, and developing a scheme for school meals. *“This new regulation is expected to mostly impact on manufacturers and retailers”* (Regulatory organisation Denmark). Moreover, national marketing standards’ requirements vary from country to country. In Poland, for instance, national marketing standards pertain to labelling and packaging; in Denmark, they address animal welfare; while in Ireland, the fruits and vegetables industry only has national requirements for potatoes.

Governmental organisations are not the only responsible when revising the national marketing standards, as supply chain actors’ opinions are also considered. In Greece, for example, *“...an online process of public consultation is taking place through which all supply chain actors are invited to provide feedback on the suggested changes”* (Regulatory organisation Greece), while in Denmark *“the national regulations can be influenced from all actors in the supply chain, such as producers, retailers, and consumer council”* (Regulatory organisation Denmark). Furthermore, in the majority of member states, supply chain actors receive assistance from either private or public organisations to raise their awareness of national standards. In Denmark, for instance, they are informed by industry associations and cooperatives or from relevant authorities like the Danish Food and Food Administration (DFFA); in Greece, they use external advisory firms; and in Poland, they get information from the Agricultural Advisory Centres, which also give them training, courses, and direct access with advisors. Additionally, in Poland, *“larger producers also hire international experts who advise them, while medium-sized producers utilize external firms that provide consulting services for free”* (Regulatory organisation Poland). However, in Ireland, no governmental body supports supply chain actors because they are obliged to understand of both the EU and national marketing standards, as part of their trade obligations.

Another crucial question is who is responsible for monitoring and enforcing national marketing standards in EU member states. Interview data analysis shows that multiple authorities are active in some countries. For example, the Hellenic Food Authority (EFET) is in charge in Greece. *“However, multiple public agencies are also involved. For example, regional veterinary services are responsible for monitoring activities of local animal producers. Another important authority is the General State Chemical Laboratory which conducts sampling and laboratory test on various foods, ensuring food safety. Lastly, the Directive of Commerce is the responsible authority for actors’ compliance with food legislation regarding handling and trading of food products”* (Regulatory organisation Greece). Additionally, in Ireland, the Department of Agriculture Food and Marine (DAFM) is in charge. They inspect marketing, labelling, and quality requirements; they concentrate more on production-level hygiene inspections, and they submit their findings to the EU once a year. These inspections are managed and coordinated by the Food Safety Authority of Ireland. An Import Controls Operations Division also manages port inspections, specifically for produce coming into Ireland. *“The port would be the main point of entry of fruits and vegetables into Ireland and from third countries. We don’t inspect produce coming from other EU member states”* (Regulatory organisation Ireland). However, in Denmark the DFFA is the sole authority in charge of overseeing adherence to national standards by random product sampling and control visits to supply chain actors.

5.1.2.2 Implementation and control

Our main focus in this part of the report is on the implementation and control of public marketing standards. In particular, we focus on: (a) the most challenging public marketing standards requirements for the supply chain participants to fulfil; (b) the proportion of products that fail to meet the public marketing standards and the kind of food that is wasted; and (c) the particular public marketing standards requirements that lead to

increased food waste. To help us understand the various conditions on the various food industries, the results of the analysis of the interview data are presented by commodity.

Fruits and vegetables

The analysis's intriguing conclusion is that most of the food supply chain actors were either completely unfamiliar with public marketing standards requirements or mistook them for private ones. Regarding the latter, most of stakeholders in that group reported that they were aware of the goal of public marketing standards, and they were truly aware that they were required to be followed. However, they gave examples of private standards, such as sustainability standards or extremely stringent cosmetic provisions regarding the shape of the products, when questioned about the specific requirements that the public standards imposed on them. Furthermore, fewer stakeholders in that group were able to distinguish between public and private marketing standards. But when asked about the implementation of public marketing standards requirements, most of them said that they had no trouble on complying with them, though occasionally they found it difficult to meet retailers' requirements. A farmer, however, stated that weather conditions are an important challenge to them when adhering the public marketing standards, *"...as it can affect crop growth and quality, leading to potential non-compliance with [public] standards"* (Farmer Greece).

The case of fruits and vegetables' stakeholders in Spain is also of particular interest. It is extremely difficult for Spanish food businesses, particularly manufacturers and retailers, to keep track of producers and origin (i.e., traceability). Finding certified organic or sustainable products that meet public market standards' requirements is another difficult issue, particularly for food service providers. This is made more difficult by the fact that these products are frequently hard to locate and consequently costly. The certification requirements for organic production are also exceedingly difficult for farmers. As stated, *"the most challenging aspect is maintaining full compliance with organic certification, especially when it comes to pest control. We use innovative methods like the bat colony to avoid chemical pesticides, but ensuring full protection for crops without synthetic solutions can be labour-intensive and risky. It also requires continuous monitoring and adaptation to prevent any issues that could affect crop yield or quality"* (Farmer Spain). Other requirements include avoiding synthetic pesticides, fostering biodiversity, and maintaining soil fertility through natural techniques.

The proportion of products that are discarded because they do not meet public marketing standards requirements is typically less than 3% according to the interviewees. It's interesting to notice that nearly all respondents concurred that while it remains steady from year to year, it fluctuates over the year. The weather, particularly the variations in temperature over the seasons, determines this. As a result of the sensitivity of fruits and vegetables, summertime food waste is higher than wintertime due to heat waves and temperature fluctuations, during distribution, between cooling chambers and the outside. This percentage, however, rises to 18% in organic productions, and it fluctuates from year to year primarily due to unforeseen pests.

In the fruits and vegetables value chain, the actors mostly affected by the public marketing standards are the producers, and especially, those adhering to EU specific marketing standards requirements (e.g., apples, lettuces, strawberries). Interestingly, challenges for retailers only appear when there is shortage of a specific product and they mix products from different origins in a bag, and, therefore, they must pay attention on labelling requirements, in order to make sure that they comply with public marketing standards.

In light of this, public marketing standards may have a negative impact on food waste. EU marketing standards were meant to have a big influence on how producers deal with food waste, especially after their revision in recent years. However, they keep contributing in many ways to waste in the food supply chain. For example, the EU marketing standards requirements do not permit any pest damage on flesh, even though fruits may be

edible, which leads to more food waste. Furthermore, the packaging and labelling requirements are crucial for transparency, but may result in waste if labelling procedure is done incorrectly or if the packaging materials are harmed. Last but not least, adhering to these standards increases the complexity of distribution, which may result in delays and possible food waste in the supply chain.

Meat

The majority of the meat industry's stakeholders, like those in the fruits and vegetables sector, are aware of the purpose of public marketing standards and that they must adhere to them. However, when asked about the precise requirements that the public standards place on them, it became clear that they were confusing public with private marketing standards. Notwithstanding, although some of the respondents were aware of the public regulations, they believed that the food safety requirements and the marketing standards regulations were identical. All of them did, however, state that they had no difficulties adhering to public marketing standards' requirements. In this direction it was stated that: *"It is the management of standards that lead to food waste, not the standards themselves"* (Distributor Greece).

In comparison to the fruits and vegetables sector, the meat business usually discards a smaller amount (less than 1%) of its products due to noncompliance with public marketing standards' regulations. Additionally, like stakeholders in the fruits and vegetables industry, almost all respondents emphasised that although it stays constant year after year, it fluctuates throughout the year because of the high summer temperatures and their effects on transportation and delivery of the meat products. Surprisingly, the amount of meat discarded can reach 4% during the summer.

Dairy

Focusing on dairy industry's stakeholders' familiarity with the public marketing standards, our analysis shows a similar pattern to that seen in the meat industry. Dairy stakeholders are aware that they must follow the public marketing standards but when questioned about the specific requirements that the public standards place on them, it became evident that they were either unaware of the requirements or confused public with private marketing standards and food safety regulations. All of them, apart from a retailer, claimed that they had no trouble following the public marketing standards. The retailer, however, indicated that they occasionally struggle with the regulations pertaining to the storage temperature of milk and milk products. Another intriguing finding is that none of the dairy companies that trade their products in international markets are complying with international marketing standards. According to them: *"We only comply with marketing standards imposed by retailers in the exporting countries"* (Processor/Manufacturer Denmark).

In comparison to the fruits & vegetables and the meat sectors, the dairy industry usually discards a smaller amount (less than 0.5%) of its products due to noncompliance with public marketing standards. Additionally, like stakeholders in the fruits & vegetables and meat industries, nearly all respondents stressed that while it remains constant year after year, it fluctuates throughout the year because of weather conditions and temperature changes, *"... as the production is affected from heat waves and insects"* (Producer Denmark). Notwithstanding, the primary causes of food waste resulting from public marketing standards were found to be improper labelling and the residual shelf-life of dairy products.

Cereals

In the cereals industry, businesses appear to be more familiar with the specific requirements of the public marketing standards, compared to the other industries of focus of the ROSETTA project. Nonetheless, our data reveals a similar pattern to the meat and dairy actors, who mistook marketing standards for food safety restrictions. Many actors specifically mentioned the mandatory hygiene and sanitary regulations for the

company's facilities as well as the storage conditions. Furthermore, many companies in the cereals industry find it difficult to achieve the minimum quality criteria of the EU marketing standards, in contrast to what occurs in other industries. They claimed that they found it challenging to comply with public marketing standards requirements, particularly those pertaining to the composition of proteins and carbohydrates. However, it appears that retailers in the industry do not take public marketing standards into consideration as *"...market products must meet specific requirements to be sold, [therefore] the responsibility of quality rests with the producer"* (Retailer Poland).

Finally, similar to the fruits & vegetables industry, cereal businesses typically throw out about 6% of their products due to noncompliance with public marketing standards. Bread appears to be the product that is wasted the most, yet requirements related to expiration dates have the biggest influence on food waste.

5.2 Consumers

In this part of the report, we will provide some key insights on how consumers perceive food waste, and their attitudes towards it. Our focus is on consumers' perceptions and preferences on product labelling, food appearance, packaging, proportion size and food promotion, and their relation to food waste. We also focus on consumer perceptions on the main causes and influences of food waste, and the actions that supply chain actor could take to reduce it.

5.2.1 Consumer characteristics

Table 13 presents the demographic characteristics of 11 consumers who participated in the in-depth interviews. It is interesting to indicate that most of the respondents did not know about marketing standards. However, it is also noteworthy that 7 of them have third level qualifications.

Table 13: Respondents' demographics (n=11)

ID	Country	Knowledge of MkSs	Gender	Age	Education level	No of people in household	No of children in household
Participant 1	Denmark	No	Female	18-24	Bachelor's	2	0
Participant 2	Denmark	No	Female	45-54	High school	2	0
Participant 3	Greece	No	Female	45-54	Master's	3	1
Participant 4	Greece	No	Female	25-34	Master's	4	2
Participant 5	Ireland	No	Female	25-34	High school	5	0
Participant 6	Poland	No	Female	45-54	High school	2	0
Participant 7	Poland	Yes	Female	55-64	Master's	2	0
Participant 8	Poland	No	Female	45-54	High school	2	1
Participant 9	Spain	Yes	Male	35-44	Master's	4	2
Participant 10	Spain	Yes	Male	35-44	Master's	2	0
Participant 11	Spain	Yes	Female	35-44	Master's	6	3

Additionally, most of the consumers are fully aware of food waste and its impact and they always consider it when purchasing groceries. For instance, reflecting on this a participant noted:

"If I know I'm not going to use it, I'm not going to buy it" (Participant 5)

Similarly, two respondents reflected on the impact of food waste:

"I am extremely sensitive to food waste because of the economic impact as well as the environmental impact"
(Participant 10)

"I always consider food waste when shopping for groceries. I am very mindful of not wasting food, primarily because I don't like wasting money" (Participant 9)

5.2.2 Product labelling preferences

For most of the respondents the information presented on the product's label is a significant aspect when purchasing food. They mostly check for information about the expiration date, the ingredient list, the country of origin, whether it's organic, and any certifications related to sustainability or fair trade. For example, some consumers prefer not to buy products that are close to their expiration date to ensure that they will not have to waste food.

Related to the ingredient list, a respondent noted:

"Preservative labels are often incomprehensible to consumers, which can lead to reluctance, as even natural ingredients are listed under their chemical names, making them difficult for the average consumer to understand" (Participant 6)

Regarding the information that could be available to reduce food waste, respondents initially indicated that labels should provide both 'best before' and 'use by' dates. Information about the storage is also considered of great importance. Reflecting on that, a respondent mentioned:

"Having clearer information on portion sizes and storage tips would be very helpful in reducing food waste in my household. I also believe that detailed instructions on how to properly store food to extend its freshness would be useful, especially for items like fruits and vegetables. Also, labels could indicate whether a product can be frozen and for how long" (Participant 11)

Others find helpful information about the packaging. In this direction a respondent noted:

"If I have information on how the type of packaging used can keep food in good condition and for how long, ensuring that the packaging protects the contents, it will help me in the decision I make to discard any packaged food" (Participant 3)

5.2.3 Leading causes of food waste and supply chain actions

The respondents indicated that the main actors positively impacting food waste are the retailers and the consumers. Regarding the retailers, respondents indicate that their promotional activities and their tendency to present 'perfect' and 'neat' food products affect consumer purchase behaviours by making them buy more than they need, leading to leftovers and food waste. Also, the fact that retailers do not provide clear information about the meaning of the date on labelling may lead to consumers buying larger quantities of food that could be spoiled.

Regarding consumers, many respondents mentioned that a major cause of food waste is the lack of education and knowledge among consumers, and their tendency to take bulk, thoughtless buying decisions and not buying only what they need. For instant, reflecting on the lack of education and its impact on food waste, a participant stated:

“Education is the root cause of most problems related to food management. People do not have respect for products, do not plan their purchases, and buy many highly processed items that are unappetising, fail to meet expectations, and ultimately end up being thrown away. Producers and stores are focused on selling as much as possible, even at the expense of food waste” (Participant 7)

Another respondent mentioned that:

“The leading cause of food waste is poor planning and over-purchasing, especially when people buy more food than they need or can consume before it gets spoiled. This is often driven by a lack of awareness about how much food will actually be used, impulse purchases, or being influenced by promotions that encourage buying in bulk” (Participant 9)

Focusing on what respondents expect the supply chain actors to do in order to address the issue of food waste, some interesting insights were presented from the respondents. Respondents think that retailers are the main stakeholders that must take some action to reduce food waste. Reduction of product prices more days before the products go bad, better packaging that keeps the food fresh for longer, clearer and more informational labels, and promotional activities to minimise food waste are some of the main reasons that they provided.

Additionally, respondents believe that farmers could also play an important role in reducing food waste by promoting products that may not meet cosmetic standards but are still perfectly edible. For instance, reflecting on farmers and retailers' role in reducing food waste, a respondent stated:

“Retailers and farmers should focus on reducing food waste by offering more flexible portion sizes, promoting imperfect produce, and providing clear guidance on storage and shelf-life. They should prioritise sustainability, such as minimising packaging and improving food handling to extend freshness. Transparency around how food is grown and delivered, along with more education for consumers on using all parts of produce, would also help address the issue” (Participant 9)

Others also consider that the government should promote and support sustainability and social responsibility, while a respondent thinks that all the supply chain should be part of reducing food waste:

“.. they could shorten the supply chain to ensure that fresh products spend less time travelling and have a longer shelf life for end-consumers” (Participant 10)

5.2.4 Influencers on food waste and actions to minimise it

Consumers are discarding food primarily because of their condition, which is mostly judged based on its appearance, taste, smell and texture. They discard food, for instance, because they are spoiled or have unpleasant smell. Reflecting on that a respondent stated:

“It's the kind of physical thing I can see on the food or if something smells sour or feels slimy, I throw it away. I tasted it and it wasn't good anymore and then it went down the sink” (Participant 1)

Another participant added that food should be discarded when it is bad for their health:

“The fact that they can potentially be harmful to my health. For example, I had some meat that its smell was not very pleasant. I was not sure whether I could eat it or not. But when in doubt, I typically throw it away. Another example with fruits that the interior was a bit dark, darker than usual. I decided to give it a try and realised that the taste was poor/neutral. Once tried, I decided to throw it away because I lost appetite in that specific piece of fruit” (Participant 10)

Additionally, some respondents indicated the time left in the fridge, and the expiration date depicted on the label of the product as important influencers of food waste. For example, a respondent reflecting on expiration date mentioned:

“I am mindful of expiration dates, particularly for dairy and meats” (Participant 11)

Consumers were also asked about the actions that they have consciously taken to reduce food waste. The primary action that they take is to process the product to other food when they are about to expire or go bad. They have made jams from fruits, pickles from vegetables, and vegetable creams. Others, give these products to the wider family and/or friends, cook something to consume it before they go bad, or freeze them to extend their product life.

It is also interesting to note that some respondents just consume the product before it goes bad. In this direction, a respondent mentioned:

“I bought a new, like pasta sauce thing that I wanted to try, but then it was sitting in there for ages, but then it was about to go out of date. So, I used it, which is usually the case. I buy something new and then I won't eat it and then it's about to go out of date. Then I will be like, ‘OK, we have to eat it. We have to try it’” (Participant 5)

5.2.5 Consumers habits and food waste

5.2.5.1 Food appearance

When consumer asked whether they buy food based on their appearance, they were torn in two. On the one hand, some respondents indicated that food appearance plays an important role on their purchasing decision. They look, for instance, at the colour and shape of fruits and vegetables. However, they prefer fruits smaller in size as for them big sized fruits may be an indication of chemical usage. Reflecting on that a respondent mentioned:

“Appearance does play a role when purchasing food, particularly with fresh produce like fruits and vegetables. I prefer items that look vibrant, firm, and free from blemishes, as these are often signs of freshness [...] For fruits and vegetables, I look for bright colours, firm textures, and signs that the produce is recently harvested—like crisp leaves on greens or smooth skin on fruits. Absence of blemishes or bruises is another key factor, as these can indicate that the food may be spoiled faster. For packaged foods, I prefer products that are neatly sealed and with clear, easy-to-read labels” (Participant 11)

Another respondent also reflected on using food appearance as choice criterion:

“I purchase food products based on their appearance. I look at the appearance of the packaging -I don't buy packaged food the shape of which is not normal, that is damaged packaging such as bottles that don't have the normal shape, because I am afraid that the contents may have been spoiled. Regarding fruits and vegetables, I don't buy those that are too big as I believe that they may have hormones. I also don't buy those that look too perfect, as the techniques used for their production may not be natural” (Participant 4)

On the other hand, some respondents prefer blemished, imperfect food because they believe they are more natural and freer of pesticides. They prioritise quality and nutrition value to aesthetics. Reflecting on that, a respondent said:

“No. I wouldn't mind if it's a bit deformed, but if it just doesn't look like healthy, if it looks kind of about to go off” (Participant 5)

5.2.5.2 Packaging and proportion size

Respondents agree that packaging and portion sizes definitely affect the quantity of food consumed.

Most of the respondents buy bigger portions even though they do not need them. The main reason is that they are offered on better prices. However, they do not always waste food because they often freeze the remaining food for future consumption. Others consciously buy bigger sizes of packaged food only for food that can be stored outside the fridge for a long period of time. In this way, even though they buy big portions, this type of food has a long shelf-life and, therefore, it is not wasted.

Reflecting on the purchase of smaller proportion sizes, a respondent mentioned:

“I prefer packaging that allows for easy portion control, as it helps me plan meals more effectively and avoid food waste. Smaller portion sizes or resealable packaging are particularly helpful. This is especially important with fresh produce and dairy, where spoilage is more common” (Participant 9)

Also, another respondent reflected that:

“Packaging and portion size significantly affect my food consumption habits. I prefer packaging that offers practical, smaller portions or resealable options, as this helps me avoid over-preparing or letting food go to waste” (Participant 11)

5.2.5.3 Food promotions

Most of the respondents are influenced by food promotions, such as ‘buy one, and get one free’ or limited time offers. However, they avoid buying products on promotion with short shelf-life that need to be stored in the fridge, as well as products that they do not use frequently. They prefer buying products on promotion only when they can be stored for longer time without get spoiled, such as pasta, rice, sugar, etc. Therefore, they do not increase the quantity of food waste. Reflecting on this, a respondent mentioned:

“For products I frequently use at home, such as cottage cheese, rice, coffee, I often take advantage of offers like ‘buy one get one free,’ but I always consider whether and how I can manage or store the product” (Participant 6)

On the other hand, some respondents indicated that any time that they took advantage of that kind of promotions, they ended up buying large quantities and they had to throw away food because they could not eat them before they go bad, leading to excess food being wasted.

5.2.6 Expiration date and food waste

As mentioned in section 5.2.2, most of the respondents always read the information provided on food product labels. One of the most important kinds of information for them was related to the expiration date, ‘use by’ and ‘best before’ dates, and they adjust their purchase behaviours accordingly. A respondent reflects on the importance of dates stating that:

“I usually look for products on the shelf based on those dates and buy those that have a later ‘use by’ or ‘best before’ date” (Participant 3)

An interesting aspect is that after purchasing the product, and storing it, most of the respondents don't rely on the expiration date, as they believe that expiration dates are not accurate down to the exact day. At home, most of the time, respondents check and smell the products to realise whether they have gone bad. Also, a respondent indicated that they often consume products past their 'best before' date.

Respondents seem to be stricter in following expiration date indicators in particular sensitive commodities with short shelf-life such as, minced meat and cold cuts. A respondent reflected on when they rely on expiration dates:

"I rely on these dates to ensure the food is still safe to eat. While I am conscious of avoiding unnecessary food waste, I prioritise my family's health, so I am careful with anything that has passed its 'use before' date, particularly for perishable items. For items with a 'best before date', I am a bit more flexible, understanding that these are more about quality or taste than safety" (Respondent 9)

Another respondent added that:

"[expiration dates] are very important to me when consuming food. I rely on these dates to ensure the safety and freshness of the products I serve to my family. For perishable items like dairy, meat, and fish, I pay close attention to the 'use by' date to avoid any risk of foodborne illness. I am a bit more flexible with 'best before' dates, especially for items like dried or canned goods. However, I still consider them a useful guideline for maintaining quality" (Participant 11)

When it comes to the 'best before' date, most of the respondents have never discarded a product solely on this expiration indication. They check the food's appearance, smell, texture, and signs of spoilage (e.g., bulging packaging, mould, etc.), before deciding to throw it away. If it seems fine, they consume it. Additionally, some respondents underline that it depends on how much time is it since the 'best before' date was over, as well as the type of food. For example, they are more concerned with 'best before' dates of packaged food that is not stored in the fridge, such as rice, sugar, pasta etc, or meat and dairy products. However, with fruits and vegetables, it also depends on their appearance. If they look fine, they will not be thrown away. Referring on the type of products wasted, a respondent mentioned:

"It depends if it looks ok or not, you know? Yeah, like you can tell by the look of fruits and vegetables that they're gone off right now, you know. Sometimes they last longer than the dates. Sometimes they last way shorter than the dates" (Participant 5)

When it comes to the 'use by' date, respondents appear to be much more cautious. Most of them do not consume any product after the 'use by' date as they indicate that food is not safe to eat and can be harmful for their health. Therefore, they discard meat, dairy products, fish, and bread past the 'use by' date. Reflecting on 'use by' date a respondent noted:

"Yes, this is one of the main reasons of food waste at my household. Specially, when it comes to meat and fish" (Respondent 10)

5.2.7 Consumer expectation and food wasted at home

Most of the respondents revealed that it has happened more than once that a product did not fulfil their quality expectations. The reasons varied according to the product category. For pre-packaged food, the main problem was the bad taste due to past expiration date or probable wrong storing temperature, leading to food waste. Another respondent has been dissatisfied more than once with pre-packaged food due to misleading labelling. A respondent reflecting on the pre-packaged category noted:

“I bought a package of waffles influenced by the attractive packaging, which suggested high product quality. Unfortunately, they turned out to be a significant disappointment in terms of taste. I was unable to say what happened to them—whether they were left sitting for a long time, so I threw them away” (Participant 8)

When it comes to fruits and vegetables, some respondents were dissatisfied due to their level of ripeness and mould. Fruits and vegetables that do not satisfy consumers’ quality expectations are either used to produce meals, or the part of them that is not good is discarded and consumers eat the rest. They are only thrown away when they are inedible. A respondent reflected that:

“I bought a net of oranges. When I got home, I found a mouldy orange in the middle. But then I threw out the mouldy orange and rinsed the others. The rest were fine enough” (Participant 1)

Finally, focusing on the commodities that respondents discard most, they mostly discard leftovers of cooked meals, followed by fruits and vegetables, bread, meat and dairy.

6. Conclusions

The present report focuses on public EU, international and national marketing standards, and their impact on food waste. Public marketing standards are developed and imposed by governmental bodies and most of the time they are mandatory in nature. Their main goals are to promote food quality, protect consumers, and create a common language for trading. The present report presents an in-depth analysis of public marketing standards helping the reader to better understand why and how they are imposed, their importance for society and trade, as well as their specific requirements.

One of the key findings of the report is that food supply chain actors often cannot differentiate between private and public marketing standards’ requirements. They are aware that most public marketing standards are mandatory, and they have to adhere on them, however they are not familiar with the specific requirements of those marketing standards. A further interesting finding is that most actors confuse public with private marketing standards. In food supply chain, retailers’ and processors’ marketing standards are of great importance to all the actors, and it is evident to them that in order to continue their business, they must adhere to these marketing standards. Therefore, they consider them as mandatory, and they become confused.

Another key finding is that private marketing standards are reported to create more food waste, compared to the public marketing standards, especially due to aesthetic requirements, such as, shape, size, colour, and weight.

One more important finding is that the food supply chain actors are working towards higher levels of sustainability, and they have become aware of food waste and its impact on economy, society, and environment. Therefore, they have found alternative ways to use the products that do not meet their partners’ marketing standards. According to them, the amounts of food wasted have been minimised. However, many producers are still struggling with the standards that retailers impose to them, particularly in the fruits & vegetables and meat industries.

Additionally, our exploratory qualitative research revealed that in addition to supply chain stakeholders, consumers are also familiar of food waste and its impact. Therefore, they have become more conscious and more careful on their purchase behaviours. For example, they always check the product labelling, the expiration date in particular, and they only buy products that they could consume before they go bad.

Furthermore, they do not depend on retailers' suggestions regarding the expiration date of food, but they check it instead to see whether it has gone bad or not. In this way, they ensure that they do not waste food.

Overall, the deliverable underlines the need to understand the role of public marketing standards for food quality and trading, as well as their impact on food waste, while stressing the importance of considering both consumer expectations and supply chain stakeholders needs when developing and imposing them.

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