

A rapid evidence assessment of UK citizen and industry understandings of sustainability — Appendix document 1: methods and bibliometric results

Why our understanding of sustainable food is important when making food choices.

June 2022

Authors

Christian Reynolds, Centre for Food Policy, City, University of London Susan Moore, The York Management School, University of York Philippa Denton, University of Aberdeen Ross Jones, Centre for Food Policy, City, University of London Cicely Abdy Collins, Sustainable Restaurant Association Charlotte Droulers, Centre for Food Policy, City, University of London Libby Oakden, Centre for Food Policy, City, University of London Ruth Hegarty, Centre for Food Policy, City, University of London Jane Snell, Centre for Food Policy, City, University of London Holly Chalmers, Centre for Food Policy, City, University of London Adrian Sieff, Centre for Food Policy, City, University of London Krystal Rampalli, Department of Health Promotion, Education, and Behavior, Arnold School of Public Health, University of South Carolina Honglin Dong, Health Sciences Research & Management, City, University of London Christine Blake, Department of Health Promotion, Education, and Behavior, Arnold School of Public Health, University of South Carolina Joe Yates, London School of Hygiene & Tropical Medicine Marcos Lopes Filho, School of Public Health, University of Sao Paulo Megan Deeney, London School of Hygiene & Tropical Medicine Sharraf Samin, Department of Health Promotion, Education, and Behavior, Arnold School of Public Health, University of South Carolina Suneetha Kadiyala, London School of Hygiene & Tropical Medicine Swrajit Sarkar, Health Sciences Research & Management, City, University of London



https://doi.org/10.46756/sci.fsa.ihr753

Contents

Appendix A – Detailed methods 4					
	A.	Rapid Evidence Assessment of the academic literature	4		
	В.	Sampling of UK industry and NGO websites and documentation	7		
Appendix B – Top line and Bibliometric results					
A	. F	Results from the Industry analysis	13		
В	. F	Policy recommendations	14		
С	. F	Future research proposed in the literature	14		
D	. F	Relevance of the literature for the research questions	15		
E	. [Detailed keyword results for each overall category (Academic literature)	17		
F	. [Detailed keyword results for each overall category (NGO and Industry)	20		
Appendix C – Appendix of other grey literature that has implications for this topic area					
Appendix D – Coding framework for definitions of sustainability and themes in papers. 3					
Appendix E – Paper Access Problems					
Appendix F – Additional sustainability concepts					
Appendix G – Policy recommendations					
Appendix H – Future research areas					
Appendix G – Summary of papers in the REA. 7					

Appendix A – Detailed methods

This report used two methods: a Rapid Evidence Assessment of the academic literature, and a Sampling of UK industry and NGO websites and documentation.

Rapid Evidence Assessment of the academic literature

For the Rapid Evidence Assessment (REA) activity a REA protocol was developed and tested in coordination with the wider research team and a Steering Group (membership of FSA and Defra representatives).

This REA focuses on UK citizens perceptions of sustainability as related to food and diet. To search for academic articles related to this research question, we used 4 buckets of search terms related to 1) Consumers and citizens, 2) Food and diet, 3) perception and definition, metrics, and 4) sustainability. The terms placed in these buckets were sourced from the literature and reviewed and refined by the research team. We chose to only use the terms "sustainabl*" OR "sustain*" in the final bucket so as to only capture papers that focus only on sustainability. The result of this is that our search may overlook papers that focus on perceptions of individual metrics (such as carbon, water, etc.) that do not also mention sustainability.

The final search term used:

("consum*" OR "public" OR "citizen" OR "purchas *" OR "buy*" OR "participant*" OR "shopper" OR "respond*" OR "customer*" OR "patron*") AND ("diet*" OR "food*" OR "canteen" OR "meal" OR "menu" OR "kitchen" OR "take-away*" OR "food system" OR "agri*" OR "farm*" OR "resilien*" OR "nutri*" OR "cater*" OR "meat*" OR "fruit" OR "vegetables" OR "beef" OR "lamb" OR "Chicken" OR "pork") AND ("defin*" OR "perception" OR "consensus" OR "impact" OR "intention" OR "value" OR "label*" OR "advert*" OR "perspective" OR "preference" OR "Influence" OR "motiv*" OR "ration*" OR

Additional search filters included a time-period screening (January 2020 to December 2022). We only considered peer reviewed studies that were published in English. Only studies that contain UK data were considered in-scope in this REA. However, we noted the existence of wider in-scope literature.

Searches were first carried out on 12/02/2022. However, it was noticed that the term *"sustain*"* was absent from the searches, and so the searches were re-run on the 17/2/2022 and 04/03/2022.

Multiple databases were searched resulting in 16,502 unique titled papers.

Individual database results are as follows:

- Scopus, 10,263 results
- EBSCOhost (Academic Search Ultimate) 5,370 results
- GreenFile search, 1407 results
- PsychInfo, 311 results;
- Comms and Mass Media Complete database, 27 results
- Web of Science, 596 results

The identified papers were then sorted and evaluated in 2 stages.

First stage: Using the title and abstract of the evidence, the papers were considered against the inclusion/exclusion criteria for relevance.

In-Scope	Out of Scope
U.K. Citizens or Unclear European Citizen-ship	Clearly not U.K. Citizens or residents
Related to sustainability	Clearly not related to sustainability
Clearly related to food (systems, life-cycle, sustainability, culture, products, service, production, consumption)	Clearly not related to food (systems, life- cycle, sustainability, culture, products, service, production, consumption)
Accessible and understandable research	Complex and in-accessible research design or findings (i.e. chemical research on product properties.)
Focussed on citizen interactions/perceptions/understandings of food systems and sustainability.	Not related to citizen interactions with food system sustainability.

 Table A1, Inclusion and Exclusion Criteria used to determine whether papers were

 in or out of scope of the rapid evidence assessment. Source: Author.

Each paper was rated as in-scope (yes = 1, no= 0), and if in-scope was given further scores for a first impression on relevancy to the research question (1=low to 5=high), and a first impression if paper contains or is focused on UK data/citizens (1=yes, 2=maybe, 3=no). These scores were used to triage and prioritise the papers for the second stage. Relevancy was determined through a discussion of the research team, and using the primary and secondary research questions that were refined by the research team and Steering Group (membership of FSA and Defra representatives). The ratings of the evidence at the first stage were recorded in an evaluation record spreadsheet and is available as supplementary information in the accompanying data file.

Second stage: Each paper was read by 1 researcher. The researcher input data into a standardised Microsoft Form that screened for 1) relevance to the research questions (yes, no), and 2) if the paper contained UK data.

If the paper was relevant and contained UK data, the researcher then coded the paper based upon the definitions of sustainability, and the main themes of the paper related to sustainability. This coding framework (Appendix B) was adapted from van Bussel (2022) as well as other papers (van Bussel et al. 2022; Ahmed et al. 2019; Clapp et al. 2021; Gustafson et al. 2016; Eme et al. 2019; Chalmers et al 2019; Drewnowski 2017; Chaudhary et al. 2018). This sustainability definition coding framework was primarily developed by Christian Reynolds and then cross checked and amended by Marcos Lopes.

On the form the researcher highlighted if and how the paper was relevant to primary and secondary research questions, and if there were food policy outcomes from the paper (using a framework adapted from Theis (2020)). This was then followed by the questions developed by Collins et al (2015). This included appraisal of the following:

Relevance: We followed the criteria developed by Collins et al (2015) for assessing relevance. Broadly, this focused on the methods, the intervention, the outcomes and the target subject. The main aspects for determining relevance were strength of link to the primary and secondary research questions. A numerical value of between 1 and 3 were be allocated, with 1 representing lower and 3 representing higher relevance.

Robustness: We followed the criteria developed by Collins et al (2015) for assessing the robustness (i.e. accuracy and bias) of the evidence will be developed. Each piece of

6

evidence was coded for its type and how well it meets the robustness criteria for its type, scored from 1 (few criteria met) to 3 (all/most criteria met).

Sampling of UK industry and NGO websites and documentation

Below are the steps taken by the research group to review a sample of UK industry, and NGO/industry body sustainability information that was gathered from organisational websites and documentation. These websites and documents were saved as PDFs and keyword coded as documents using a Microsoft Form in a similar manner to the academic REA.

Due to capacity constraints, only a sub sample of 21 organisations could be sampled (see table A2). The research team identified a long list of organisations and then selected a random sub-sample. Organisations were selected from different sectors of the food system to present a diverse range of perspectives. Data used to identify the wider group of organisations included:

- Mintel Market Shares 2020, was used to identify 26 food manufacturing market leaders (for Baby Food, Biscuits, Bread & Bread products, Breakfast Cereals, Butter & Yellow fats, Cheese, Chocolate Confectionery, Cooking & Edible Oils, Cooking Sauces, Desserts, Ice Cream, Instant Noodles, Milk, Pasta, Pet Food, Prepared Soup, Processed Fish, Processed Meat, Ready Meals (inc pizza), Rice, Snack Bars, Snack Food, Sugar, Sugar & Gum Confectionery, Sugar & Sweeteners, Sweet Bakery, Sweet Spreads, Table Sauces, Vitamins & Minerals and Yoghurt). From this list, five companies were selected at random for our sampling activity.
- Kantar world panel data (2022) provided a list of ten supermarkets, from which three were chosen at random.
- YouGov (2022) data containing 'Most Popular Dining Brands in the UK' yielded a list of twenty brands, from which three were randomly selected for our sampling.
- Farmers Weekly (2016) data was mined for the top 25 farming co-ops in the UK, from which three were randomly selected for our sampling.

The research group also began by considering NGOs from the charitable and voluntary sector in addition to food industry bodies. However, given the composition of the rest of the sample, the limit to sample size, and the specific focus on sustainability, it made sense to confine our sampling for this report to the food industry bodies. This also influenced our decision not to include disruptor tech companies operating largely in the home delivery sector currently, such as Amazon, Just Eat, Uber Eats etc to avoid seeking resources concerning sustainability which did not relate to food and diet. Whilst pertinent to the delivery of sustainable business practice across all business sectors, they may be outside and beyond the scope of this review. For this reason, the wider tech sector was excluded from our sampling activity for this report.

Category	Company name	Analysis code
Market leader	Bighams Ltd.	ML1
Market leader	The Kellogg Company	ML2
Market leader	Arla Foods	ML3
Market leader	Dr. August Oetker KG	ML4
Market leader	Groupe Danone S.A.	ML5
Supermarket	Tesco	SP1
Supermarket	Iceland	SP2
Supermarket	Со-ор	SP3
Restaurant chains	Pizza express	R1
Restaurant chains	Nandos	R2
Restaurant chains	Costa coffee	R3
Farming co-ops	G's Growers	F1
Farming co-ops	Anglia Farmers	F2
Farming co-ops	Fane Valley Co-operative Society	F3
NGOs and industry bodies	UK Hospitality	NGO1
NGOs and industry bodies	British Retail Consortium (BRC)	NGO2
NGOs and industry bodies	Food and Drink Federation (FDF)	NGO3
NGOs and industry bodies	IGD	NGO4

Category	Company name	Analysis code
NGOs and industry bodies	National Farmers Union (NFU)	NGO5
NGOs and industry bodies	Sustainable food places	NGO6
NGOs and industry bodies	Sustainable Restaurant Association (SRA)	NGO7

Table A2, Description of the 21 organisations sampled in the analysis of UKindustry and NGO websites and documentation.

Appendix B – Top line and Bibliometric results

Of the 16,502 unique titled papers identified from our keyword searches, only 102 papers published between Jan 2020 and March 2022 were included in this REA. We also identified an additional 341 papers that although relevant and in scope were not focused on the UK, and so were excluded. We include a list of these in the appendix for further research. This is a good indication of the speed of growth of the literature with van Bussel (2022) identifying 76 articles published globally between January 2010 and June 2020 that were linked to citizens' perceptions on food-related sustainability. Table 6 provides a summary of the number of papers found and included at each stage of the REA.

Stage of search	Number of papers
Number of unique titled papers identified	16,502
Number of papers identified in stage 1 as being UK in focus and relevant	99
Number of papers identified in stage 1 as being "possibly" UK in focus and relevant	770
Number of papers identified in stage 1 as being outside the UK in focus and but relevant (excluded from further search)	1452

Stage of search	Number of papers
Number of papers identified in stage 2 as being in scope and UK in	114
focus	
Number of papers identified in stage 2 as being in scope but outside	341
the UK in focus (excluded from further search)	
Number of papers identified in stage 2 as being out of scope (excluded	309
from further search)	
Number of papers that were not able to be accessed (see Appendix E)	31
Final number of papers included in REA (after removal of 13	102
duplicates)	

Table B Number of papers found and included at each stage of the REA

Following the approach of van Bussel (2022) the 102 papers were coded into seven different overarching overall categories: 1) production, 2) transportation, 3) product, 4) product group, 5) consumer (citizen), 6) waste and 7) contextual factors, with 225 keyword codes split between these categories. These codes are used to simultaneously highlight definitions of sustainability and main themes found in each paper. The full list of keywords coded by overall category can be found in Appendix B sections E (Academic) and F (Industry).

Papers were given on average 22.05 keyword codes (95.0%, confidence level: 3.83); with a standard deviation of 19.49 keyword codes per paper. The highest number of keyword codes assigned to a single paper was 120.

A keyword was linked to an average of 10.04 papers (95.0% Confidence Level 1.50), with a standard deviation of 11.39. However, the median number of papers a keyword was linked to was 6.

The ten most popular keywords that emerged from the literature were related to Food choice (n=72,(71%) in the citizen information (overall category)), Environment or environmentally friendly (n=64,(63%) in the Production (overall category)), Meat (n=56,(55%) in the Product group (overall category Food Behavior/behaviour

(n=50,(49%) in the citizen information (overall category)), Health/healthy (n=48,(47%)) in the Product group (overall category)), Knowledge (n=40,(39%) in the citizen information (overall category)), Meat reduction (n=37,(36%) in the Product group (overall category)), Motives for sustainable food choices (n=40,(39%) in the citizen information (overall category), Socio determinants of food (n=35,(34%) in the Contextual factors (overall category)), and consumer/citizen preferences (n=36,(35%) in the Contextual factors (overall category)).

Some of the 10 most popular keywords were used together due to linked concepts within keywords. For example, meat and meat reduction were used together 37 times and separately 19 times (correlation of 0.686). Likewise, Food choice and Motives for sustainable food choices were used together 40 times and separately 32 times (correlation of 0.522). Other keywords had distinct use patterns within the literature. In the most extreme case within the top 10, citizen preferences and Health/healthy were used together 17 times and separately 50 times (correlation of 0.009). Likewise, Environment or environmentally friendly and Health/healthy were only used together 34 times, and separately 44 times (correlation of 0.167). This highlights some distinct keyword grouping within the literature that investigate different topics.

The top 10 papers that had the most keyword links had between 50 to 120 keywords linked to each paper. By comparison, there were 148 keywords that were linked to 10 papers or less. This highlights that many sub-themes are coded into small pockets of the literature. The coding frame also allowed for other definitions of sustainability and key themes to be recorded by the research team as identified in the literature, 33 papers had additional information recorded and this is available in the appendix.

There were 15 keywords that were not used in the analysis of the 102 papers. While a further 23 keywords that only had a single paper associated, and 22 keywords that had two papers associated with that keyword. These 15 keywords not linked to a paper include: Artisanal, Short circuit, Allergens, Bio-dynamic, Migrant, Illness, Hand washing, Freezing, Cash transfer, Sanitation, Right (to food), Tradition (and Traditional foods), Culturally acceptable / adequacy, Food sovereignty (food and nutritional sovereignty), and Commensality. This is surprising as these keywords were drawn from the wider academic literature to be consistent with the academic definitions of sustainability, as well as associated words and concepts. For instance, many of the keywords not used were found to be public concerns in National Food Strategy Independent Review, The Public

11

<u>Dialogue</u> (Hopkins Van Mil 2021), as well as academic and NGO documents and so can be seen to be in the public discourse.

It is also notable as "core" concepts for citizen food safety (such as Allergens, Illness, and Hand washing) have not been linked to sustainability in the UK academic literature – although the keyword of Safety has been linked to 18 (18%) papers.

This lack of use of these keywords in the REA does not necessarily imply that UK citizens do not relate these keywords (and the full complexity of the wider academic definition of food sustainability). Rather, there may be a bias in the academic literature that has previously investigated UK citizen perceptions and definitions of food-related sustainability. This bias is that the papers reviewed use a smaller definition for "sustainability". This means that the hypotheses, research questions and focus of the studies found in this REA may all be smaller in scope than the wider definition of sustainability as discussed in section 1.

Explanations for this bias may be that many papers are focused on other specific (but relevant) research questions rather than specifically focusing on the research question of this REA. For example, a focus on carbon footprint of diet (U4UCM3E4) rather than the broader concept of sustainable diets in their full complexity. Indeed, only 11 papers were found to directly review or engage UK citizens about their perceptions and definitions of food-related sustainability and directly compare this to a wider academic framework of sustainability concepts.

The other explanation is that the literature is bias towards specific established keywords and concepts, with the research community not yet examining themes that have only recently begun to emerge in wider sustainable food systems literature, and ask these questions to the UK population. This bias for established concepts could explain why keywords such as Migrant, Cash transfer, Sanitation, Commensality, or the aforementioned Food sovereignty, Tradition (and Traditional foods); Culturally acceptable / adequacy; and Genetically modified organisms all have no coded papers. This absence of those keywords within the literature could be explained by bias from researchers defining their own research priorities, UK funders defining what kind of research is a priority for the UK, and even bias in journals which are defining what understandings and analysis of sustainability related research are publishable. The core interpretation of the results from this review is that the perceptions and definitions of UK scholars as related to food and sustainability in 2020 to 2022 are focused on a smaller definition of "sustainability". This definition is smaller than the contemporary academic definition of sustainability, and focuses on established concepts: with three major themes being environment, health, and meat, but with many sub-themes. This smaller definition could mean that certain concepts related to the wider academic definition sustainability may not be a concern to the UK citizens. However, our results may also mean that concepts related to wider academic definition sustainability have not been the focus of academic research with the UK population, with the research evidence base disconnected from the ground truth. Indeed, UK citizen perceptions and definitions on sustainability could be similar to the wider academic definition, due to influences from other sources of information and knowledge (popular culture, NGOs etc), but UK scholars may be ignoring this new occurrence.

We highlight that this outcome could be very different if we had searched beyond the academic literature including grey literature documents such as those produced by civil society organizations. The grey literature may offer a more grounded and relevant picture of UK citizens perceptions.

A. Results from the Industry analysis

Below we present bibliometric analysis of the 21 UK food industry organisations, split into 5 Market Leaders (in food manufacturing), 3 supermarkets, 3 dining brands, 3 farming co-ops, and 7 Industry memberships bodies.

There was an average of 22.21 keywords per organisation, SD 15.34, Min 1, max of 59. A keyword was linked to an average of 3.6 organisations, SD 3.15, Median of 3.

The top ten keywords are as follows: Food waste (n=15,(71%)), Carbon and carbon footprint (n=14,(67%)), Recycling (n=14,(67%)), Environment or environmentally friendly (n=13,(62%)), Use of energy (energy footprint) (n=13,(62%)), Packaging material (n=12,(57%)), Plastic (n=12,(57%)), Use of water (water footprint) (n=11,(52%)), Amount of packaging (n=11,(52%)), and Greenhouse gas emissions (environmental impact) (n=9,(43%)).

After the top 10 keyword codes, the remaining are linked to 33% or less (n=7) documents in the sample. There were 110 of our keywords not linked to an organisation, 29 keywords linked to 1 organisation, 31 keywords linked to 2 organisations, 24 keywords linked to 3 organisations etc.

B. Policy recommendations

88 papers were coded as having some form of policy recommendation, the full description of these is found in Appendix G.

18.2 % (n=16) papers recommend developing campaigns/strategies to increase the awareness and knowledge of environmental impact of the animal and plant-based food items.

11.4% (n=10) recommend designing and implementing carbon labelling (or eco-labelling) for food business to indicate the relative environmental impact.

Policy needs to develop strategies to encourage food industries to create novel and sustainable food through food waste utilisation (n=2), education of customers to reduce food waste (n=6).

However, similar to the findings of Theis (2020) there were fewer papers with recommendations that linked to a wider food system context (n=60,(49%)), food policy theory (n=36,(35%)), or theories of change (n=36,(35%)).

Likewise, the recommendations lacked specificity. Only 28 papers mentioned a specific Target population (n=28,(27%)), only 23 described the agent responsible (n=23,(23%)), 9 suggested Methods of monitoring and evaluation (n=9,(9%)), while only 3 papers suggested a time frame (n=3,(3%)) for policy implementation and only a single paper provided any possible costs or budgets (n=1,(1%)) for the policy change.

C. Future research proposed in the literature

82 papers provided proposals and suggestions for future research.

Around 12% of the papers (n=10) recommended the future research should focus on specific populations e.g., older citizens, those in rural communities, vegan, vegetarian,

flexitarian, university students, population with different socioeconomic status, race, ethnicity, religion, health status, food environment, cooking skills, citizens suffering from egg allergies or intolerance etc. for a wider/more representative population sample.

Around 37% of the papers (n=30) directed the future research to the investigation of key attributes to customer behaviour changes around sustainable diet, including awareness, education (communication), acceptance, drivers and barriers. Ten papers (12.2%) recommended to investigate the above in a real-world condition (e.g., retail/market setting), and six (7.3%) stressed the importance of sensory influence on customers' sustainable behaviour as future research.

Future studies should also focus on the hybrid food products rather than single product (e.g., meat) (n=3, 3.7%). Only two studies indicated the role of food waste on sustainable diet and so this warrants further research.

Few studies proposed future research that focuses on the efforts from food manufacturers (industries) on sustainable diet, besides one that talked about the relationship of hospitality businesses' sustainability practices, citizen/customers' attitudes and behaviours, and another about the food labelling and sustainable food consumption.

D. Relevance of the literature for the research questions

There was a range of methods used in the papers reviewed. 38 papers were observational, and had no intervention (n=38,(37%)), 38 papers had an Intervention in laboratory or online survey setting (n=43,(42%)), while 11 papers had an Intervention in field (n=11,(11%)). Finally, there were 10 papers classified as Other (n=10,(10%)), which can be shown to be a mix of reviews and other formats.

The type of papers found in the REA were wide ranging in methodological approach. 28 papers were classified as Quantitative (experimental design), 27 papers were classified as Quantitative (observational), 26 papers were classified as Reviews, 15 papers were Qualitative studies (incl. interviews, expert elicitation), 6 papers were classified as Mixed method/Other, no papers were classified as Economic studies (e.g. CBA). This is important to note the absence of economic studies from the literature.

The relevance of the methodical approach to our specific REA questions were varied. 31 papers were rated as Low methodical relevance, and had no evaluation (theoretical or

proposed change to sustainability related concepts) (n=31,(37%)). 8 papers were rated as Medium methodical relevance, and featured an Intervention but without robust measurement/quantification (n=8,(8%)). 44 papers were rated as High methodical relevance, and featured an intervention with robust measurement/quantification (n=44,(43%). 13 papers had no set intervention but robust measurement of perceptions and/or impacts of food choices (n=13,(13%)), while 6 other papers were classified as Other (n=6,(6%)),

The rating of the relevance of the papers to the research questions found a spread of results. 31 papers were rated as Low, with Limited focus on citizen perceptions of sustainability, and the implications of this (n=31,(30%)). 41 papers were rated as Medium relevance to the research questions, featuring some focus on citizen perceptions of sustainability, and the implications of this (n=41,(40%)). 24 papers were rated as High relevance to the research questions, featuring a primary focus on citizen perceptions of sustainability, and the implications of this (n=24,(24%)). 6 papers were also classified as Other (n=6,(6%)).

The rating of the relevance of the outcome assessed also found a spread of papers. 34 papers were ranked as Low, and featuring some qualitative description of outcomes (n=34,(34%)). 31 papers were ranked as Medium, and featured Self-reported or survey-based outcomes (n=31,(30%)). 31 papers were ranked as High (3) and featured quantified outcomes (n=31,30%)). Again, 6 papers were classified as Other (n=6,(6%)).

The relevance of the evidence within each paper to the target population of the REA (e.g UK citizens) was found to be typically rated as Medium relevancy, and featured principles could be applied to change in/link to citizens perceptions of food sustainability (n=53,(52%)). 21 papers were rated as Low relevancy, with no explicit references to change in or link to citizens perceptions of food sustainability (n=21,(21%)). While 19 papers were rated as High relevancy, and featured evidence observed directly from a change in/link to citizens perceptions of food sustainability (n=19,(19%)). 9 papers were classified as Other (n=9,(9%)).

The minimisation of bias within the papers reviewed was found to be Poor (n=26,(26%)), Adequate (n=51,(50%)), and Excellent (n=23,(23%)).

E. Detailed keyword results for each overall category (Academic literature)

Within the overall category of **Production**, the most common codes were Environment or environmentally friendly (n=64,(63%)), Greenhouse gas emissions (environmental impact) (n=28,(27%)), Carbon and carbon footprint (n=27,(26%)), Ethical production (n=24,(24%)), Organic (food production) (n=23,(23%)), Animal welfare (n=23,(23%)), Sustainable production (agriculture, livestock, aguiculture) (n=20,(20%)), Use of water (water footprint) (n=17,(17%)), Climate (n=17,(17%)), Use of land (land footprint) (n=16,(16%)), Alternative (food production) (n=14,(14%)), Protecting natural resources (n=11,(11%)), Biodiversity (including degradation and/or deforestation) (n=11,(11%)), The degree/level of processing (n=11,(11%)), Pesticide or herbicide (n=9,(9%)), Use of energy (energy footprint) (n=9,(9%)), Fair trade (n=9,(9%)), Ultra-processed food (n=9,(9%)), Pesticides or Agrochemicals (n=8,(8%)), Fertilizer use (n=8,(8%)), The scale of farming (n=8,(8%)), Pollution (n=7,(7%)), The working conditions and wages for food producers and the use of child (labour) (n=6,(6%)), The protection of natural resources (n=5,(5%)), Ecological production (n=5,(5%)), Production (volume of, increased etc) (n=5,(5%)), Ecological footprint (n=4,(4%)), Traditional / indigenous production (n=4,(4%)), Methane (n=3,(3%)), Soil (n=3,(3%)), Own garden (n=3,(3%)), Fishery (n=3,(3%)), Bio-dynamic (food production) (n=2,(2%)), Ecosystem services (n=2,(2%)), Agro-ecological (n=2,(2%)), Urban agriculture (n=2,(2%)), Restorative agriculture (n=1,(1%)), Agroforestry (n=1,(1%)), Genetically modified organisms (GMOs) (n=1,(1%)), Climate smart agriculture (n=1,(1%)), Family farming / peasant (n=1,(1%)), and Communal gardens/ Community gardens (n=1,(1%)). Artisanal (n=0,(0%)) was the only code in this category not used.

Within the overall category of **Transportation** the most common codes were Local and locally produced foods (n=24,(24%)), Distance (n=13,(13%)), Origin of a product (n=8,(8%)), Food miles i.e., the distance food travels (n=8,(8%)), Sold directly from the farm (n=5,(5%)), Better for the local economy (n=5,(5%)), Transportation method (n=4,(4%)), With shorter transportation distances (n=4,(4%)), Environmental impact of transportation (n=4,(4%)), Mode of transportation (n=3,(3%)), Transportation by plane (n=3,(3%)), Circular economy (n=3,(3%)), Social and solidarity economy (n=2,(2%)), Consumers groups (n=2,(2%)), Food Networks (n=2,(2%)), Nested markets (n=1,(1%)), Transportation by ship (n=1,(1%)), Transportation by truck (n=1,(1%)), Farmers' markets

(n=1,(1%)), Community supported agriculture (CSA) (n=1,(1%)), Food cooperatives (n=1,(1%)), Food hubs (n=1,(1%)), and Inclusive markets (n=1,(1%)). Short circuit (n=0,(0%)) was the only code in this category not used.

Within the overall category of **Product** the most common codes were The function of labels (e.g., useful in food choices, or source of information) (n=24,(24%)), Sustainability labels of food products (n=22,(22%)), Familiarity of the labels (n=14,(14%)), Eco-label (n=13,(13%)), Organic label (n=13,(13%)), Nutrition labels of food products (n=12,(12%)), Front-of-package (front of pack) labels (n=11,(11%)), Amount of packaging (n=11,(11%)), Lack of trust in labels or skeptical of labelling (n=10,(10%)), Packaging material (n=9,(9%)), More knowledge was needed to understand the meaning of the labels (n=8,(8%)), Trust in product (not label) (n=8,(8%)), Plastic (n=6,(6%)), Minimum amount of packaging (n=6,(6%)), Fair trade label (n=4,(4%)), General label (n=4,(4%)), Official certification was required to make the consumers trust the labels (n=4,(4%)), Paper (n=4,(4%)), Packaging necessary to protect the food products (n=4,(4%)), UK production preferred (or wider nationalism if outside UK) (n=4,(4%)), Well-known labels (n=2,(2%)), 'doubts about the criteria used to claim sustainability' (n=2,(2%)), 'more transparency needed' (n=2,(2%)), Packaging necessary for shelf-life extension (n=2,(2%)), 'greenwashing' (n=1,(1%)), and Cans (metal) (n=1,(1%)). Allergens (n=0,(0%)) was the only code in this category not used.

Within the domain of **Product group** the most common codes were Meat (n=56,(55%)), Health/healthy (n=48,(47%)), Meat reduction (n=37,(36%)), Fruits and vegetables (n=29,(28%)), Dairy (n=24,(24%)), Vegetarian (n=21,(21%)), Vegan (n=20,(20%)), Aware of the idea that reducing meat was environmentally beneficial (n=19,(19%)), Eggs (n=18,(18%)), Food nutrient adequacy (nutrition and dietary) (n=18,(18%)), overweight, obesity, and diet-related non-communicable diseases (n=18,(18%)), Plant-based (n=17,(17%)), Seafood / Fish (n=16,(16%)), Aware of the idea that reducing meat was healthier (n=15,(15%)), at Home (n=15,(15%)),Shopping (n=15,(15%)), Flexitarian (n=14,(14%)), Wellbeing (n=12,(12%)), Natural (n=12,(12%)), Flavour (flavor) (n=11,(11%)), Out of home (n=11,(11%)), Pulses and legumes (n=10,(10%)), Seasonal (n=10,(10%)), Cooking (n=10,(10%)), Not aware about the impact of foods (meat etc) (n=9,(9%)), Aware of the idea that reducing meat was animal friendly (n=9,(9%)), Preparation (n=9,(9%)), Sugars (n=8,(8%)), Fat or oils (n=8,(8%)), Reluctant to reduce their meat consumption (n=8,(8%)), Culinary skills (n=8,(8%)), Free-range (n=6,(6%)), Essential component of the meal (n=6,(6%)), Underestimate the impact of foods (meat etc) (n=6,(6%)), Smaller portions (n=6,(6%)), Culinary preparation (n=6,(6%)), Time (to shopping, to cook, to eat) (n=6,(6%)), Exercise and physical activity (n=5,(5%)), Clean (n=4,(4%)), Social justice (n=4,(4%)), Labour/labor (n=3,(3%)), One meat-free day (n=3,(3%)), Real food (n=3,(3%)), Savoury (n=2,(2%)), Storage (n=2,(2%)), and Slow food (n=1,(1%)). The codes not used in this category were Bio-dynamic (n=0,(0%)), and Migrant (n=0,(0%)).

Within the overall category of **Consumer information** the most common codes were Food choice (n=72,(71%)), Food Behavior/behaviour (n=50,(49%)), Knowledge (n=40,(39%)), Motives for sustainable food choices (n=40,(39%)), Barriers to sustainable food choices (n=32,(31%)), Food prices / cost (n=29,(28%)), Advertising and marketing (n=28,(27%)), Education (n=28,(27%)), Taste (n=28,(27%)), Nudges (n=22,(22%)), Affordability (n=20,(20%)), Safety (n=18,(18%)), Better taste (n=15,(15%)), Food industry (n=14,(14%)), Availability (n=14,(14%)), Lack of available informatio (n=14,(14%)), Higher prices/more expensive (n=13,(13%)), Higher quality (n=12,(12%)), (lack of) Adequate knowledge about the environmental impact of their food choices (n=12,(12%)), Sources of information (n=11,(11%)), Eco-conscious (n=10,(10%)), Dietary guidelines (n=9,(9%)), Lower prices/cheaper (n=9,(9%)), Inconvenient to use (n=7,(7%)), Trusted/mistrusted information sources (n=6,(6%)), Hard to find (n=4,(4%)), Sustainability was difficult to define (n=4,(4%)), Autonomy (n=3,(3%)), Fresh (n=3,(3%)), Resilience (n=3,(3%)), No connection between food choices and (environmental) sustainability (n=3,(3%)), Conflict of interest (n=2,(2%)), Allergen (n=2,(2%)), and More reliable (n=2,(2%)), Information (if available) was not used much (n=2,(2%)). Illness (n=0,(0%))was the only code not used in this category.

Within the overall category of **Waste** the most common codes were Food waste (n=28,(27%)), Reducing food waste was perceived as environmentally beneficial (n=11,(11%)), Recycling (n=6,(6%)), avoidable (food waste) (n=6,(6%)), Food loss (n=5,(5%)), A waste of money (n=2,(2%)), Not aware of the extent of the food waste problem (n=2,(2%)), Unavoidable (food waste) (n=2,(2%)), Best before and use-by dates (n=2,(2%)), and Short shelf life leading to food waste (n=1,(1%)). Freezing (n=0,(0%)) was the only code not used in this category.

Within the overall category of **Contextual factors** the most common codes were Consumer preferences (n=36,(35%)), Socio determinants of food (n=35,(34%)), Dietary pattern (n=26,(25%)), Society (n=25,(25%)), Eating habits (n=24,(24%)), Gender (n=17,(17%)), Income (n=15,(15%)), Agency (n=12,(12%)), Meals (n=11,(11%)), Life cycle (age, other demographics) (n=9,(9%)), Empowerment to change (n=8,(8%)), Accessibility (n=8,(8%)), Environment (local food environment) (n=7,(7%)), Future generation/responsibility included (n=7,(7%)), Food security (economic, access etc) (n=6,(6%)), Family (n=6,(6%)), Community (n=5,(5%)), Powerless to change (n=4,(4%)), Livelihood (n=4,(4%)), Race (n=4,(4%)), Socio protection (n=3,(3%)), Food justice (n=2,(2%)), Food democracy (n=1,(1%)), Smallholder (n=1,(1%)), Jobs (n=1,(1%)), Equity issues (n=1,(1%)), and Diversity (n=1,(1%)),. However, there were seven categories not used: Cash transfer (n=0,(0%)), Sanitation (n=0,(0%)), Right (to food) (n=0,(0%)), Tradition (and Traditional foods) (n=0,(0%)), Culturally acceptable / adequacy (n=0,(0%)), Food sovereignty (food and nutritional sovereignty) (n=0,(0%)), Commensality (n=0,(0%)).

F. Detailed keyword results for each overall category (NGO and Industry)

Production (overall category)

Carbon and carbon footprint (n=14,(67%)),

Environment or environmentally friendly (n=13,(62%)),

Use of energy (energy footprint) (n=13,(62%)),

Use of water (water footprint) (n=11,(52%)),

Greenhouse gas emissions (environmental impact) (n=9,(43%)),

Biodiversity (including degradation and/or deforestation) (n=7,(33%)),

Climate (n=7,(33%)),

Ethical production (n=6,(29%)),

Protecting natural resources (n=5,(24%)),

The protection of natural resources (n=5,(24%)),

Restorative agriculture (n=4,(19%)),

Soil (n=3,(14%)),

The working conditions and wages for food producers and the use of child (labour) (n=3,(14%)),

Sustainable production (agriculture, livestock, aquiculture) (n=3,(14%)),

```
Pesticides or Agrochemicals (n=2,(10%)),
```

```
Ecosystem services (n=2,(10%)),
```

```
Genetically modified organisms (GMOs) (n=2,(10%)),
```

Pollution (n=2,(10%)),

Use of land (land footprint) (n=2,(10%)),

Fair trade (n=2,(10%)),

Fishery (n=2,(10%)),

Organic (food production) (n=1,(5%)),

Agroforestry (n=1,(5%)),

Fertilizer use (n=1,(5%)),

Bio-dynamic (food production) (n=0,(0%)),

Agro-ecological (food production) (n=0,(0%)),

Alternative (food production) (n=0,(0%)),

Animal welfare (and Humane treatment of animals) (n=0,(0%)),

```
Pesticide or herbicide (n=0,(0%)),
```

Methane (n=0,(0%)),

Ecological footprint (n=0,(0%)),

Ecological production (n=0,(0%)),

Climate smart agriculture (n=0,(0%)),

```
Production (volume of, increased etc) (n=0,(0%)),

The degree/level of processing (n=0,(0%)),

Ultra-processed food (n=0,(0%)),

Own garden (n=0,(0%)),

The scale of farming (n=0,(0%)),

Family farming / peasant (n=0,(0%)),

Traditional / indigenous production (n=0,(0%)),

Artisanal (n=0,(0%)),

Urban agriculture (n=0,(0%)),

Communal gardens/ Community gardens (n=0,(0%)),
```

Transportation (overall category)

Transportation method (n=6,(29%)),

Transportation by truck (n=4,(19%)),

Local and locally produced foods (n=3,(14%)),

Distance (n=3,(14%)),

Environmental impact of transportation (n=3,(14%)),

Mode of transportation (n=3,(14%)),

Origin of a product (n=2,(10%)),

Circular economy (n=2,(10%)),

With shorter transportation distances (n=1,(5%)),

Food cooperatives (n=1,(5%)),

Sold directly from the farm (n=0,(0%)),

```
Better for the local economy (n=0,(0\%)),
```

Short circuit (n=0,(0%)),

Nested markets (n=0,(0%)),

Food miles i.e., the distance food travels (n=0,(0%)),

Transportation by plane (n=0,(0%)),

Transportation by ship (n=0,(0%)),

Farmers' markets (n=0,(0%)),

Community supported agriculture (CSA) (n=0,(0%)),

Food hubs (n=0,(0%)),

Social and solidarity economy (n=0,(0%)),

Inclusive markets (n=0,(0%)),

Consumers groups (n=0,(0%)),

Food Networks (n=0,(0%)),

Product (overall category)

Packaging material (n=12,(57%)),

Plastic (n=12,(57%)),

Amount of packaging (n=11,(52%)),

Packaging necessary to protect the food products (n=6,(29%)),

Paper (n=5,(24%)),

Minimum amount of packaging (n=4,(19%)),

Nutrition labels of food products (n=2,(10%)),

Cans (metal) (n=2,(10%)),

Front-of-package (front of pack) labels (n=1,(5%)),

Allergens (n=1,(5%)),

The function of labels (e.g., useful in food choices, or source of information) (n=1,(5%)),

```
Trust in product (not label) (n=1,(5%)),
```

Sustainability labels of food products (n=0,(0%)),

Eco-label (n=0,(0%)),

Fair trade label (n=0,(0%)),

Organic label (n=0,(0%)),

Familiarity of the labels (n=0,(0%)),

Well-known labels (n=0,(0%)),

General label (n=0,(0%)),

Lack of trust in labels or skeptical of labelling (n=0,(0%)),

'greenwashing' (n=0,(0%)),

'doubts about the criteria used to claim sustainability' (n=0,(0%)),

'more transparency needed' (n=0,(0%)),

Official certification was required to make the consumers trust the labels (n=0,(0%)),

More knowledge was needed to understand the meaning of the labels (n=0,(0%)),

Packaging necessary for shelf-life extension (n=0,(0%)),

UK production preferred (or wider nationalism if outside UK) (n=0,(0%)),

Product group (overall category)

Meat (n=7,(33%)),

Health/healthy (n=6,(29%)),

Seafood / Fish (n=5,(24%)),

Fat or oils (n=4,(19%)),

Plant-based (n=4,(19%)),

Dairy (n=3,(14%)),

Free-range (n=3,(14%)),

```
Fruits and vegetables (n=3,(14%)),
```

Sugars (n=3,(14%)),

Wellbeing (n=3,(14%)),

Labour/labor (n=3,(14%)),

overweight, obesity, and diet-related non-communicable diseases (n=3,(14%)),

```
Vegetarian (n=3,(14%)),
```

Eggs (n=2,(10%)),

Pulses and legumes (n=2,(10%)),

Flavour (flavor) (n=2,(10%)),

Food nutrient adequacy (nutrition and dietary) (n=2,(10%)),

Exercise and physical activity (n=2,(10%)),

Aware of the idea that reducing meat was environmentally beneficial (n=2,(10%)),

Aware of the idea that reducing meat was healthier (n=2,(10%)),

Vegan (n=2,(10%)),

Out of home (n=2,(10%)),

Meat reduction (n=1,(5%)),

One meat-free day (n=1,(5%)),

Seasonal (n=0,(0%)),

Savoury (n=0,(0%)),

Natural (n=0,(0%)),

Clean (n=0,(0%)),

bio-dynamic (n=0,(0%)),

```
Social justice (n=0,(0%)),
```

Migrant (n=0,(0%)),

Essential component of the meal (n=0,(0%)),

Underestimate the impact of foods (meat etc) (n=0,(0%)),

Not aware about the impact of foods (meat etc) (n=0,(0%)),

Aware of the idea that reducing meat was animal friendly (n=0,(0%)),

Reluctant to reduce their meat consumption (n=0,(0%)),

Smaller portions (n=0,(0%)),

Flexitarian (n=0,(0%)),

at Home (n=0,(0%)),

```
Culinary preparation (n=0,(0%)),
```

Shopping (n=0,(0%)),

Storage (n=0,(0%)),

Preparation (n=0,(0%)),

Cooking (n=0,(0%)),

Culinary skills (n=0,(0%)),

Time (to shopping, to cook, to eat) (n=0,(0%)),

Real food (n=0,(0%)),

Slow food (n=0,(0%)),

Consumer information (overall category)

Sustainability was difficult to define (n=6,(29%)),

Food choice (n=5,(24%)),

Knowledge (n=3,(14%)),

Dietary guidelines (n=3,(14%)),

Sources of information (n=3,(14%)),

Food Behavior/behaviour (n=2,(10%)),

Education (n=2,(10%)),

Allergen (n=2,(10%)),

Affordability (n=2,(10%)),

Food prices / cost (n=2,(10%)),

Taste (n=2,(10%)),

Nudges (n=1,(5%)),

Autonomy (n=1,(5%)),

Food industry (n=1,(5%)),

Motives for sustainable food choices (n=1,(5%)),

Barriers to sustainable food choices (n=1,(5%)),

Safety (n=1,(5%)),

Availability (n=1,(5%)),

Lack of available informatio (n=1,(5%)),

Trusted/mistrusted information sources (n=1,(5%)),

(lack of) Adequate knowledge about the environmental impact of their food choices (n=1,(5%)),

Advertising and marketing (n=0,(0%)),

```
Conflict of interest (n=0,(0\%)),
```

```
Illness (n=0,(0%)),
```

Hand washing (n=0,(0%)),

Higher prices/more expensive (n=0,(0%)),

Lower prices/cheaper (n=0,(0%)),

Better taste (n=0,(0%)),

Higher quality (n=0,(0%)),

Hard to find (n=0,(0%)),

Inconvenient to use (n=0,(0%)),

More reliable (n=0,(0%)),

Fresh (n=0,(0%)),

Resilience (n=0,(0%)),

Eco-conscious (n=0,(0%)),

Information (if available) was not used much (n=0,(0%)),

No connection between food choices and (environmental) sustainability (n=0,(0%)),

Waste (overall category)

Food waste (n=15,(71%)),

Recycling (n=14,(67%)),

Reducing food waste was perceived as environmentally beneficial (n=7,(33%)),

Food loss (n=4,(19%)),

avoidable (food waste) (n=3,(14%)),

A waste of money (n=2,(10%)),

Best before and use-by dates (n=2,(10%)),

Freezing (n=1,(5%)),

Not aware of the extent of the food waste problem (n=0,(0%)),

Unavoidable (food waste) (n=0,(0%)),

Short shelf life leading to food waste (n=0,(0%)),

Contextual factors (overall category)

Jobs (n=6,(29%)),

Dietary pattern (n=5,(24%)),

Food security (economic, access etc) (n=5,(24%)),

Society (n=4,(19%)),

Future generation/responsibility included (n=4,(19%)),

Community (n=4,(19%)),

Socio determinants of food (n=3,(14%)),

Empowerment to change (n=3,(14%)),

Socio protection (n=3,(14%)),

Sanitation (n=3,(14%)),

Consumer preferences (n=3,(14%)),

Environment (local food environment) (n=2,(10%)),

Livelihood (n=2,(10%)),

Life cycle (age, other demographics) (n=2,(10%)),

Cash transfer (n=1,(5%)),

Smallholder (n=1,(5%)),

Equity issues (n=1,(5%)),

Family (n=1,(5%)),

Meals (n=1,(5%)),

```
Eating habits (n=1,(5%)),
```

Gender (n=1,(5%)),

```
Powerless to change (n=0,(0\%)),
```

Income (n=0,(0%)),

Accessibility (n=0,(0%)),

Right (to food) (n=0,(0%)),

Tradition (and Traditional foods) (n=0,(0%)),

Culturally acceptable / adequacy (n=0,(0%)),

Food democracy (n=0,(0%)),

Food justice (n=0,(0%)),

Food sovereignty (food and nutritional sovereignty) (n=0,(0%)),

Commensality (n=0,(0%)),

Race (n=0,(0%)),

Agency (n=0,(0%)),

Diversity (n=0,(0%)),

Appendix C – Appendix of other grey literature that has implications for this topic area

- BEIS (Department for Business, Energy & Industrial Strategy). (2021b) Climate change and net zero: public awareness and perceptions. UK: Department for Business, Energy & Industrial Strategy (BEIS). Available from: <u>https://www.gov.uk/gover.nment/publications/climate-change-and-net-zero-publicawareness-and-perceptions</u>
- Bock, A., Bontoux, L. and Rudkin, J., Concepts for a sustainable EU food system, EUR 30894 EN, Publications Office of the European Union, Luxembourg, 2022, ISBN 978-92-76-43727-7, doi:10.2760/381319, JRC126575.
 https://publications.jrc.ec.europa.eu/repository/handle/JRC126575
- FAO. 2014. Developing sustainable food value chains Guiding principles. Rome Available from: <u>https://www.fao.org/3/a-i3953e.pdf</u>
- IGD (Institute of Grocery Distribution). (2020) Appetite for change. UK: Institute of Grocery Distribution (IGD). Available from: <u>https://www.igd.com/social-</u> <u>impact/sustainability/healthy-and-sustainable-diets/appetite-for-change-summary</u>
- M. Rivington, R. King, D. Duckett, P. lannetta, T. G. Benton, P.J. Burgess, C. Hawes, L. Wellesley, J. G. Polhill, M. Aitkenhead, L.-M. Lozada-Ellison, G. Begg, A. G. Williams, A. Newton, A. Lorenzo-Arribas, R. Neilson, C. Watts, J. Harris, K. Loades, D. Stewart, D. Wardell-Johnson, G. Gandossi, E. Udugbezi, J.A. Hannam, D. Sandars and C. Keay. (2021). UK Food and nutrition security during and after the COVID-19 pandemic: Project Report and Recommendations. The James Hutton Institute. Available from: https://www.hutton.ac.uk/sites/default/files/files/UK%20Food%20and%20nutrition %20security%20during%20and%20after%20the%20COVID-19/19%20pandemic%20-%20FINAL%2017-12-21%20v3.pdf

- The Behavioural Insights Team (2020) A Menu for Change Available from: <u>https://www.bi.team/wp-content/uploads/2020/03/BIT_Report_A-Menu-for-</u> <u>Change_Webversion_2020.pdf.pdf</u>
- The Carbon Trust (2020) Product carbon footprint labelling: consumer research 2020 Available from: <u>https://www.carbontrust.com/resources/product-carbon-</u> <u>footprint-labelling-consumer-research-2020</u>
- The Food and Drink Federation's (2021) Shaping Sustainable Value Chains 2021
 https://www.fdf.org.uk/globalassets/resources/publications/reports/environmental-sustainability/ambition-2025/sustainability-ambition-2025-progress-report-2021.pdf
- World Resources Institute (2019) It's All in a Name: How to Boost the Sales of Plant-Based Menu Items Available from: <u>https://www.wri.org/insights/its-all-name-how-boost-sales-plant-based-menu-items</u>
- World Resources Institute (2022) Changes to Menu Messaging Can Increase Sales of Climate-friendly Food Available from: <u>https://www.wri.org/update/menu-messaging-increase-sales-climate-friendly-food</u>
- WRAP (Waste and Resources Action Programme). (2020) Life under Covid-19: Food waste attitudes and behaviours in 2020. Waste and Resources Action Programme (WRAP). Available from: <u>https:// wrap.org.uk/resources/report/life-under-covid-19-food-waste-attit udes-and-behaviours-2020</u>

Appendix D – Coding framework for definitions of sustainability and themes in papers.

Coding framework for definitions of sustainability and themes in papers.

Production (overall category)

Environment or environmentally friendly

Pesticides or Agrochemicals

Protecting natural resources

Organic (food production)

Bio-dynamic (food production)

Ecosystem services

Agro-ecological (food production)

Restorative agriculture

Agroforestry

Alternative (food production)

Genetically modified organisms (GMOs)

Animal welfare (and Humane treatment of animals)

Pesticide or herbicide

Fertilizer use.

Greenhouse gas emissions (environmental impact)

Pollution

Biodiversity (including degradation and/or deforestation)

Methane

Use of land (land footprint)

Use of water (water footprint)

Use of energy (energy footprint)

Carbon and carbon footprint

Ecological footprint

Climate and climate impacts

Soil and soil impacts

The protection of natural resources

Ethical production

The working conditions and wages for food producers and the use of child (labour)

Fair trade

Ecological production

Sustainable production (agriculture, livestock, aquiculture)

Climate smart agriculture

Production (volume of, increased etc)

The degree/level of processing

Ultra-processed food

Grown in their own garden (home grown)

The scale of farming

Family farming / peasant

Traditional / indigenous production

Artisanal

Fishery

Urban agriculture

Communal gardens/ Community gardens

Transportation (overall category)

Local and locally produced foods

Distance

Transportation method
Sold directly from the farm

Better for the local economy,

With shorter transportation distances

Origin of a product

Short circuit

Nested markets

Food miles i.e., the distance food travels.

Environmental impact of transportation

Mode of transportation

Transportation by plane

Transportation by ship

Transportation by truck

Farmers' markets

Community supported agriculture (CSA)

Food cooperatives

Food hubs

Social and solidarity economy

Inclusive markets

Circular economy

Consumers groups

Food Networks

Product (overall category)

Sustainability labels of food products

Nutrition labels of food products

Front-of-package (front of pack) labels

Allergens

Eco-label

Fair trade label

Organic label

The function of labels (e.g., useful in food choices, or source of information),

Familiarity of the labels

Well-known labels

General label

Lack of trust in labels or skeptical of labelling.

'greenwashing', (labels)

'doubts about the criteria used to claim sustainability' (labels)

'more transparency needed'. (labels)

Official certification was required to make the consumers trust the labels,

More knowledge was needed to understand the meaning of the labels.

Trust in product (not label)

Amount of packaging

Packaging material

Plastic

Paper

Cans (metal)

Minimum amount of packaging

Packaging necessary to protect the food products

Packaging necessary for shelf-life extension

UK production preferred (or wider nationalism if outside UK)

Product group (overall category)

Meat

Meat reduction

Dairy

Free-range

Eggs

Seafood/Fish

Pulses and legumes

Seasonal or seasonality

Fruits and vegetables

Sugars

Fat or oils

Savoury or Savory

Flavour (flavor)

Health/healthy

Wellbeing

Natural

Clean

Bio-dynamic

Social justice

Labour/labor (including conditions and standards)

Migrant

Food nutrient adequacy (nutrition and dietary)

overweight, obesity, and diet-related non-communicable diseases

Exercise and physical activity

Essential component of the meal

Underestimate the impact of foods (meat etc)

Not aware about the impact of foods (meat etc)

Aware of the idea that reducing meat was environmentally beneficial

Aware of the idea that reducing meat was healthier

Aware of the idea that reducing meat was animal friendly

Reluctant to reduce their meat consumption

Smaller portions

One meat-free day

Vegetarian

Vegan

Flexitarian

Plant-based

Out of home

Home

Culinary preparation

Shopping

Storage

Preparation

Cooking

Culinary skills

Time (to shopping, to cook, to eat)

Real food

Slow food

Consumer information (overall category)

Food choice

Food Behavior/behaviour

Nudges

Autonomy

Knowledge

Advertising and marketing

Education

Dietary guidelines

Food industry

Conflict of interest

Motives for sustainable food choices,

Barriers to sustainable food choices

Safety (food safety)

Illness

Allergen

Hand washing

Higher prices/more expensive

Lower prices/cheaper

Affordability

Food prices / cost

Availability

Better taste

Higher quality

Hard to find

Inconvenient to use

More reliable.

Taste

Fresh

Resilience

Eco-conscious

Lack of available information

Sources of information

Information (if available) was not used much

Trusted/mistrusted information sources

Sustainability was difficult to define

(lack of) Adequate knowledge about the environmental impact of their food choices

No connection between food choices and (environmental) sustainability

Waste (overall category)

Food waste

Food loss

Recycling

A waste of money.

Not aware of the extent of the food waste problem,

Reducing food waste was perceived as environmentally beneficial

unavoidable food waste

avoidable food waste

Short shelf life leading to food waste

Freezing

Best before and use-by dates

Contextual factors (overall category)

Dietary pattern

Society

Environment (local food environment)

Socio determinants of food

Future generation/responsibility included

Powerless to change

Empowerment to change

Livelihood

Socio protection

Cash transfer

Sanitation

Income

Accessibility

Right (to food)

Tradition (and Traditional foods)

Culturally acceptable / adequacy

Food democracy

Food justice

Smallholder

Jobs

Food security (economic, access etc)

Consumer preferences

Equity issues

Food sovereignty (food and nutritional sovereignty)

Family

Community

Commensality

Meals

Eating habits

Gender / gender identity / sexual identity

Race

Life cycle (age, other demographics)

Agency (of citizens/individuals etc)

Diversity (of diet and/or of producers)

Appendix E – Paper Access Problems

Paper Access Problems (from Round 2 of the REA refinement)

Row code from Spreadsheet	Issue	Title of Paper
46	Author Access	Consumer perception of dried dairy ingredients:
		Healthy, natural, and sustainable?
112	Unable to	Fisheries ecolabelling - clearing the haze.
	download	
139	Unable to	Love the Food That Loves You Back: A Planetary
	download	Health and Women's Heart Health Partnership.
140	Unable to	Invited review: Sustainability: Different
	download	perspectives, inherent conflict.
612	Unable to	Consumer Perception as a Criterion for Process
	download	Design
733	Unable to	Root cause analysis and impact of wastage on
	download	production effectiveness
814	Unable to	From Individual Nutrients to Sustainable Nutrition
	download	
816	Unable to	Food losses and food waste: The Industry 4.0
	download	opportunity for the sustainability challenge
1009	Unable to	Grassroots projects and social inclusion: Using
	download	surplus food to facilitate education, reduce
		deprivation, and achieve sustainable
		development
1010	Unable to	Ontological frameworks for food utopias
	download	
1074	Unable to	Assessing consumer buy and pay preferences for
	download	labeled food products with statistical and
		machine learning methods

Row code	Issue	Title of Paper
from		
Spreadsheet	Linchia ta	The offect of queteinable peakage on tests
1082		The effect of sustainable package on taste
	download	perception of healthy foods [L'effetto del package
		sostenibile sul gusto dei cibi healthyj
1086	Unable to	Personality and climate change mitigation: A
	download	psychological and semiotic exploration of the
		sustainable choices of optimists
1118	Author Access	Bioethical considerations of cell-cultured meat
		[细胞培养肉的生物伦理学思考]
1125	Author Access	Improving sustainable consumption and
		production in the supply chain: The role of eco-
		innovation practices
1152	Unable to	Neuromarketing: Some remarks by an economic
	download	experiment on food consumer perception and
		ethic sustainability
1176	Unable to	Circular economy from the point of consumption
	download	relations: Consumer's role in maintaining circular
		process
1182	Unable to	Mandatory Method-of-Production Labelling for
	download	Animal Products in the EU: A Case Study
1183	Author Access	Food market segmentation based on consumer
		preferences using outranking multicriteria
		approaches
1342	Waiting	Healthy sustainable food patterns and systems: a
	Regristration	planetary urgency [Patrones y sistemas
		alimentarios saludables y sostenibles: una
		urgencia planetaria]
1499	Not in English	Climate change, land degradation and food
		insecurity: Linkages and potential solutions
1730	Unable to	Session Two: Food Waste
	download	

Row code from Spreadsheet	Issue	Title of Paper
1731	Unable to download	Rethinking food preservation
1698	Full text requested	P98 Student Perceptions of Food and Climate Change.
1704	Full text requested	A Qualitative Study to Understand Stakeholders' Views About the Fruits & Veggies (FNV) Social Marketing Campaign to Promote Fruit and Vegetable Consumption in the United States.
1791	Unable to download	0
1794	Unable to find paper	EVALUATION ON CONSUMER ATTITUDES TOWARDS TO THE PURCHASE OF ECO- LABELED PRODUCTS
1787	Unable to download	Pleasure versus Healthiness in Multi-Ingredient Sustainable Foods: How Centrality Influences Performance: An Abstract
1570	Unable to find paper	Exploration of the food-related guilt concept
916	Not in English	The food hub sareko: Learnings from the upscaling governance processes of alternative agro-food networks [El centro de acopio sareko: Aprendizajes para la gobernanza de las redes agroalimentarias alternativas en un salto de escala]
791	Unable to find paper	Whose Justice is it Anyway? Mitigating the Tensions Between Food Security and Food Sovereignty

Appendix F – Additional sustainability concepts

Out of 31 papers, 56 additional sustainability concepts were coded as "other" and can be found in appendix D. 16 of the "other terms" are relevant to contextual factors, 14 to production, 11 to product group, 6 to the citizen information, 4 to product and waste and 1 to transport. Climate change was listed on three occasions. Sustainable fish, hybrid food, social influence, social norms, and self- construal were all listed on 2 occasions and the remaining "other" sustainability concepts were all listed only once. "Carbon footprint" was listed as an "other term" however can be found within as the coding framework. These "others" have not been re-coded into the main analysis.

Additional definitions not picked up in the coding frame:

- LIEZNN63 sustainable fish
- EKMRNREU eco-sustainable; allergen free
- P362IT72 None
- ERRC5PCJ sensory perceptions (citizen driver above sustainability)); affinity/hedonism - attachment to meat; environmental self-identity; healthconsciousness
- J5DVHI79 reduce air freighted goods; sustainable fish
- 8S8ZKT64 Vertical Farming, use of robots
- The hybrid enigma: The importance of self-construal for the effectiveness of communication messages promoting sustainable behaviour. Climate Change,
- P2N7XUZX social influence; social status; social norms; climate change
- 69LKTMX6 Organic certification;
- IPCQML5Y Food politics; political decision-making
- 5F6VVU5F Cosmetics;
- 6LLGWB6Y procurement industry definition, supply chain, value chain

- FEF9B8WM household budgets
- WFV8BWDH Use of livestock bi-product; Farmer mental health; market development opportunity;
- ZXBN3VQH Waste reduction through bi-product use; upcycling; novel foods;
- R6M5B5JV Scratch cooking;
- S9ABUKDP less and better
- WDZ5PC82 Climate Change; hybrid food products; self-construal;
- NS63TSWF Carbon footprint
- Y7Y5ID2I Protein
- 5HZCIGIM Perceptions of healthiness of food;
- BXGA9YAN Prolonged maternal feeding;
- U6Z5SXIB Social influence
- 5Y8RCWML Emotional impact on food behaviour; Impact of stress on food behaviour;
- 5EPMQZV9 Menu design; decoy effect;
- A7IH7EC3 immune-boosting
- VX6Q7JFI Risk-benefit; Global problem; Level of education
- NAZH76W4 social norms
- T8JU8HAI Ugly food; Wonky food;
- Z4Q8DBBF High proportion of processed plant based foods
- U4JBHTA7 Seasonal food;
- NEW79 Soy fish feed;
- NEW118 "Maintaining a healthy lifestyle is the common denominator in their [sustainable food] consumption, and this study argues that citizens with positive perceptions towards ethical products are willing to buy and consume ethical food products"

Appendix G – Policy

recommendations

- VCZE23AJ Sustainable changes to dietary habits for families on low-income requires policy and government responses to food poverty, food prices and access to food outlets.
- YBFGX9XH Yes, supported the call for more research.
- LIEZNN63 important for policy and interventions encouraging sustainable diets to promote consumption of healthy foods which also have a low environmental footprint, rather than solely encouraging citizens to eat less meat. campaigns promoting sustainable diets should focus on raising awareness of the environmental benefit of prioritising plant-based proteins and choosing organic produce rather than packaging and food waste as citizens are already aware of these issues.
- BCL9SG7U The success of the Nourish programme suggests wider participation, in areas of socio-economic disadvantage, would be beneficial for childrens' ability to learn and make good choices for themselves regarding their diet and health. Whole school modification of food environment is central to the production of these results. The future use of public-private partnerships for sustainable food environments is advocated by the authors.
- 6S73ERTB The initiative involves working with policy makers, academics, marketing professionals, retailers, caterers, manufacturers, restaurants, etc to make a commitment to play their part in helping everyone in Britain to eat an extra portion of vegetables per day and overcome barriers in purchasing and consuming vegetables
- 3PVUZHYQ This study emphasises the need to identify an intervention that encompasses all dimensions of sustainability: social, economic and environmental to overcome scepticism and increase awareness and knowledge about sustainable food among stakeholders. An acceptable and feasible café-based intervention ought to increase awareness and understanding of healthy and

environmentally friendly food choices, protect customer choice and avoid additional costs.

- EKMRNREU Recommendations for industry and marketing: keep price comparable to eggs; communicate taste is similar; increase flexibility of use and give recipes; emphasise sustainability in marketing
- P362IT72 Although the effect of using simulation language is small on a population level if part of this were translated into real change it may be significant. The effect is significant in committed meat eaters. Small changes in the language used to describe plant based options in combination with other strategies could have a bigger combined effect. Strategies such as increasing ease, salience, and availability of plant-based foods could multiply the effect and help change social norms.
- CGVQGAJ8 first, future hybrid products should be developed to resemble meat • products in terms of taste, texture, and flavour, thus bringing both sides of the coin and fulfilling citizens' passion for meat while promoting more sustainable consumption practices. Efforts from policy makers should be thus made to encourage the consumption of hybrid products, raise awareness, familiarity, and support their introduction as these represent middle ground alternatives to traditional 100% meat or 100% plant-based foods that are perceived tasty (because of the meat element), but also sustainable and healthy (because of the plant element). Second, it has to do with communication and labelling of hybrid products, where first role should be unquestionably taken by the product quality itself and eliciting higher levels of sensory reward (i.e., pleasure), while labelling should play only a supporting role. Specifically, new hybrid products coming to the market should be easily perceived as having the same sensory attributes of full meat products by its overall appearance, which should be supported by suitable market communication, where green and health claims would have only a supplementary function.
- ERRC5PCJ companies should focus on improvement and communication of the sensory characteristics and pleasure derived from taste, rather than the environmental and health benefits associated with hybrid products
- J5DVHI79 may be better to promote replacing conventional red and processed meat products with lower environmental impact alternatives such as white meat

and sustainable fish which have been shown to be more readily accepted than plant-based protein sources

- 8S8ZKT64 The aspect of food security in the UK was explicitly linked to Brexit.
- NPDEQCYG Recommendations originating from the actual preferences and choices of citizens have a greater potential to be adopted by citizens than is currently the case. Flexitarian diets may be easier to promote.
- The hybrid enigma: The importance of self-construal for the effectiveness of communication messages promoting sustainable behaviour. Yes, the marketers of food and food products.
- Y9WEFFTA Only an opportunity to understand the relative emotional drivers that engage citizens to consume more sustainable food products. The paper is more aligned with the perspective of food developers rather than policy
- P2N7XUZX Not explicitly, but the meat reducer eating behaviour would seem to be tactic worth trying in the wider public health toolkit, it is suggested.
- 69LKTMX6 The significant challenge of organic food import and export to the UK after 2022 (post Brexit) was highlighted as a key issue by the authors.
- 2QXC9EBC yes the paper suggests that policy makers work to educate on a national scale the citizens around what carbon labelling means. It also recommends that policy makers concentrate on emerging markets to influence behaviour change early.
- IPCQML5Y Yes the interplay between local and regional power in disseminating best practice, in effect the ability to scale up. It is not cognisant of the risks of one size not fitting all, preferring to deride the notion of the 'local trap'.
- 5VGJNTUM The authors suggest that: Using carbon labelling to indicate the relative environmental impact of protein sources could be a promising strategy to promote more sustainable protein consumption, as those citizen segments who prefer red meat and poultry burgers derive more utility from the carbon label representing the lowest carbon footprint.
- 5F6VVU5F Implicitly, choice editing was a issue of consideration resulting from these research outcomes. Or perhaps that should be production editing.

- BBI57YCH Businesses (fish companies, retailers, and others) should consider the specific market context and adapt their labelling strategies accordingly. Public authorities campaigns should inform citizens about the tangible benefits related with health and environmental labels.
- GA3P8UPV Increasing PBMA in fast-food outlets to increase uptake in men, lower income and BAME groups. Improving regulation of nutritional content of PBMA as popularity increases. Consideration to wider political/agricultural (production) implications for UK and trade partners as/when dietary shift to PBMA accelerates.
- CK7FCQL4 Not for the UK, only for Poland where the organic market is less mature
- FEF9B8WM If food assistance programs or fiscal policies such as subsidies and taxes are to be considered for nutritional and/or environmental goals, it is crucial to account for their heterogeneous effect across food groups.
- WFV8BWDH Support to grow the market for rose veal product.
- ZXBN3VQH Upcycling may result in novel foods and increased costs to industry
 of the bureaucracy of having them accepted and registered for use. This may be a
 barrier to the utilisation of food waste that might be feasible for this purpose. The
 authors also propose research with a larger sample of UK citizens to understand if
 these attitudes are held at scale within the UK. This may then have an effect within
 industry of pursuing this line of product research and development. This is of direct
 interest to the FSA.
- VXZPIZ3I This paper provides evidence to support the continued improvement of food product labelling in the US and the UK, and particularly as the US considers the establishment of a national strategy on date labels.
- 2HPQ9KYQ To develop any success of floating rice in the UK, a citizen information program is recommended.
- ZMU3YTM2 Engagement with digital platforms, digital influencers, tackling social change issues when marketing to Gen Z citizens.
- ELR5HHIQ Implementing interventions which encompass social, economic and environmental aspects; namely increasing awareness and understanding of healthy and EF foods, AND protecting customer choice, AND avoiding additional

costs (for producers and customers). Specifically, rewarding customers with extra rewards 'points' for EF food purchases, accompanied by provision of relevant information about heath and environmental impact.

- JBNKV3ZB Chefs were singled out as the decision maker in implementing sustainable diets in these environments.
- R6M5B5JV Yes the authors recommended that policy makers challenge the cultural and social norms around meat consumption, through public procurement for example. Food retailers were encouraged to develop affordable plant based alternatives to convenience and other food containing meat to change citizen perceptions about non-meat products.
- S9ABUKDP Net Zero linked to production, education to citizens around environmental impact of food in order to introduce meat taxes, concentration on the horticulture system as an easy win, policies that focus on production and consumption equally,
- IAFYA6I2 There is a potential for an increase in the rosé veal market in the UK as the majority of respondents were willing to eat rosé veal, however the product needs to be made more easily available and clearly labelled to support this market.
- EKHZHXE2 That processed foods and nutritional supplements containing seafood by-products would gauge a more positive result in terms of purchase when they also demonstrate their contribution to reduced food waste but even more so when there is a perceived personal health benefit. The policy implications of this study could be summarised and potentially applied to labelling. This study shows that citizens have positive attitudes about reducing food waste and products resulting from cleaner production. A label certifying that products contain ingredients from a cleaner production process could be implemented after further investigation of citizen demands, production method controls and the challenging task of establishing a labelling scheme that could function across various product types and countries
- WDZ5PC82 The messaging to citizens in campaigns should be congruent with notions of self-transcendence and the environment and self-interest and health goals.

- H3ZY39JS Information Promoting behaviour-change is more likely with 'nudging' techniques and when changes are easy, convenient, appealing and the default, or are promoting a dynamic norm.
- NS63TSWF Increased citizen knowledge about the environmental impact of foods will support the public's intention to move toward more sustainable diets
- H3ZY39JS Transitioning from traditional, large scale food systems towards CLFR may offer solutions to recent market shocks. Short supply chains, importance of sourcing foods using shorted supply chains and information dissemination allow CLFR to communicate 'sustainable credentials'. Exploration of cross-sector partnerships to help increase competitiveness and secure environmental and social impact in local retail marketplaces.
- SXHBVG5U Further education was advocated about the benefits of moderate consumption of wine and innovations concerning low alcohol wine products, based upon the UK studies.
- 45FYUAMN Motivations and learning, with 'adequate nutritional knowledge' recommended as determinants of sustainable diets (behaviour). Also developing environments that supported the sustainable behaviour transition.
- HAV2VSPN citizen segments including omnivores, often referred to as meateaters, and flexitarians, often referred to as meat-reducers, comprise a much larger percentage of the population in many developed countries [22,23,26].
 Therefore, understanding the motivations of omnivores and flexitarians is key to enacting a sizeable and long-term shift towards consuming less meat in developed countries.
- IP8BEMN3 Authors suggest that (conservation) policies should pay attention to intrinsic incentives, such as 'warm glow', perhaps in combination with financial incentives.
- B29UYBQJ Recommendations to food service providers to redesign menus to have 75% vegetarian choices.
- XPIR2I8C Policy makers should target 'Doers' and 'Conscious' citizens by firstly building citizen awareness and derived benefits, and secondly incentivising sustainable behaviour following developed awareness.

- QIQX65SY For all citizens, policy makers have to implement awareness trainings based on scientific facts and clear product information based on labelling schemes ("eco-labelling") which can potentially support citizens in their sustainable buying behaviour.
- U8U6MYE3 Labelling-based food policies in recent years aimed at helping citizens make better choices by making the estimation of the impact of food products on health and the environment easier
- FG4XMGL7 Policy makers in low-income countries should support traditional egg production in order to support economies
- Z53EHKNL Facilitating 'background goals' to the benefit of one other choice option. Combining health and environment, for example, by suggesting alternative, 'more sustainable' foods that are also healthy. Combining concern for climate change and biodiversity (assuming both are motivations) may fit this strategy. Strategies linking diet change with social status, ethical consumption and urban food centres. Care should be taken to avoid elitist tendencies to minimise exclusion due to perceived normative standards.
- EBHM8SKC yes to ensure that AD can facilitate bioplastics, to centralise waste management, or to centralise recycling labelling.
- 5HZCIGIM Alignment of priorities for what the food system delivers.
- BXGA9YAN Information for citizens on agroforestry, which, from the study, does not appear to be uniformly understood.
- WT24ZKHI The research suggests that findings can be used as a guide by food producers, marketers and policymakers when making decisions related to the sustainability of food products. Firstly, regarding the region's importance in the appearance of sustainable food products, citizens in Europe and Asia exhibited high WTP estimates, followed by North America and Oceania, suggesting that sustainable food marketing departments in the food business companies could additionally promote the sustainable attributes of their products in Europe and Asia. The subgroup analysis indicates that the fruit & vegetable category has the highest WTP estimate while the seafood receives the lowest. The main factors for high WTP for fruit & vegetable mostly relied on a perceived increase in food safety and quality, especially for fresh and perishable products. This indicated that

citizens perceived sustainable fruit & vegetable as being natural, with higher vitamin and nutrient content, and containing fewer or no pesticides and additives compared to conventional fruit & vegetable. The high WTP estimate for fruit & vegetable gives the producer and other stakeholders involved in the added-value chain of this category focus on promoting and advertising the sustainable aspects of the production systems that better attract citizens.

- 6BBFEQKQ Information about meat content may inhibit purchases of environmentally-friendly products. Highlighting and quantifying health AND low carbon foods could be a useful strategy for encouraging sustainable diets.
- HNM4ZQPP Education should be the focus of policy makers, in order to stimulate low-carbon diets.
- 2UVKLP59 The result of this study shows that participants who took part in the study are (i) aware of the environmental impacts of food packages; (ii) concerned about the negative impact of the unsustainable packages on the environment, and (iii) desire a change in the type and amount of materials used in food packaging.
- WWE8BGHSA need to bring more nuance into sustainability narrative in the context of FBDGs, with the aim of promoting essential, complementary dietary options available.
- ZXIPS9ZC Using citizens' existing perceptions to increase proportion of fruits and vegetables purchased and consumed. Using multiple platforms, including citizen science platforms, may diversify the sampling populations from that of survey panels, enhancing the evidence base.
- UW8YWXMLField studies were advocated by the authors as a recommendation for future research. The role of meat in meal choices was specifically advocated as requiring testing under real world conditions.
- GMXS5I4G other nutrients being provided by protein-rich foods). Health
 promotion and education of the benefits of plant-based protein could be one of the
 strategies to encourage the wider population to consider a shift towards a more
 plant-based diet.
- 45IGYIEV Do more research on this over a longer term to disentangle complex effects.

- J5KL34UX Findings can be used by different stakeholders, mainly retailers, producers and policy-makers, to promote FAPs' consumption. The study recommends highlighting the healthiness, the taste of the products, the cheaper protein ingest in comparison with other foods and the ease of digestion. Retailers and the food industry should provide products that are easy and quick to prepare. Other less important determinants that could be improved are the appearance of the products, as well as the provision of clearer information regarding the origin, quality labels, and environmental, social, and ethical impacts. Regarding the distinction between farmed and wild products, citizens who prefer wild-caught products are more likely to eat them at least once a week.
- U4UCM3E4 Research suggests the usefulness of Pigouvian taxation, combined with more contemporary food policy interventions in the form of nudging and influencing future behaviour through information recall prior to purchase. Social marketing campaigns targeting individuals based on level of 'environmental engagement'.
- GTUIFEDI As citizens are still unwilling to pay more for omega-3 enriched eggs, as well as for eggs produced with reduced GHG emissions, policy makers should work with producers to better inform citizens about the health and environmental benefits that can be derived from purchasing these eggs.
- GD7E74BH Changing food waste attitudes at the individual level will, for example, only have limited impact on behaviour if other household members do not support these changes or if supermarkets continue to encourage overpurchasing. Our framework gives structure for policy makers and program designers to develop joined up, multi-level interventions to effectively reduce household food waste.
- QY68ULII Collection practices to emphasize and minimize the amount of food waste, and incorporation of food waste education into the school curriculum.
- VX6Q7JFI More research about citizen acceptance of food technology, including gene-editing and cultured product. In other places there is a difference between gene-editing in plant food and animal based food.
- VW2SF9XL In order to intervene and diminish food waste, policy makers should adopt several regulations regarding food safety and food loss prevention.

- 3SHGQLJE Raising public awareness through collaboration from industry, government and other stakeholders that eating healthily and being active are important, do not need to be expensive and that reducing food waste can provide environmental benefits.
- T8JU8HAI The use of anthropomorphism as a marketing tactic (Mr Potato) was advocated to increase citizen engagement with sustainability actions.
- Z4Q8DBBF Management of prevailing dietary shift without compromising on health attributes of plant-based diets, given that plant-based foods can have a halo effect for health and climate change. Industry innovation without becoming a new vehicle for salt, sugar, fat.
- U4JBHTA7 Consideration of national level policies that guarantee non-meat choices in all food environments were advocated.
- AWU9Z98U Broader and more comprehensive policy tools, such as carbon taxes
- 9QZWYEJN Educational interventions to push for more plant-based diets via simple interventions such as well- designed visual calorie or carbon labels, based on the hierarchy of carbon footprints or energy content.
- YBQS688X Practical implications include: for universities, the need for monitoring the effects of their food environments, and situational factors, on the food choices of students; for key actors in the production side of the food chain, the almost absent sustainable produced food consumption alternatives, beyond organic food, show the need for more transparency about other aspects of production sustainability that are increasingly relevant for young citizens; and for food policy actors this work adds to the growing body evidence about diverse SFC behaviours that can be promoted to advance health and sustainability targets.
- NEW5Public sectors are required to give a training for the citizens to conduct an assessment quality of information related to food product innovation.
- NEW12 t would be useful for policymakers to communicate sustainability knowledge in a transparent, evidence-based and controlled way and to guide citizens by designing a highly regulated and controlled sustainability label.
- NEW32 The policy and legal requirements of some countries could also improve the animal welfare in other countries that do not have this legislation but trade and want to sell their products in the former.

- NEW73 Further research is advocated by the authors on behaviour, sustainability and interventions in the article.
- NEW46 While policy-making is necessary for "changing the macro-level context and to create more systemic change", retailers can make an important contribution by changing the micro-level context. This is all the more feasible since small-scale adjustments can often be implemented with comparatively few resources while having an important short-term impact on citizen behavior and an even more important long-term impact on food norms. Regarding this micro level context, three marketing measures concerning citizen education, communication, and availability are proposed and elaborated in more detail below.
- NEW85 Clear guidance and criteria used to label foods, since citizens believe this can help with sustainable food choice. Government should emphasise the immediacy of food climate policies, while 'beliefs of the next generations should also be considered'. Education and monitoring younger generations' beliefs and actions, since 'climate change will greatly affect the next generation'.
- NEW50 The paper recommends government and industry sectors view sustainable packaging in a more comprehensive lens. It found that certain areas were overlooked, particularly that of households' socio-cultural and structural characteristics, the role of technology in sustainable packaging, and the impact of food packaging on food waste. Similarly, the lack of design-based theoretical approaches hampers the development for recommendations to industry sectors to design effective packaging and labelling. The review suggests a lack of research funding in these areas, which could be overcome through industry and government partnerships for specific studies.
- NEW127 Due to the recognized differences between the UK and Polish organic food market, both manufacturers and retailers should develop marketing strategies tailored to the specificities of the countries in which they operate.
- NEW111 Educating and informing customers about the benefits of insect-fed hens. Produced and marketed under 'enhanced animal welfare standards, e.g. at least free-range labelling'.
- NEW128 Members of a hospitality supply chain should develop and improve social and environmental sustainability practices by investing additional resources in those areas that will improve their financial performance. Improved financial

performance can further enable companies to achieve higher quality hospitality experiences that may result in higher satisfaction, loyalty and willingness to pay higher prices. Additionally, companies in a supply chain can develop human resource policies and practices to recruit and retain locals as employees, who may help hospitality companies to provide outstanding hospitality experiences. Furthermore, developing and implementing initiatives and practices to make local businesses part of the supply chain may also improve citizens' perceptions and behavioural intentions.

- NEW118 Interventions should promote health and social co-benefits, rather than solely environmental benefits of ethical food consumption. Social consciousness could be incorporated into contemporary marketing strategies, focussed on promoting primarily social/personal/environmental agendas, and not perceived as promoting an economic agenda.
- **NEW131** Policymakers and organic food producers /retailers can benefit (Balezentis et al., 2019) by optimising their marketing and promotions accordingly. Regulators in government and organic food interest groups can strengthen the industry by providing incentives for growing and marketing of organic food to increase its supply in the organic food market. Various educational and awareness campaigns should be regularly conducted to increase citizen trust. Simultaneously the government should address the issue of organic food safety and traceability by initiating, maintaining and enforcing pragmatic policies for its promotion and penalising for greenwashing. Marketers in high-income economies should promote the environmental benefits of consuming organic food. Similarly, managers in emerging economies should capitalise on citizens desire to eat healthy food. In addition, by improving citizen's awareness through get together, organic food fairs, farmer's organic markets, advertisements and promotional campaigns issues related to trust, food safety, origin and traceability can also be addressed. Use of social media and subjective influence can accelerate the adoption curve of organic food.

Appendix H – Future research areas

1. YBFGX9XH Yes, signposted UKRI announced plans.

2. LIEZNN63 More research to target other population groups such as older citizens, those in rural communities or manual work as well as citizen in other parts of the UK. To confirm if findings of high level of awareness of sustainability issues relating to diet are seen in wider/more representative population sample. Also suggest using more representative/robust measure for actual dietary consumption.

3. BCL9SG7U Yes a study with the whole school system based on the Nourish programme for universal coverage was advocated by the authors.

4. EKMRNREU Test relevance measure; willingness to pay; differences between different citizen segments - eg vegan, vegetarian, flexitarian as possible targets for launch; non-hypothetical market testing combined with sensory tests

5. P362IT72 large-scale field trials could examine which of these intervention strategies or combinations thereof are most effective for replacing meat-based with plant-based foods.

6. CGVQGAJ8 This study was done using real world stimuli but without testing these products in a real retail setting and accounting for actual citizen choice. Future research could address this with experiments in markets settings using incentive-compatible methods, such as real choice experiments or multiple price list and experimental auctions combined with sensory studies.

7. ERRC5PCJ Citizen experiments with hybrid products and in a market setting (e.g., stores) using incentive-compatible methods, such as real choice experiments (Macdiarmid, Cerroni, Kalentakis, & Reynolds, 2021), or multiple price list and experimental auctions (Asioli, Mignani, & Alfnes, 2021) combined with sensory studies (Asioli et al., 2017), would be useful to provide more realistic information about citizen preferences and willingness to pay for hybrid products. Further, investigations of communication messages where specific goals (e.g., taste, health, and environment) could be taken into account may further allow for identifying persuasive paths for adoption of hybrid products. Moreover, additional research is needed on the role of sensory properties and expectations of hybrid products, particularly focusing on specific plant-based ingredients that could further increase product adoption.

8. 8S8ZKT64 Yes around the increased benefits to the citizen and in the increased role of technology including robots in food production.

9. NPDEQCYG The novel clustering method suggested in this paper would benefit from being generalized and the results could be used to promote more sustainable dietary patterns adapted to specific populations.

10. The hybrid enigma: The importance of self-construal for the effectiveness of communication messages promoting sustainable behaviour. Future research with other hybrid food products other than meat (diary was specifically mentioned) to test the effect.

11. Y9WEFFTA As above understand the relative emotional drivers that engage citizens to consume more sustainable food products.

12. P2N7XUZX Yes - with university populations in different places and with a different sample of the UK representative populations to assess differences and similarities over time.

13. 69LKTMX6 Yes the need for frequent and longitudinal studies regarding the organic food market were advocated in order to evidence the impact of changes across time and context.

14. A9FSQW87 No but a request for better real time data to chart changes more closely.

15. 2QXC9EBC yes - the authors recommend 5 future research areas: emerging markets, citizens' willingness to pay for CF labelled products, experimental research design such as eye tracking, research on label design, research using real products to see how they interact in the real world rather than studies.

16. IPCQML5Y Yes more research on municipal food scapes and the power of local and regional public governance in proliferating concepts of food for good health and sustainability into local life.

17. 5VGJNTUM Further research is recommended to identify sustainable protein-rich products for older adults who dislike burgers (19%). This paper was focused on protein adequacy in older adults so the further study relates to that sphere.

18. 5F6VVU5F No, but is clear that the use of open-ended questions (OEQs) will be given careful consideration for further use in future research.

19. BBI57YCH From the methodological side, further efforts should be devoted to including a measure of beliefs in the choice modelling for improving the understanding of citizens' behavior and WTP [69], or by applying other models, such as the Latent Class model, to gather information about different market segments carrying different patterns of preferences and willingness to pay for attributes and fish species.

20. GA3P8UPV Replication in other settings (non-UK) where dietary data exists. Greater regional granularity in dietary substitution. Dietary and planetary health as drivers of dietary substitution.

21. 6LLGWB6Y yes - Further research is required to understand the potential of sustainable food procurement schemes, and indeed the public procurement function in general as it relates to sustainability.

22. FEF9B8WM A potential extension of the study involving the distinction between domestic and foreign food-related GHGEs

23. WFV8BWDH No, but suggesting support for market development suggests further market research.

24. ZXBN3VQH Yes with UK citizens at scale to establish attitudes to upcycled ingredients, and promote knowledge and understanding of what these are.

25. 2HPQ9KYQ Further examination of the variation of willingness to pay across ethical attributes, as well as country of origin, would also be valuable, as would the identification of citizen segments and the best communication and distribution strategies to target each of those. Additionally, further research should consider how preferences and price sensitivities might be influenced.

26. ZMU3YTM2 Comparative analysis with other generations, cross-cultural comparison, time-based research through the 'life path' of Gen Z citizens.

27. JBNKV3ZB Qualitative research with chefs on the impact of and choices linked to sustainable diets was proposed.

28. R6M5B5JV Quantitative research to assess perceptions at scale was advocated.

29. 9X6V8X7E how households understand the notion of 'sustainable food' and what effect, if any, the pandemic may have had on the household interpretation of the related food attributes.

30. EKHZHXE2 Hybrid methods can provide such indications, but actual sales in shops are arguably the strongest indication of citizen behaviour. With the increasing relevance of reducing the environmental impact of industrial and private endeavours, future research should seek results that are closer to predicting actual behaviour, of honest citizens, in a real market.

31. WDZ5PC82 Yes - with testing of hybrid diary products rather than a single focus on hybrid meat product as in this study.

32. H3ZY39JS Research in non-university settings, impact of (behaviour change) strategies linked with economic, resource and human factors.

33. 47YC8UY4 Yes, further evaluation of the use of volunteers to help parents with child eating behaviours was advocated with reference use of randomised controlled trials.

34. NS63TSWF 1. Further explore citizen understanding- including a greater number of foods, different countries and different cultures. 2. Develop and access citizen facing communications to improve awareness and understanding of the numerical value of carbon footprint associated with different foods. 3. Replicating past studies using Zooinverse for a larger and more diverse sample

35. H3ZY39JS Examine similar community-led retailers other than food

36. SXHBVG5U Future research on public perception about the research on the health impact of wine was suggested by the authors..

37. 45FYUAMN Further studies in low and middle income countries; randomised and larger, national representative sampling could be employed. Raising awareness through the role and impact of selecting, preparing and eating food on the environmental implications, using different sustainability outcomes, to enhance the person's perceived behavioural control. Adopting harder, subsidy-based interventions to incentivise citizen behaviour and reduce final cost to the citizen

38. HAV2VSPN More research is needed to establish the relevance of socioeconomic status, race, ethnicity, religion, health status, food environment, and cooking skills. Future research should consider the importance of standardizing methods in order to allow for better comparisons among studies. Additionally, studies should prioritize examining potential drivers and inhibitors across different citizen segments and various non-meat protein sources to determine differences in citizen acceptability and the long-term health and environmental consequences of such replacements.

39. WTAWTVVZ More research is needed to understand the factors that influence meat consumption in later life. In addition, more exploratory research is needed to identify culturally acceptable sustainable protein sources that older adults are willing to either replace meat with or to consume in greater quantity to increase their protein intake.

40. IP8BEMN3 Measuring using physiological indicators or behavioural choice scenarios

41. XPIR2I8C Expansion of sample sizes, exploring retail settings and how living environment affects sustainable attitudes.

42. FG4XMGL7 1.Quantitative research on citizen WTP for plant based eggs.
2.compare citizens' acceptance for plant-based eggs from both developed and developing countries 3. There is need to investigate preferences, habits, and attitudes of specific citizen's segments, such as citizens suffering from egg allergies or intolerance, vegans, vegetarians, or flexitarians as possible targets for launching plant-based eggs.

43. Z53EHKNL Exploring culturally appropriate, healthy and tasty diet changes, perhaps using a food environment using affordable plant-based food options.

44. 5HZCIGIM Studies in Africa to supplement the gap in global studies, more qualitative public health research generally, and further research to identify the individual perception aspects of healthiness, eg body image (dysmorphia) are all advocated.

45. BXGA9YAN Research on willingness to pay for the impact of prolonged maternal feeding practices on milk prices was proposed, as was a design encompassing wider aspects of citizen choice well as.

46. WT24ZKHI An extension of existing methodology with the research scope and quantity of studies expanded.

47. U6Z5SXIB Future research should validate these findings by repeating this experiment under more realistic conditions to investigate if the social influence of network members is strong enough to overcome negative consequences or barriers naturally inherent in sustainable consumption situations, such as increased cost or food shopping habits

48. 6BBFEQKQ Varying ingredients or attributes other than carbon footprint and healthiness. Appearance and information (and price) were measured, however other decisions (such as taste) could be included.

49. HNM4ZQPP The importance of considering social heterogeneity in future research, to account for variance in interest and demand in sustainability across demographic groups, and therefore effectiveness of interventions.

50. 2W2DM5AY Research underrepresented the role of religion in food choice, both in terms of non-Muslim citizen segment responses to Halal attribute, and Muslim responses to attributes studied in this research.

51. WWE8BGHS Improving data collection & sharing, use holistic approached considering multiple sustainability domains, collaboration across industry, science and geography

52. ZXIPS9ZC Exploring differences in perceptions and impact on purchase and product choice. Secondly, how citizens acquire knowledge and how this informs their perceptions, and how this influences food choice.

53. UW8YWXML Real world field studies were advocated, specifically to test the impact of meat in meal composition.

54. 4RKPVIX5 Future studies may collect data from other social media platforms to validate the findings of this paper. future research, we recommend researchers focus on specific countries or continents to analyze what areas of sustainable consumption are essential to that country or continent.

55. 45IGYIEV Yes, in the policy making arena.

56. 5EPMQZV9 Further decoy effect research within the food system was advocated by the authors.

57. J5KL34UX The greatest negative impact on the frequency of home consumption of FAPs corresponds to not understanding the information accompanying the products. Further analysis is recommended to confirm this result. For example, some citizens may have never read the labels, either because they have good knowledge of FAPs based on childhood habits or because they could trust the suggestions made by local fishmongers.

58. U4UCM3E4 Longer time scales, larger sample size to improve effect sizes

59. GTUIFEDI Research should be conducted to estimate citizen willingness to pay for eggs produced with these new technologies to compare with costs of production in order evaluate the economic sustainability for producers.

60. QY68ULII Further research advocated to obtain further gaps in understanding in different places in order that they might be successfully tackled.

61. VX6Q7JFI In addition to the acceptance of gene-editing in plant and animal food products, more research is called for as cultured meat becomes more widely available to citizens.

62. NAZH76W4 More research is needed to explore the role of social and cultural processes and how they are linked to food choices. More comparative research would also be useful to better understand the effectiveness of different interventions in different food environments.

63. VW2SF9XL research can focus on one hand on particular details of the behavior of different societies. On the other hand, it would be interesting to analyze whether food waste is a matter of a natural born characteristic or if it can be re-educated in order to reduce the quantities of wasted food.

64. T8JU8HAI The authors suggested using anthropomorphic tactics with more risky foods to assess how this impact on notions of self-construal with citizens.

65. U4JBHTA7 Yes more social marketing intervention studies concerning sustainable diets were advocated to validate the findings in this study.

66. AWU9Z98U Results could be more generalisable in real-world conditions, to test for backfiring in other contexts and whether impact of interventions persists. Heterogeneity effects of past behaviour, identity, moral values, could be tested and controlled.

67. YBQS688X Future research areas can examine the effects of communication framings that emphasize the individual health or pro-social environmental benefits of SFC in different populations. There is also a need to further examine the behavioural aspects related to the co-benefits and also the management of risks associated to SFC, at the lifestyle and health outcomes level. Social norms [89, 90], including related variables as eating with others, and situational factors such as time pressure, portion size, palatability [55], availability of sustainable alternatives, food repositioning or labelling [86] deserve further examination. The moderation effects of social and environmental factors on personal factors related to sustainable food consumption reveal opportunities to design choice architecture interventions. Future research could evaluate the interaction between possibly conflicting predictors of different SFC behaviours, the disentangling mechanisms

behind attitudes and knowledge as a predictor of behaviour, and the factors to adopt SFC in male citizens.

68. K6WXPHR4 Further market research with developed product.

69. NEW5 Future studies need to understand the key attributes that are more related to citizen acceptance of the alternative meat products.

70. NEW12 As a next step, it would be of great interest to study the perceptions of food- related sustainability in selected target groups and segmented groups. It would be interesting to examine the perceptions of citizens in low-income countries regarding food sustainability, as their food system is often more rural based.

71. NEW73 Low participation from marketing journals in the field suggested to the authors that future research from that perspective may be fruitful.

72. NEW79 The authors propose research to understand why the ASC standard has been accepted more readily in mainland Europe than in the UK.

73. NEW46 In future research, more store-tests are needed as well as investigations along the entire value chain.

74. NEW85 Study perceptions of sustainability on segmented groups, such as vegetarians, or other demographic segments ('sustainers'). Future research could be stratified by age groups or genders, as well as low-income countries where food culture and consumption may be more rural- (vs. urban-) oriented.

75. NEW50 How and if perceptions and attitudes affect citizen s' understanding of the role of packaging in reducing food waste

76. NEW127 In the UK, the association between the perception of organic food and purchasing behaviour was not observed to the same extent as Poland's. These findings need to be explored further in future studies.

77. NEW111 Larger sample sizes; providing information on taste, quality and nutritional content to assess how the product's intrinsic attributes may affect citizen perceptions.

78. NEW128 Future research should investigate the potential moderating effects of citizen' socio-demographic characteristics and the level of interactions between the relationship of hospitality businesses' sustainability practices and citizen attitudes and behaviours. Though sustainability in the hospitality supply chain management may yield
remarkable results for hospitality companies, the costs of developing and implementing those sustainability practices cannot be ignored.

79. NEW130 Future research should aim to expand on these findings, investigating in more detail the types of messaging and product positioning which may be optimal for animal-free dairy products. One particular area which needs further research is nomenclature; this has been an important issue in the cultivated meat field (Bryant and Barnett, 2019) but there is not yet comparable attention given to the naming of animal-free dairy.

80. NEW118 Sample size could be expanded to explore the utility and application of the proposed model for ethical consumption. Other consumption contexts could be explored to develop a measuring instrument, scales and to test validity and reliability of the model.

81. NEW131 Future research is needed with more data collected to confirm this paper's conclusions. Further, it should also be explored whether information processing differs across eco-labels or individuals from different social groups, regions and nationalities.

73

Appendix G – Summary of papers in the REA.

Due to the length and format of this Appendix, it is presented in a separate document. Please see Appendix document 2.