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PUBLIC PERCEPTIONS TOWARDS SUSTAINABLE FOOD PRODUCTION AND THE IMPACT OF FOOD CHOICES ON THE ENVIRONMENT

A DISSERTATION SUBMITTED AS PART OF THE REQUIREMENT FOR THE BSC ECOLOGY AND WILDLIFE CONSERVATION

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1.0 Abstract

Today's population, as it increases, faces an immense challenge when it comes to providing sufficient and nutritional food to keep up with demand, without overwhelming the Earth's natural boundaries. In order to keep up, it is vital that the public understanding of global food systems and their intrinsic connection with nature is strengthened and maintained, especially highlighting new, sustainable systems which could help rebuild our connection with the Earth and its resources. Understanding public perceptions, levels of knowledge and barriers to change is a key way to beginning the transition to environmentally friendly practices and habits.

Through the use of an online survey, I gathered information on a variety of topics relating to food systems and consumption habits, identifying key demographic factors such as gender, age group and occupation. These showed to be especially important in levels of meat and dairy consumption, and general attitudes towards animal agriculture and its place in a sustainable food system. Female participants reported an overall lower level of meat consumption, while males as well as individuals in a rural occupation were found to eat the most meat. Older respondents were much less likely to use the internet to inform them of their dietary choices, whereas younger generations reported higher use of social media as their main source of food related information.

Secondly, I conducted a sustainability analysis of current popular diets, with the help of wider literature. Vegan and vegetarian diets scored low on a scale of environmental impact, while diets high in meat consumption scored much higher. This was consistent with the literature, however not with my participants, who thought omnivorous or local based diets more sustainable than those with reduced animal products. Understanding how the public perceives the environmental impact of different food products is an important step to ensuring the correct information is distributed, and to creating strategies to enable everyone to make the right choices as a consumer. Such strategies, for example environmentally accurate food labelling, ensure that the decisions made by the consumer are fully informed and judged accurately.

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3.0 Introduction

3. 1 Background

3.1.1 An Introduction to Sustainable Food Systems

The term “sustainability”, defined by the United Nations (2022) as “meeting the needs of the present without compromising the ability of future generations to meet their own needs”, has been branded as an effective “boundary term” (Scoones, 2007), linking the objectives of all kinds of groups to a common agenda. In 2015, the UN and its member countries adopted the 2030 Agenda for Sustainable Development, containing at its heart the 17 Sustainable Development Goals (SDGs). These goals recognise the imperative to create environmental, economic and educational growth, as well as combatting inequality and global health concerns. SDGs 13 (Climate Action) and 2 (Zero Hunger) each tackle global food systems, and highlight how by improving them we can build up both the natural world and continuation of the human race.

In response to the modern challenges faced by our planet today, such as the growing population, food security and the climate crisis, it is now widely believed that there is an urgent need for a shift towards a new paradigm for sustainable food systems (Marsden and Morley, 2014). The challenge comes with the competing needs to keep up with the increasing demand for food, as well as providing nutritional sufficiency for decades to come while also respecting the Earth’s planetary boundaries (Lindgren et al, 2018).While the UN’s definition for sustainability focuses on the need to not overwhelm the Earth’s natural boundaries, recent reviews on the state of UK agriculture outline the “imperative” (Rhodes 2017) for a regenerative approach, with which we can not only decrease but *reverse* the detrimental effects of the last few decades of intensive farming on our country’s biodiversity and land quality.

In order to reconnect humans with nature, and to change public perceptions towards the link between soil health and public health, it is vital to strengthen society’s understanding of humans and the environment as an interactive and interdependent

relationship (Allen, 2016). Our food system lies at the centre of discussions surrounding sustainability, producing between 19-29% of global anthropogenic greenhouse gas emissions, with agricultural production responsible for around 80% of this (Vermeulen, 2012). It is therefore imperative that the public perception of their food and where it comes from is strengthened through the right sources, and that policy is used to rebuild the psychological gap between food and farming.

In recent years, there have been discussions in many forms about the place of meat and dairy in our food systems today, especially whether they fit with a sustainable or regenerative approach. The number of consumers following a vegan diet has grown considerably in the recent decades, with over 46% of vegan individuals in a recent survey (Janssen et al, 2016) claiming to have environment related motives. This implies that there is a general understanding that animal agriculture as it stands is not a sustainable practice, with no place in an environmentally friendly food system. This could be a sound interpretation of the evidence, as animal agriculture is linked to an excess of land use change, deforestation and biodiversity loss all over the globe (Poore and Nemecek, 2018). However, with the growing movement towards regenerative farming practices, new light is being shed on livestock as “soil ecosystem engineers” (Cusworth 2022), with the ability to increase carbon capture and improve soil health through holistic grazing systems.

3.1.2 The Role of Agriculture

Agriculture is a complex socio-ecological system, involving many interactions between humans and nature, and therefore requires an understanding of the inner functioning of this complex relationship. Since its inception, farming has been the most extensive and sustained interaction between humans and the natural world, altering and diverting natural systems to fulfil the needs of our species (Cunfer, 2005). Many agricultural practices we still use today have been around for hundreds of years, as human civilisation has relied upon the food provided by farmers since the Neolithic times (Tauger 2010). The agricultural revolution around 11,000 years ago was a turning point in human history, where nutrition ceased to be dependent on

hunting and gathering and became domesticated, with grains intentionally cultivated and livestock reared to comprise the “missing link” between seed collecting and cereal harvesting (Kislev et al, 2004). For the first time, what we now know as the “Hunger Gap” could be combatted by this new awareness and the ability to grow surplus food in the summer months to withstand the colder and less abundant winter.

Gradually, as agriculture has flourished and become more efficient, using new technology and machinery, the negative effects of such intensive processes are being seen all around the world (Rodrigues et al, 2004). Agriculture is currently one of the leading causes of increasing CO_2 levels in our atmosphere, caused primarily by land conversion dominated by livestock and livestock feed (Alexander et al, 2017). The FAO estimate that the level of CO2 produced by animal agriculture amounts to 14.5% of all greenhouse gas emissions, with other scientific literature claiming this figure may now have risen to 16.5% (Twine, 2021). The loss of large areas of rainforest and other plant life results in far less carbon sequestration, and the burning of plants to clear land for agriculture releases any carbon stored in their biomass. Fertilisers from farmland are also responsible for the majority of global eutrophication of waterways, and about one third of terrestrial acidification (Schreefel, 2020). If the current practices used in the majority of agriculture today continue into the future, global carrying capacities are likely to be surpassed and the human population will cease to be sustained. “Earth Overshoot Day” is one way that this has already been calculated, defined as “the day of the year on which humanity’s demand on nature exceeds the Earth’s annual biological capacity to regenerate”, in 2021 falling on July 19th (Lin et al, 2021) .These challenges have opened up a new narrative around creating a sustainable food production system, one which respects the Earth’s planetary boundaries as well as providing sufficient, nutritious food for the continuing populations (Conijn et al, 2018). At the production level, many have called for a new circular system, within which ecology and carrying capacities are taken as a starting point, and maintaining closed nutrient cycles and optimisation of the whole system are prioritised (de Boer, 2018).

The movement towards regenerative agriculture (RA) is centred around similar ideas, with core themes including soil health, climate change resilience, increased biodiversity, and a system which is circular in its regeneration and productivity. The practices involved in this process are focused on these key concepts, such as

reduced tillage to avoid soil damage and desertification, and the use of cover crops to increase carbon capture and resilience against adverse weather and climate. Others are more niche, such as permaculture and holistic grazing, but all promote a change to a more sustainable manner of food production (Giller et al, 2021). The idea of moving beyond sustainability and into regeneration is based on the current state of the world's soils. Gabe Brown, a pioneer of regenerative agriculture, asks "why in the world would we want to sustain a degraded resource? We need to work on regenerating our soils, not sustaining them" (White, 2020). The potential for regenerative practices to convert degraded and biologically dead soils back to life is what makes RA stand out against other sustainable ideas; instead of calling for continuation of current systems, or promoting "sustainable intensification", it insists on a new way, integrated with the natural world and rebuilding humans' relationship within it.

Food systems are unusual in their ability to be impacted at every level, from producer to consumer, where each is dependent on the other. The decisions made by the consumer have the capacity to impact demand, and therefore alter supply chains and the value of any product. In the UK, new food networks are becoming more common, in the form of farmers markets and community supported agriculture (CSA) schemes in order to engage in more direct relationships with consumers, and decrease the carbon footprint of consumer products (Weatherell et al, 2003). A local, circular economy within food production is beneficial for both the farmer and the consumer, as it reconnects people to their food and the natural processes involved in making it both optimally nutritious and environmentally friendly. In this study, I investigate public opinion on local food production against a vegetarian or vegan diet, and how the benefits of buying local might weigh up against the exclusion of non-environmentally friendly products.

3.1.3 Plants vs Meat

In the evolving world of agriculture, the most controversial topic to be discussed is the place of livestock and animal produce in a new and sustainable system. Animal products provide one-sixth of human food energy, including more than one-third of global protein, and the benefits are even more far-reaching when we factor in the

nutrient recycling and waste disposal functions provided by livestock (Bradford, 1999). It is difficult to argue that the domestication of livestock was not advantageous to humans in a number of ways. Animals provide a means of coping in times of crop scarcity, vegetation management, and food from non-farmable soils. From a farmer's perspective, keeping livestock is a valuable and stabilising decision. However, due to the usually intensive and damaging nature of livestock farming and meat and dairy production, discussions are constantly taking place surrounding the position of such agriculture in a sustainable system, with proposed solutions ranging from sustainable intensification, or "clean-cow", to "no cow", a future with little to no animal products (Cusworth et al, 2022). The regenerative agriculture movement is calling for a green rebranding of cattle, through the optimisation of grazing animals in carbon sequestration and the creation of healthy soils through closed nutrient cycles. The question remains; do we need animals in our food systems today?

There is of course the moral counterpoint when it comes to animal agriculture; non-meat eaters, whether it be veganism or vegetarianism, stand by the fact that even the most humane parts of the dairy and meat industries are intrinsically immoral, and that benefitting from animal exploitation and killing is an unnecessary and inhumane act of speciesism (Zamir, 1970). Arguably, the healthiest option for both people and planet when consuming animal products is to consume a smaller proportion of animal produce and to buy local, focussing more on whole grains, legumes and fruits and veg, as indicated by the EAT-Lancet Commission in their "Planetary Health Diet". However, it is clear that land-access is a great privilege, and that the majority of the UK population do not live within a close proximity of agricultural land (Stanners et al, 1995), therefore the ability to buy locally produced animal products is a pleasure not many can afford. Instead, most meat-eaters rely on intensive producers, due to affordability granted by lower food standards and environmentally damaging practices. Globally, livestock consume around one third of all cereal production and use about 40% of global arable land (Mottet et al, 2017), which arguably could be used instead for the production of human-edible foods. The debate is wide and varied, and in this study, I will investigate the opinions of the general public on the plants vs meat dispute, investigating people's perceptions of reducing meat consumption in the name of a more sustainable food system and

bringing in a range of influences and factors which may impact the way we view animal agriculture.

3.2 Public attitudes towards food choices

Public attitudes towards their food choices are likely to be impacted and influenced by a range of factors, and are vital to understanding how the UK food system works. As discussed earlier, the power of the consumer is not to be taken lightly when it comes to food products, and the decisions the public make in the supermarket are hugely influential. To effectively utilize support from the public in the switch to a food system which is not only sustainable, but regenerative, we must have a comprehensive understanding of the basis of these choices, and influences on public opinion (Patchen, 2006). Patchen suggests that people are more likely to respond to environmental threats the more they perceive themselves to be affected; for example, how much they understand their day-to-day decisions to be impacted by climate change. Therefore, providing people with the information to arouse concern is likely to stimulate action. However, British activist and conservationist Chris Packham (2022) makes the logical claim that information about the climate and food systems is no longer hidden; thanks to modern social media, the truth is available for anyone who wishes to find it, and the mission is no longer to “spread awareness”, it is to control misinformation and ensure that the truth isn’t diluted in a storm of opinions which lack scientific basis.

Public interest in sustainability is at an ever increasing high (Schaller, 1993), however consumer behaviour is not totally consistent with attitude patterns. This could be due to a number of reasons; the perceived consumer effectiveness (PCE) being a main barrier to radical change (Vermeir et al, 2006). Sustainable consumption is based on a decision-making process, in which the individual must take into account their own social responsibility, on top of assessing their own personal wants and needs (Ingenbleek et al, 2015). PCE and perceived availability of sustainable products are amongst the most important factors which can increase likelihood of more ethical and sustainable food consumption. Roberts (1996)

suggests that consumers must believe that their behaviour will have a substantial positive impact on the environment for them to consider making the (perhaps costly) change to a more sustainable diet. Promoting the power of the consumer and making the public aware of the impact of their individual actions might be the most effective way to reach a new era of sustainable consumption and food systems.

3.3 Influences on Public Attitudes; Impacts of the Media

There has been a fair amount of research into public environmental concern, especially focusing on demographic determinants such as gender, occupation, age and location (Liere and Dunlap, 1980). The most common findings seem to show that young people are the most environmentally concerned, especially those from urban areas (Buttel, 1979). In recent years, the impacts of social media on the younger generations could potentially account for this (Finch et al, 2016). The incredible amount of information available at their fingertips allows interpersonal connections to people all over the world, who are experiencing all kinds of environmental impacts and changes. Exposure to nature through media, such as environmental programmes or documentaries, is associated positively with public concern and pro-environment attitudes, however general viewing of television or news is shown to relate negatively to environmental concern (Zhao, 2012). The media is at the centre of society today, and has a huge impact on public opinion and therefore a powerful influence over any movement or public issue.

Other sociodemographic factors can determine an individual's level of environmental concern outside of their media consumption; there are a number of studies unpicking the differences between attitudes in rural and urban environments, with varying results but often finding that rural residents express less concern than those from towns or cities (Freudenburg, 1991), possibly reflecting the farming communities there. Rural communities also have more access to land and green spaces, possibly creating a more positive outlook on the climate and agricultural issues as they are less exposed to more intensive and damaging practices.

3.4 Aims and Objectives

This report will act upon the lack of literature surrounding public attitudes towards food systems and sustainable consumption habits. With consumers being arguably the most impactful group in the food production line, it seems imperative that their perspectives are understood and influencing factors are examined, such as demographic factors or influences in the media. With this understanding, it is more likely that successful management and policies can be put together which work with the public to create more sustainable food systems, in a way that will bring the positive impact further down the supply chain. An online survey will be used to uncover these perceptions, to discover the extent of public awareness and concern surrounding sustainable food production and consumer patterns.

A secondary aim is to assess different diets popular in the UK today, and compare each carbon footprint to evaluate the meaning of a “sustainable diet”, and whether such a thing exists. To assess each diet, I will use online resources and a basic measurement system, based on the level of greenhouse gases produced by the main proponents of each diet. I will weigh up these findings with the opinions shared by the public in the online survey, and assess whether common beliefs line up with reality.

Table 1 – Research questions presented by this study and my expectations for their findings.

Research Question	Expected findings	Reasoning
What are the main reasons given by the public for adopting a new diet?	Personal health and wellbeing and affordability	For most people in the UK, food costs following Brexit have risen significantly, along with other commodities, meaning food insecurity is likely to increase (Barons and Aspinall, 2020). Therefore, when food shopping it is likely that the priority will be to find the most affordable items.
Is there a difference in level of meat consumption	Women will report that they eat less meat, and are more aware	From both personal experience and wider literature (Rosenfield and Tomiyama, 2021), I find that women are likely to be

between men and women?	of the environmental impacts of food	more open to a meat-free diet. They also appear to have higher concern for the environment, as well as showing more empathy towards animals, both resulting in lower levels of meat consumption (Amiot and Bastian, 2015)
Does age impact the way people find information to guide their food choices?	Older people will not use the internet as much as younger people when searching for dietary information	This assumption comes from general inductive reasoning, in that the older generation is not as familiar with technology or social media as younger people. This is also backed up by literature such as Laor (2022) who found that Facebook is much more commonly used by young people.
Is awareness of the environmental impacts of food affected by rural or urban location?	People living in rural locations will have more awareness of the environmental impacts of different foods	My own experience living in both rural and urban locations consecutively leads me to make this conclusion, as living in an agricultural area appears to make people more aware and have concern for the environmental impacts of their actions, particularly food sourcing, as they can see the consequences first hand.
Which diet do people believe is the most sustainable?	The majority of people will believe that vegan or vegetarian diets are the most sustainable	This result would align with the majority of literature (O'Malley et al, 2019), claiming that a diet that is lower in meat content is more environmentally friendly. I also believe that with the availability of such information through social media and the internet today, many people may be aware of this, even if their habits do not align.

4.0 Methodology

4.1 Questionnaire

In this investigation, primary data was collected through the use of an online survey. This was based on the dietary habits of members of the public, as well as their perceptions of sustainable food systems. Interlinking with these findings, secondary data was also collected to form a hypothetical “sustainability calculator” for the main diets identified in my research, to investigate whether there is a particular diet which is more sustainable, and whether this lines up with public beliefs.

The decision to create and distribute the questionnaire online was based on the number of advantages presented with this method; very low cost, high efficiency (Wright 2005) and access to a much larger and more diverse population (Lefever et al, 2007) with the potential for extensive amounts of data. Designing the survey through Google Forms also allowed me to change and adapt the structure as much as needed.

4.1.1. Questionnaire design

An effective online questionnaire relies on ease of access, especially when appealing to a large population range (Taherdoost, 2016). Google Forms allows an easily shared link and does not require any kind of login or other requirements to access a shared form, therefore this seemed to be a good platform choice. When the participant first accesses the form, a short participant information sheet would be shown, with a simple tick-box to verify informed consent was given and that the participant was completing the form willingly and with the knowledge that his or her data may be (anonymously) used in this investigation. The aim was to make this section as brief as possible, as readers are more likely to intake information such as this when it is concise and short (Antoniou et al, 2011).

The survey was split into 3 sections, in order to separate the different subjects of questioning and avoid leading questions – for example, a question on the sustainability of the participants current diet followed by a question on meat intake

may unintentionally create a bias (Brace, 2018). The first section focussed on personal information, which was intentionally limited to only include data which could predict to impact someone's opinions on this topic. For example, instead of asking for a specific area or county, participants were only asked whether they are from a rural/urban location etc, as this is most likely to have an impact on their consumer habits.

To aid the participant's thinking, most questions were designed either as multiple choice or as a linear scale, ranging from 1-7. This choice was made to give a wider range of responses, and to allow for a middle or neutral answer. Most multiple-choice questions also had an "other" option, to accommodate for answers which were not included as a choice.

4.1.2 Questions

The survey itself was split into 3 sections, each containing questions on a sub-category of the topic. Section 1 was to accumulate personal demographic details, such as age, gender and geographic location. Section 2 focussed on personal food choices, determining the respondents understanding of UK food practices as well as their personal opinions on the agricultural industry and consumer habits. In section 3, the questions were more focussed on the respondents' beliefs about sustainable diets and the different impacts of consumerism with respect to food, including opinions on the role of meat and dairy. We intentionally arranged the sections in this order to avoid any predisposition, as the questions about sustainable diets may have caused some social desirability bias when answering questions on food choices and perceptions (Grimm, 2010)

4.1.3 Pilot Questionnaire

The questionnaire was trialled by 4 individuals, 2 from environmental science/ecology degrees and 2 from other backgrounds. The purpose of this was to ensure the context and terminology was comprehensible from an outsider's perspective, for example someone with no significant knowledge of sustainable food

systems or agroecology. The pilot participants from an ecology background were used to ensure the technical concepts and jargon used were correct and lined up with general scientific belief. A pilot study is a vital element of good study design, and fulfils a number of functions, generally increasing the likelihood of success within the main research (Van Teijlingen et al, 2001).

A number of alterations were made to the survey during this process, following on from the feedback given by pilot participants. One of the first changes was to the structure of the questionnaire, as it was thought the order of the questions being random was likely to lead the participant to believe there was a “right” answer. This is what spurred me to restructure the form into 3 separate sections; separating the questions on diet choices from those on beliefs about sustainability to avoid any potential bias. For a similar reason, the title of the questionnaire was also changed from “Sustainable Food Choices” to “Investigation into Dietary Choices”, so the participant did not enter into the questionnaire with any preconceptions. A couple of the questions were also made multiple choice after participants saying they felt they had more than one answer, such as “Where do you look to inform your food choices?”. While I had attempted to make the vocabulary as accessible as possible, there was still some feedback that terms such as “food systems” be changed to “food production” so as to accommodate for people without prior understanding of the term. The final questionnaire can be seen in the Appendix (9.1).

4.1.4 Distribution

The process of online distribution was fairly simple, as is the benefit of using an online survey (Nayak et al, 2019). Initially the survey was shared using a link on my own social media platforms, mainly Instagram and Facebook, enabling it to be easily shared and reposted by friends and family, as well as reaching further geographically across the country. To reach more diverse groups, I asked friends and family to also share within work groups and other organisations they are a part of.

4.1.5 Number of Surveys

Sample size is contextual, and dependant on the parameters of the study and range of responses needed for a meaningful result (Boddy 2016). As this study aimed to uncover the views of the general public, I was driven to gain as many varied responses as possible to then relate to the UK population. Denscombe (2010) suggests that the ideal sample size to apply to this population is 2,000, however for a study of this size and timescale this was just not a realistic goal, and so I set a minimum of 100 responses with a hope to gather more.

4.1.6 Analysis

To allow easier analysis, the data was sorted into nominal and categorical scales. For example, the question "*How would you rank your knowledge/understanding of UK food production?"* was displayed as a scale from 1 (being "very poor") to 7 ("excellent"). Those questions which could be substituted by a scale were also converted, for example the age categories were changed to a scale from 1 – 6 (18-25 to 75+). Doing this enabled much more efficient analysis of the data as there was less qualitative data to work with, and more opportunity to run statistical tests.

4.1.7 Statistical analysis

A statistical analysis of the questionnaire results was completed using the platform IBM SPSS Statistics 20 to determine how contributing factors may impact the public's opinion on several topics, or their behaviour when it comes to food consumption and sustainable attitudes.

The Spearman's Rank correlation was used to measure the relationships between age and level of consideration of the environmental impacts of food, as well as self-perception of sustainability within their choices. Spearman's Rank is one of the most widely used non-parametric statistics (Astivia and Zumbo, 2017), and was chosen for this analysis as the two variables are both ordinal, and the aim was to test the significance of the correlation between them (Mehta and Patel, 2011).

For most of the analysis, for example the impact of gender identification on consumption of animal products or beliefs about the contribution of meat or dairy, the Cramer's V test was used to test the association when one of more nominal variable was present (Prematunga, 2012).

4.2 Dietary Analysis

Alongside analysis of public perceptions using a questionnaire, I undertook a study of current popular diets or food choices and made an approximate evaluation of their carbon footprints, based on the most commonly consumed food items (Vergeer et al, 2020). The purpose of this was to provide a reference point for the range of diets mentioned in the survey, and to come up with a measurement technique and scientific basis to test against the perceptions of the public; a "sustainability calculator".

While there is no real criteria for any of the diets included, I used food and pop-culture blogs, and opinion-based articles to gauge an idea of how different food items fit in with each diet. In Forbes Health Magazine (Acosta, 2021), the "Best Diets of 2021" were reported to include Vegetarian, Vegan, Mediterranean and the infamous, albeit controversial, Keto (ketogenic) diet (O'Niell and Raggi, 2020). In this study I also chose to include an "omnivorous diet" to cater for those who do not abstain from any particular food groups, and generally eat most things in moderation, as well as a "Flexitarian" diet for the increasing number of people who follow a diet which is close to vegetarianism, with a minimal inclusion of meat and fish (Derbyshire, 2017). The "Carnivore" diet, also known as the Paleo diet, is a newly popular yet lightly studied variant of the keto diet in which all plant-foods are eliminated, and animal products are the primary source of nutrition (O'Hearn, 2020).

Instead of measuring the amount or mass of each food consumed, I chose to measure by frequency of consumption as this allows for more variation week by week. For example, dairy products such as cheese may be consumed every day in a ketogenic diet, due to its high fat and low carbohydrate content, but will possibly be less prominent for a vegetarian and non-existent in a vegan diet. In this analysis, I used the online database created by Poore and Nemecek (Initially in their 2018

study), called the Climate Change Food Calculator (Stylianou, 2018). This database was the result of a study of 40 major food products which make up the majority of global consumption, and the effect of these foods on greenhouse gas emissions and the amount of land and fresh water used across all stages of their production, excluding the cooking process. Poore and Nemecek (2018) analysed data from 40,000 farms and 1,600 processors, packaging types and retailers to create the calculator.

FOOD PRODUCT	Vegetarian diet	Carnivorous diet	Vegan diet	Ketogenic diet	Mediterranean diet	Omnivorous diet	Flexitarian diet
Apples	7	2	7	2	12	7	7
Avocados	41	15	72	72	41	15	15
Bananas	14	5	14	5	14	14	14
Beans	20	7	36	0	36	7	7
Beef	0	2,820	0	2,820	604	604	0
Berries/Grapes	25	9	25	0	25	9	9
Bread	12	4	12	0	21	21	21
Cheese	210	210	0	352	75	201	201
Chicken	0	497	0	497	106	284	106
Milk Chocolate	80	80	0	0	80	214	214
Citrus Fruit	6	2	6	0	6	6	6
Coffee	89	89	89	33	89	89	89
Eggs	115	202	0	202	43	115	43
Fish	0	390	0	390	390	146	146
Lamb	0	904	0	904	0	339	339
Dairy Milk	131	131	0	0	49	131	49
Soy Milk	0	0	40	0	0	0	15
Nuts	1	1	2	1	5	1	1
Pasta	9	9	25	0	43	25	25
Pork	0	656	0	656	0	140	140
Potatoes	9	9	9	0	9	9	9
Rice	69	69	69	0	69	26	26
Tofu	58	0	58	0	0	0	12
TOTAL	**896**	**6,111**	**464**	**5934**	**1717**	**2403**	**1494**

Figure 1 – Diet Sustainability Calculator, representing kilograms of carbon dioxide equivalents (CO2eq) per 1kg of product.

Never	X0
1-2 times a week	X2
3-5 times a week	X4
Once a day	X7
Twice a day or more	X14

Figure 2 – Figure 1 Key

As shown in figure 1, each food item's sustainability value is calculated based on the number of times I estimated it to be consumed on average per week. The value

placed on each item represents kilograms of carbon dioxide equivalents (CO2eq) per 1kg of the product, which encompasses all different types of greenhouse gases which may be emitted along the production line. The “score” given at the bottom of the table is therefore a measurement of how environmentally friendly each diet may be considered based on their greenhouse gas emissions, for example according to this method, the carnivorous diet scores the highest, therefore is the least sustainable, while veganism displays the lowest score.

4.3 Scopes and Limitations of Methodology

4.3.1 Questionnaire

The choice to create and distribute the survey online was mostly due to efficiency and cost. Although this allowed for the survey to be shared further and more diversely, there were a number of limitations. For example, sharing links on social media, although saving time and cost, is limited to the sharer’s own demographic, who are most likely of a similar age range, location and possibly mindset. In the distribution of this questionnaire, the majority of respondents were female (67%) and between the ages of 18-25 (52.9%). The geographic location was also biased towards the countryside, with 65.7% of respondents from a rural location. These answers are most likely due to my own Instagram audience being mostly students from rural areas, and even though I pushed for more mature participants the response rate was significantly lower when posted on Facebook groups.

When analysing demographic factors, the occupation of participants was not useful at first due to the wide and varied spread of different industries. Therefore, instead of taking into account each individual sector, I decided to reduce the variables to fit into two categories; those in rural occupations and those *not* in the rural sector (the former category including farmers, gardeners, and other individuals involved in crop growing or food production). This made it much clearer to identify any potential relationships.

4.3.2 Dietary Analysis

The dietary analysis allowed a basis from which public perceptions about these diets could be compared, with a more standardised criteria for each diet based on regularity of consumption. The method used was based on a prestigious study (Poore and Nemecek, 2018), and calculated the amount of carbon dioxide equivalents (CO_2eq) produced by each diet in order to assign it a sustainability score. The main limitation within my method was that the amount of each item eaten in each diet was the result of estimations made by a single researcher (myself), rather than using a method such as food diaries as this would have been outside the scope of my research.

Of course, my own method fails to take into account the wide ranges of each product when it comes to their carbon footprint, and factors such as distance travelled and the standards to which it has been produced (Yan et al, 2021). Due to time restraints and practicality, it would be impossible in this study to accurately calculate the impact of each product in it's different standards of production, as factors such as the foods place of origin cannot be meaningfully determined on a large scale. As pointed out in Poore and Nemecek's study (2018), impacts of some of the lowest-impact animal products still appear to exceed those of vegetable substitutes, highlighting the potential implications of meat and dairy production in a sustainable future. For my calculations I took only the average emissions for each item from Poore and Nemecek's research.

5.0 Results

5.1 Questionnaire Results

The questionnaire was released on 15th October 2022, and gained the majority of its responses in the first 3 days. After the initial spike, responses began to slow, and after hitting 105 I decided to close the survey.

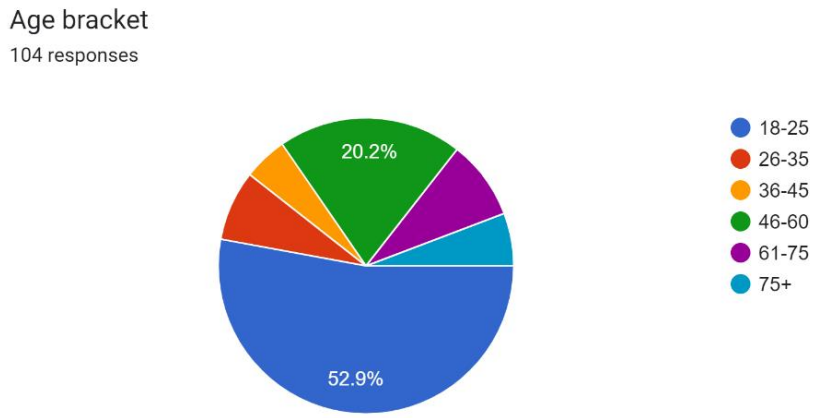

Figure 3 – Pie chart displaying ages of respondents, split into 6 brackets from 18 to over 75 years.

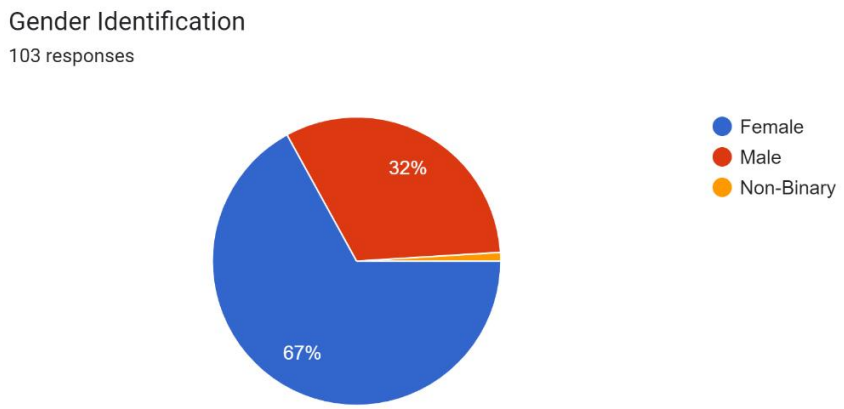

Figure 4 – Pie chart displaying the gender identification of respondents, including male, female and non-binary. Participants were also given the choice to answer “other” although there were no responses for this option.

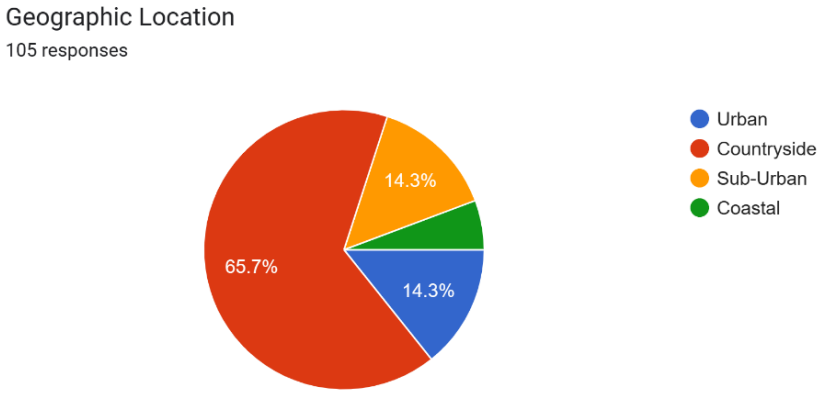

Figure 5 – Pie chart displaying the geographic location of residence for participants, based on general area.

5.1.1 Consumer Awareness

On the whole, respondents generally self-reported to have a good understanding of UK food production (figure 6, mean response 4.24). There was only a small proportion, however, who ranked their understanding as “excellent” (2.9%). Only 31.5% ranked their knowledge as 3 or below.

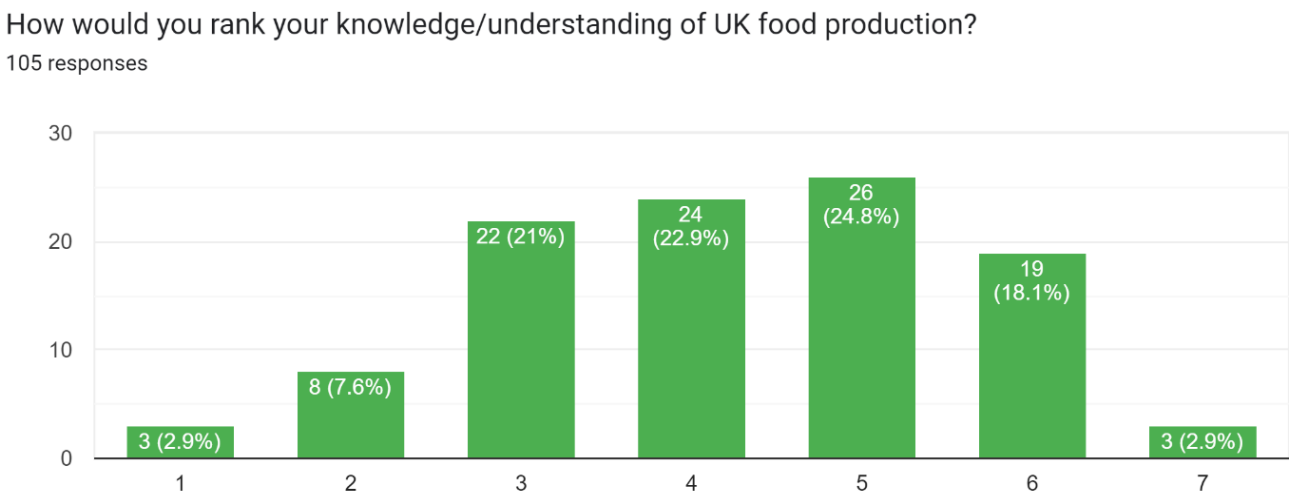

Figure 6 – Shows responses to the question “How would you rank your knowledge/understanding of UK food production?”. Respondents were asked to answer on a scale from 1 (Very poor) to 7 (Excellent)

Contrary to these results, figure 7 shows an uneven spread of answers to the question “How often do you consider the environmental impact of the food you buy?”. The majority hovered around the middle of the scale, with 26.7% answering “often” and very few selecting “never” (3.8%) or “always” (4.8%). The mean answer sits at 4.12, implying that although there is a spread of opinions, the general consensus leans towards being considerate of the environment when shopping for food, rather than having no concern for it at all.

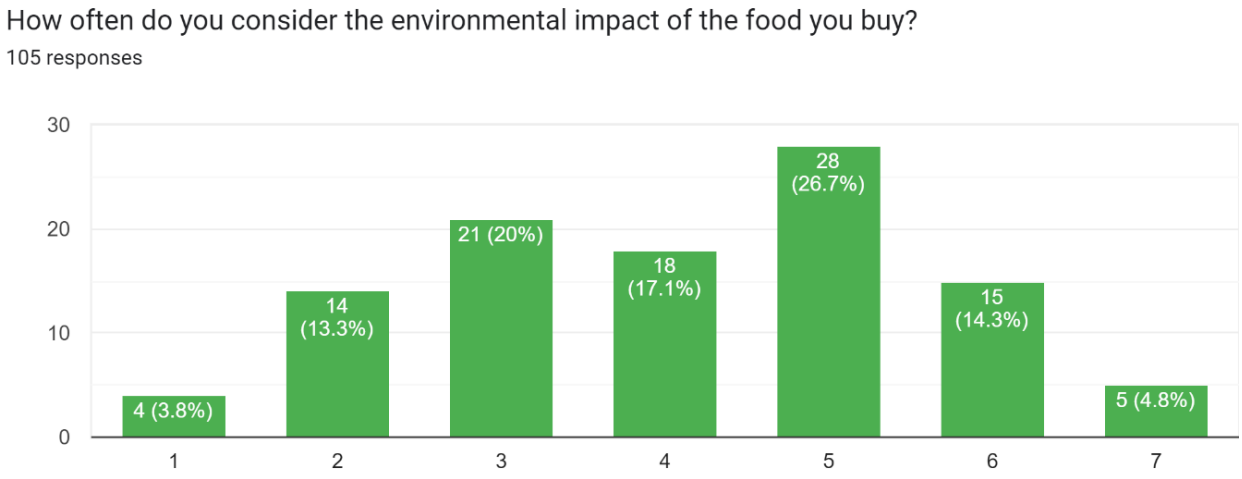

Figure 7 – Shows responses to the question “How often do you consider the environmental impact of the food you buy?”. Respondents were asked to answer on a scale from 1 (Never) to 7 (Always)

Figure 8 displays the respondent’s opinions about which factor is the most significant in defining food choices as environmentally sustainable. Some of the top answers are interesting in that they each take a different meaning of sustainability, for example nutritional availability implies that the diet will be sustainable for the individual’s health, while continuation for future generations relates to the sustainability of the human race. However, local and seasonal produce has the highest number of answers (39%), implying that although the physical content of a diet is important, the sourcing and origin of these foods has a significant impact on their environmental sustainability.

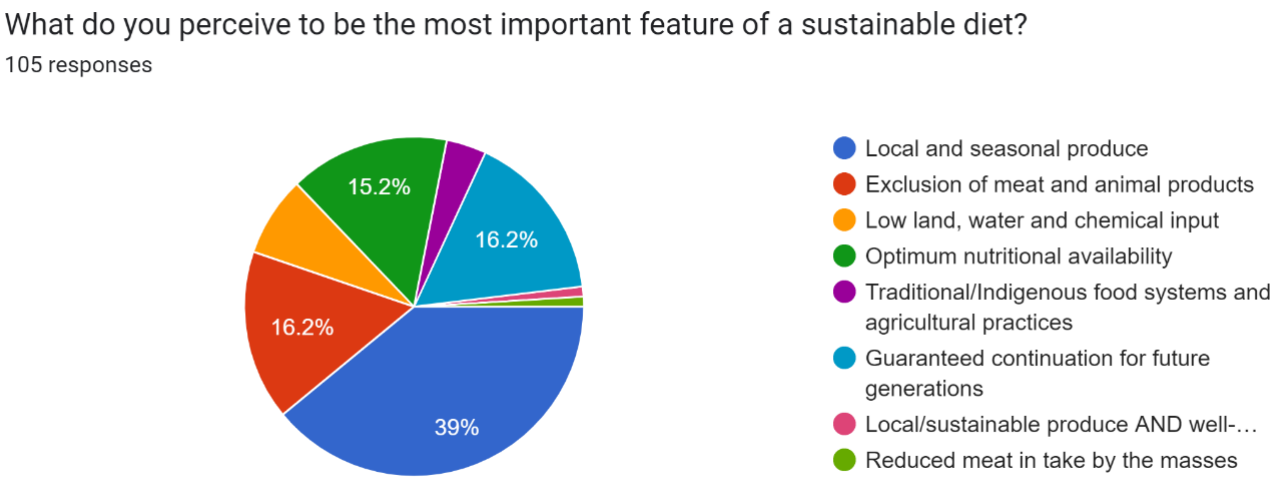

Figure 8 – Pie Chart displaying respondents answers to the question “What do you perceive to be the most important feature of a sustainable diet”, with the majority answering from the provided selection, and the final two answers being individually written.

5.1.2 Dietary Choices

Respondents also answered a number of questions regarding their current food choices and trends. Figure 9 shows their opinions on the most important reason to follow a certain diet, with an overwhelming majority (58%) answering “personal health and wellbeing”. Environmental health and sustainability was the second most popular answer with 12.4%. Placing personal health above environmental health is a trend seen before in research (Walker et al, 2019), where people also tend to associate “healthy” foods with being also good for the environment, which is not always the case (Tobler et al 2011).

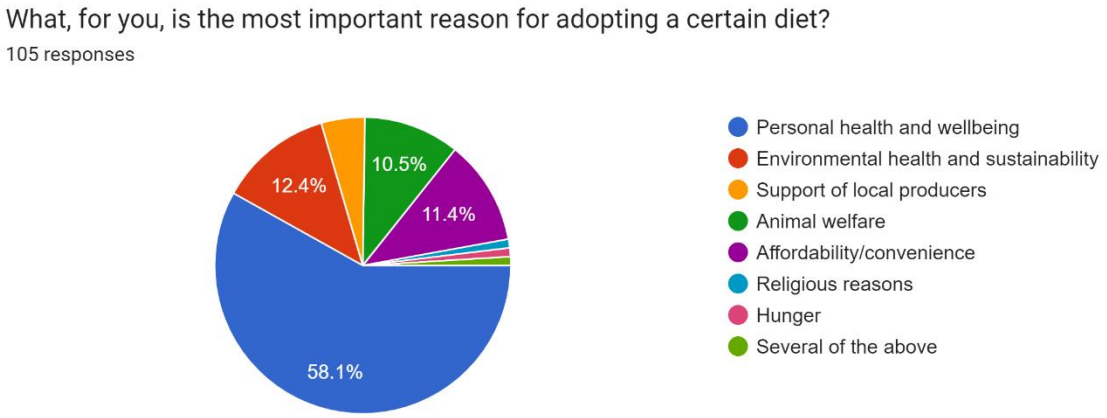

Figure 9 – Pie Chart to show the respondents opinions on the most important reason for adopting a certain diet or making certain food choices.

When discussing sustainable food habits, one of the most prominent questions is that of meat and dairy consumption and where (or if) it fits in an environmentally friendly system. The survey asked participants to summarise their average meat consumption (figure 10), ranging from eating a meat product with every meal or abstaining completely, as in a vegan or vegetarian diet. 39% of respondents claimed to eat meat every other day, the most popular answer, with “every day” following with 31.4%.

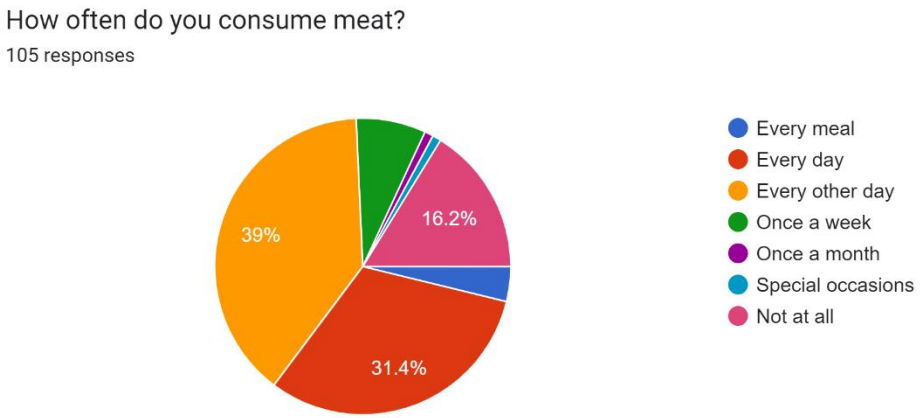

Figure 10 – Pie Chart showing the participants meat consumption habits,

The majority of participants perceived themselves to be relatively environmentally friendly with their diet choices, as shown in figure 11. The majority (37.9%) of respondents selected 4 on a scale from 1-7, with the average answer being 4.48.

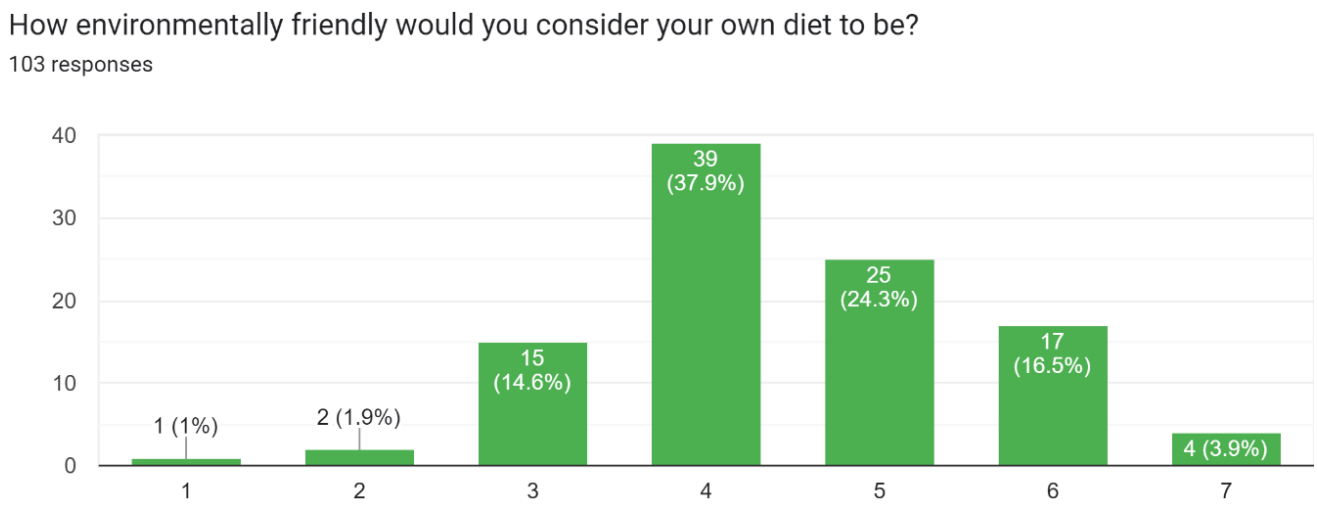

Figure 11 – Bar chart to show participants perceptions of the sustainability of their own diet, on a scale from 1 (Not at all) to 7 (Very)

5.1.3 Analysis of Factors Affecting Attitude

Gender

Gender generally didn't appear to have a significant impact on public awareness of sustainability within food systems (table 2). However, when it came to meat consumption, the association between women and eating less (or no) animal products was significant (<0.001), whereas men were shown to have a higher level of consumption. Interestingly, this relationship did not persist into beliefs about the contribution of animal products to climate issues, so whereas women eat less meat, this does not appear to be due to a higher concern for the environmental impact of animal products.

Table 2 – Table showing the results of statistical tests to measure the relationship between gender and a number of public perceptions. Rows highlighted in blue are found to be significant.

Factor	*Significance*	*N value*	*Test Statistic*	*Description*
Consideration of the environmental impacts of food	0.322	102	Cramer's V: 0.262	There was no significant association between gender and consideration of the environmental impacts of food
Perception of personal environmental awareness	0.127	101	Cramer's V: 0.262	There was no significant association between gender and level of environmental awareness
Levels of meat consumption	<0.001	102	Cramer's V :0.469	Women are reported to consume significantly less meat than men
Beliefs about the contribution of animal products to climate issues etc.	0.208	102	Cramer's V: 0.320	There was no significant association between gender and the contributions of animal products.

Age Bracket

There is a significant association between the age of the participant and where or how they obtain their dietary information, or advice on food choices (Table 3). Notably, participants in the later age brackets (i.e., 45 years or older) are much less likely to use the internet or social media to inform their food choices, whereas for younger participants (especially 18–25-year-olds) this appeared to be their main source of information. Age does not seem to be a contributing factor to level of personal sustainability.

Table 3 – Table showing the results of statistical tests to measure the relationship between the age of the participant and a number of public perceptions. Rows highlighted in blue are found to be significant.

Factor	*Significance*	*N value*	*Test statistic*	*Description*
Consideration of the environmental impacts of food	0.066	104	Spearman's Rho: 0.181	There may be a correlation between age and the consideration for the environmental impacts of food, but it is not significant
Source of information to aid food choices	0.001	104	Cramer's V: 0.652	There is a significant association between age and source of information, with participants under the age of 25 favouring the internet and ages 45+ preferring to look at food labels and packaging
Perception of personal environmental awareness	0.317	102	Spearman's Rho: 0.100	There is no significant correlation between age and perception of personal environmental awareness

Geographic Location

The geographic location of the participants did not appear to have any impact on their perceptions of sustainable food systems (table 4), contrary to my expectation that the more green area or agricultural land a person is exposed to the higher their awareness might be.

Table 4 – Table to show the results of statistical tests to measure the relationship between geographic location and a number of public perceptions. Rows highlighted in blue are found to be significant.

Factor	*Significance*	*N value*	*Test Statistic*	*Description*
Consideration of the environmental impacts of food	0.094	105	Cramer's V: 0.289	There may be an association between geographic location and consideration of the impacts of food, but it is not significant
Personal feelings towards the agricultural community	0.267	105	Cramer's V: 0.260	There is no significant association between geographic location and the personal feelings held towards the farming community
Level of meat consumption	0.327	105	Cramer's V: 0.253	There is no significant association between geographic location and the level of meat consumption
Beliefs about the contribution of animal products to climate issues etc.	0.246	105	Cramer's V: 0.262	There is no significant association between geographic location and beliefs about the contribution of animal products to climate issues

Occupation

Respondents in the agricultural sector appear to have a more positive outlook on the impact of animal agriculture, and this is reflected in their higher levels of consumption (Table 5)

Table 5 – Table to show the results of statistical tests to measure the relationship between occupation and a number of public perceptions, where occupation is considered as farmers and non-farmers rather than individual industries. Rows highlighted in blue are found to be significant.

Factor	*Significance*	*N value*	*Test Statistic*	*Description*
Beliefs about the contribution of animal products to climate issues etc.	0.003	105	Cramer's V: 0.436	There is a significant association between being in the agricultural/rural sector and believing that animal products do not contribute highly to climate issues.
Levels of meat consumption	<0.001	105	Cramer's V: 0.522	There is a significant association between being in the agricultural industry and having a higher meat consumption.
Perception of personal environmental awareness	0.737	103	Cramer's V: 0.186	There is no significant association between occupation and perception of environmental awareness, and there is a similar trend with both farmers and non-farmers hovering around the middle of the scale
Consideration of the environmental impacts of food	0.843	105	Cramer's V: 0.161	There is no significant association between occupation and consideration of the environmental impacts of food, both farmers and non-farmers appear to hover around the middle of the scale

5.2 Dietary Analysis Results

From the Dietary Analysis I undertook (figure 1), I was able to come up with a score for each of the diets studied (table 6), representing the kilograms of carbon dioxide equivalents (CO2eq) per amount of each food product consumed each week. Based on this approach, the most sustainable diet appears to be Veganism with the lowest score of 464, and the least sustainable with 6,111 is the Carnivore/Paleo diet.

Table 6 – Table showing total scores taken from Diet Sustainability Calculator (figure 1). Score based on kilograms of carbon dioxide equivalents (CO2eq) per amount of each food product eaten each week.

Diet	**Vegetarian**	**Carnivore/Paleo**	**Vegan**	**Ketogenic**	**Mediterranean**	**Omnivorous**	**Flexitarian**
Total score	896	6,111	464	5,934	1,717	2403	1,494

When comparing this to the respondent's opinions on which diet might be the most sustainable (figure 12), there is not an obvious pattern. Interestingly, the answer with the most responses was the "Local Produce only" option, which is not a diet that was explored in the analysis.

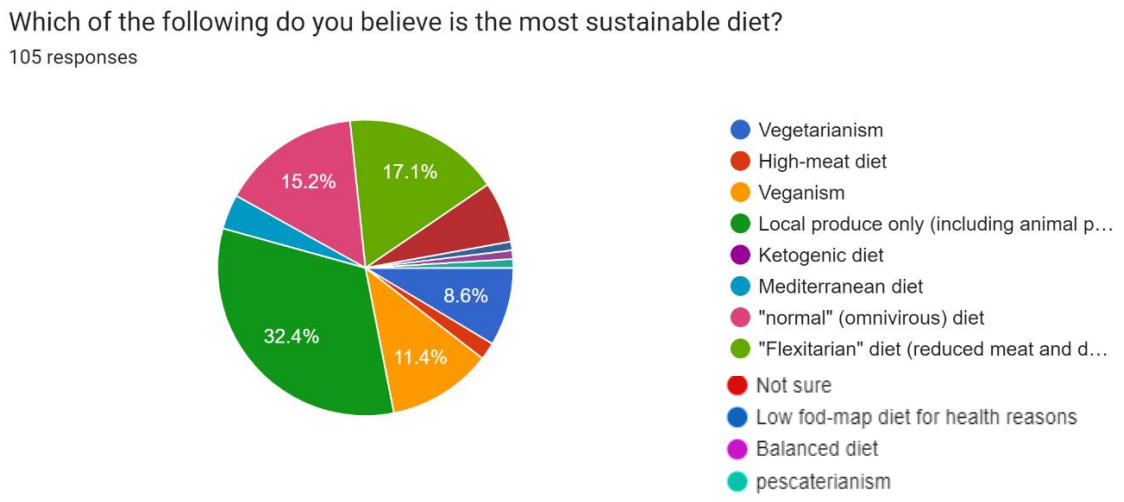

Figure 12– Pie Chart displaying participants opinions on the most sustainable diets from a range of options.

A large proportion of participants (15.2%) also believed that the “normal” omnivorous diet (i.e., not abstaining from any food types, a moderation of everything) would be the most sustainable option. 17.1% chose a Flexitarian diet, a diet which reduces but does not completely cut out animal products. Only 11.4% opted for veganism, although this had the highest sustainability score in the Sustainability Calculator (figure 1, table 5).

6.0 Discussion

6.1 Factors Influencing Attitude

6.1.1 Gender

One of the key concerns for environmentalists campaigning for reduced meat consumption is to understand the psychological barriers to becoming meat-free, one of which may be the relation between gender identity and food choices. My investigation found that while women consume less meat, they do not acknowledge a significantly higher concern than men for the environmental impact of food, perhaps because there is less inclination to be held accountable. This could also suggest that the reasoning for women's reduced meat consumption is not limited to environmental impacts, which is supported by both quantitative and qualitative research (Dyett et al, 2013, Ruby, 2012). Ethical reasons (animal welfare) and health reasons are found to be more responsible for the switch to veganism than environmental concern, across all genders.

The results of my study are echoed in a wide range of literature surrounding the differences in gender when it comes to meat consumption and openness to a meat-free diet (Rosenfield and Tomiyama, 2021, Mertens and Oberhoff, 2022). Aside from just considering gender differences, there may also be significant heterogeneity when it comes to masculine and feminine perceptions of food habits (Rosenfield and Tomiyama, 2021). My study finds that women are much more likely to have a reduced or non-existent meat consumption, while men are much less likely to follow a vegetarian or vegan diet. Mertens et al (2020) brings in the reasoning that the personality differences between men and women may have an impact on their meat-eating justification, for example they reference a meta-analysis (Muris et al, 2017) which found that men tend to score higher in personalities associated with the Dark Triad; Machiavellianism, narcissism and psychopathy (Egan et al, 2015), therefore are less likely to feel empathy towards animals and the environment and therefore may justify a higher level of meat consumption. To build on this, women are also found to be more likely to have higher concern for the environment and engage more

in animal activism than men (Amiot and Bastian, 2015) (Zelezny et al, 2000), perhaps explaining their openness to vegetarian diets and reduced meat consumption overall.

When it comes to justification of meat consumption, Mertens and Oberhoff (2022) found that men tend to defend their behaviour in an unapologetic manner, while women are more avoidant of responsibility and are less likely to make direct justifications for meat-eating.

6.1.2 Age

Age of participants did not significantly contribute to personal perception of sustainability, nor the consideration of environmental impacts when buying food. Although there is conflicting evidence on the level of environmental concern across age groups in wider literature, general assumptions claim that the younger generation has a greater awareness of environmental impacts and challenges (Gray et al, 2019). Casey and Scott (2006) found that older people have less motivation to protect the environment than younger people, whereas there are contrary findings to suggest that age is a non-factor in beliefs about mitigating climate risks across six different countries (Visschers et al, 2017).

However, age did contribute to the method of obtaining information about food choices, and where participants were most likely to look to inform their decisions. There is limited research in this area, however Ybarra and Suman (2008) found that when it came to health information, adults of 60 years and older used the internet at a similar rate to adolescents to inform their behaviour. On the other hand, older participants also reported more negative experiences and frustration with this method. The inconsistency in my study may be due to the small proportion of older people who completed the survey, with 52.9% being under the age of 25. It is likely that this is due to the survey being available only online and therefore less accessible to older generations. If this study was to be repeated, I would try to find other ways of distributing the questionnaire to make it more accessible for all ages, possibly by printing and distributing it by post or handouts.

6.1.3 Geographic Location

In my investigation, geographic location did not appear to have any significant impact on the awareness of sustainability in food systems, nor the likelihood of being an environmentally friendly consumer. This was surprising as I had hypothesised a link between access to green spaces or farming landscapes and a greater awareness of food systems, due to more of a conscious link between seeing how food is produced and what ends up on the plate. There is little wider literature to expand on this that is specific to the UK, however a number of studies investigate the difference in meat consumption between rural and urban areas in Ethiopia (Betru and Kawashima, 2009) and Vietnam (Van Phuong et al, 2014). The latter finds that meat consumption is significantly affected by socio-economic and demographic factors of households, including income and geographic location of the household. However, urbanisation was not found to be a contributing factor to the rise in meat consumption in the country, implying that accompanying socio-economic factors are more likely to be an impact.

The inconclusive results from my study are likely due to the imbalance of responses, as a majority were from rural locations (65.7%) (figure 5). There may have simply not been enough evidence from urban communities to see a pattern, and this is likely due to the dispersal of the survey through my own social media, which consists mainly of people from rural communities and much fewer from cities. I did try to combat this by posting the survey in student groups, but again this had the adverse effect of skewing the results towards a younger majority.

6.1.4 Occupation

When initially recording respondent’s occupations, the spread of answers seemed too large to be able to effectively quantify and analyse. For this reason, I decided to separate each answer into larger categories, eventually deciding on farmers (including all those working in the agriculture or rural industries) and non-farmers, because of the more significant effect this variable appeared to have on the responses. This also made it easier to see patterns in the data, for example out of all

those in the “farmers” category, none reported to be vegetarian or vegan, and all reported that they eat meat at least every other day, some with every meal. Farmers reported a belief that animal agriculture is not a main contributor to unsustainable food systems and practices. This therefore is reflected in their consumption habits, implying that their beliefs about meat and dairy are such that they do not feel the need to reduce these products in their diet.

Of course, when it comes to the agricultural community there is a significant difference in attitudes between conventional farmers and those adopting sustainable or regenerative practices (Comer et al, 1999), on subjects such as the role of animal agriculture, and whether livestock are necessary, harmful or helpful in achieving sustainable agricultural ecosystems and food systems (Oltjen and Beckett, 1996, Van Zanten et al, 2016). The foundations of regenerative agriculture differ from conventional in that attitudes centre around the conservation and maintenance of the health of the surrounding environment, as opposed to the profit and yield provided by the land with little concern for soil health or biodiversity (Bergmann et al, 2022). In my study, the farmers are likely to have a more regenerative attitude, due to their beliefs about how livestock farming can be done in a way which does not harm the environment, and consumption of animal products does not necessarily have to be unsustainable.

6.2 Limitations

The majority of the limitations in my study arose from difficulties in the dispersal of my questionnaire, which did not achieve the desired diversity of individuals. The majority of respondents were female and below the age of 25, a skew which likely had an impact on my results and the trends which were visible in my analysis, and many of the trends seen in wider literature were not present in my results.

The gender disparities may be due to a higher and more interactive use of Facebook and Instagram by women, as reported in a study by Laor (2022). Laor also found that Instagram is used much more frequently and interactively by younger people, while Facebook is used by more of the older generations. Instagram users are more likely to post and share more often, which provides an explanation as to the faster

responses and shares the survey had when shared on the site. Factors such as these imply that if I was to repeat this investigation, dispersing the survey by post or handouts may be more effective to combat these issues.

Many of the questions used in my survey were based on self-reporting, therefore are very susceptible to a social desirability bias, with the participant likely to choose their answer with a more positive skew to appear more socially acceptable (Grimm, 2010).

6.3 Dietary Analysis

The results of my dietary analysis supported suggestions that a low-meat diet is considerably better for the environment (O'Malley et al, 2019), with veganism displaying the lowest emissions of carbon dioxide equivalents (CO2eq) and a Paleo (or carnivore) diet having the highest. When comparing this to the respondent's opinions on which diet might be the most sustainable (figure 11), there is not an obvious pattern. Interestingly, the answer with the most responses was the "Local Produce only" option, which is not a diet that was explored in the Analysis. This was due to the difficulty with measuring the emissions from a diet that only includes locally sourced food, as the database took each food item's average impact level, although it is known that there is large variability in the impact food may have depending on where it has come from, and how it has been produced (Van Passel, 2013). For example, according to the Diet Sustainability Calculator (figure 1), eating an apple every day is equivalent to 12 kilograms of CO2eq per 1kg of product, however this does not take into account whether this apple has been grown, packaged or produced locally (in the UK) or in Kenya, the second largest source of fresh fruit to the UK (Barrett et al, 1999). Instead, the database takes an average of all countries, which can be misleading and significantly skewed. If we were to consider, more specifically, items produced in a range of countries, there would be a large range in the emissions produced, possibly with those in the UK being towards the lower end of the scale in comparison to feed lots in the US, for example (Phetteplace et al, 2001).

A number of additional studies identify veganism or vegetarianism as the optimal diet choices for reducing environmental damage, due to them emitting the lowest amount of greenhouse gases during production (Chai et al, 2019, Salonen and Helne, 2012). Chai et al also identify the possibility of achieving sustainability by reducing meat and dairy substantially, without having to exclude them completely. There are a number of barriers to reducing meat intake, for example the poor general understanding of what a sustainable diet means, and misconceptions of the link between personal and environmental health. For example, the amount of protein needed for a healthy diet is highly overestimated, creating a misleading sense which may prevent people from believing that a low-meat diet is a healthy alternative (Macdiarmid, 2013).

6.4 Applications

The results of my study imply that a greater knowledge and understanding of the barriers to consumer changes will aid progression to a more sustainable system. Getting agriculture and food systems into the national curriculum and teaching about environmental impacts from a young age will begin to change attitudes in a new generation of consumers, sparking interest and action before they are exposed to misinformation. Information can also be shared more effectively through food labels and packaging, which alongside dietary information could contain some sort of impact calculation to make consumers aware of each choice they make in the supermarket, and how that choice could be changed to have a better effect on the environment.

Properly communicated information on the impacts of animal agriculture and the power held by consumers is one step towards changing behaviour, however in some cases new information can have a “backfire effect” (Wood and Porter, 2019). In this case, providing factual information can not only lead to denial and ignorance, but can even occasionally cause people to believe that the *opposite* is true, especially when an issue challenges their initial ideologies.

Perhaps concentrating on the links between human health and environmental health would be an effective strategy to ensure that change is maintained, for example

more investigation into whether reducing consumption of animal products is simultaneously good for our health as well as the planet's. Currently there is divided evidence for this, as animal products provide many vital nutrients needed for the human body to thrive, however may cause increased risk of a number of chronic diseases (Givens, 2010). Deeper research into the specifics of this may prove helpful to reaching new demographics and giving fresh motivation to eat sustainably.

7.0 Conclusion

Overall, I found that the variables most impacted by social demographics were the level of meat consumption, and attitudes towards meat and dairy production. With animal agriculture being such a prominent topic in environmental campaigns, understanding what impacts the publics perceptions of this could help to reduce meat consumption overall, possibly leading to a more sustainable future in food production (Chai et al, 2019). Differences in gender were clear, implying that women are much more likely to eat less meat than men, however it appeared that this was not necessarily due to an increased concern for the environment. Janssen et al (2016) identifies the main motives for vegan consumers to be animal welfare and personal health, followed by environmental reasons. While these motives are sufficient for many, there is reasonable belief to suggest that raising awareness of the environmental impacts of the livestock industry may drive more people, from different social demographics, to reduce their meat consumption.

The nature of this study highlighted some significant differences between age groups, though not particularly relating to their consumption habits or attitudes. Older participants reported less internet use when obtaining information on food choices, while under 25-year-olds used social media as their main source of knowledge. Although this data is consistent with wider literature (Ybarra and Suman, 2008), my study was skewed towards younger generations, having only a small minority of participants over the age of 35. Although not helpful to the study, this imbalance is consistent with my findings, as the survey was distributed exclusively online, consequently having a generally younger audience and being less accessible to the older generations.

The focus on consumption and animal agriculture made my dietary analysis even more significant, as a deeper investigation into the beliefs of the public and how they stand against the science. As expected, diets with reduced amounts of animal products had a lower environmental impact, which interestingly did not line up with public belief. Generally, participants believed an omnivorous, flexitarian or locally based diet would be more sustainable than a vegan or vegetarian one. These results aligned with the idea that many people may eat less meat for varying reasons, other than to have less of an environmental impact.

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9.0 Appendix

9.1 Interim Review Form

Independent Research Project

Interim Interview - Agreed Comments Form

Student Name: Rosie Smith	Programme: EWC
Date: 11/11/2022	IRP Title: Public perception of sustainability
Supervisor Name: Pippa Gillingham	

Agreed comments – to include progress and plans for completion:

Rosie has been drafting her methods and should be able to share a draft soon and has also been working on her introduction. She has designed her questionnaire, completed a pilot study and ethical review and has started data collection with 105 responses. She has made an attempt to get a good demographic spread but is starting to run out of ways to do this. The next step is to start thinking about data analysis.

Each student should retain a digital copy of this form once it is completed and signed and include it in the appendices of the IRP. The completed form should also be emailed to the supervisor.

Student Signature: R Smith	Supervisor Signature: P Gillingham

9.2 Signed Learning Contract

Bournemouth University

LEARNING CONTRACT: INDEPENDENT RESEARCH PROJECT

The learning contract is an agreement between student and supervisor: it should clearly indicate what is expected from both sides. The text in Sections 2 and 3 provides guidance and can be modified to give more details reflecting what has been agreed, such as deadlines for submission of drafts and provision of feedback, word count limits/exclusions and number/timing of meetings.

Importantly, the document checklist helps students to follow the required procedures (e.g. ethical approval and risk assessment) and communicate what has been done to the supervisor.

The student should submit a draft of the completed form to the supervisor and request a meeting to discuss and finalise the content. Both the student and the supervisor are responsible for keeping a signed copy of this document and following what has been mutually agreed.

1. YOUR DETAILS

Student name: Rosie Smith

Degree Programme: Ecology and Wildlife Conservation

Proposed IRP Title or Set Project: Public perceptions of sustainability

Supervisor name: Phillipa Gillingham

2. As the student undertaking the above project I agree to:

- E-mail my supervisor on a fortnightly basis with a progress report
- Meet with my supervisor at least once a month to discuss progress and I understand that it is my responsibility to organise these meetings
- Comply with the terms of this learning contract and the guidance set out in the Guide to Independent Research Projects
- I understand that this is an *independent* project and that I am solely responsible for its completion
- I agree to comply with all ethical, laboratory and fieldwork protocols established by the Faculty.

3. As the supervisor of this project I agree to:

- Meet with the student undertaking this project on at least a monthly basis and to respond to the progress e-mails as appropriate
- To meet formally with the student during the first week in November to undertake the interim interview

- To provide guidance and support to the student undertaking this project bearing in mind that it is an *independent* research project. This is inclusive of commenting on drafts of the final report in a timely fashion.

3. DOCUMENT CHECKLIST

Research Proposal or Plan Attached? ☐ **YES** ☒ **NO**

☐ **YES**	☒ **NO**	**Risk Assessment for fieldwork and evidence of COSSH assessment for all laboratory procedures (online risk assessment completed)**
☐ **YES**	☒ **NO**	**Completed booking for all field equipment**
☐ **YES**	☒ **NO**	**Letters of permission where appropriate providing evidence of access to such things as field sites and/or museum archives**
☐ **YES**	☒ **NO**	**Completed Ethics Checklist**

4. INTERIM INTERVIEW – Progress evaluation

- Design and release questionnaire
- Collect data
- Draft methods
- Decide on topics to cover in intro

Interim Review Date: November 2022

5. Variance from the Independent Research Project Guide

The IRP assessment is normally governed by the guidance provided in the Independent Research Project Guide. Any variance in terms of format (e.g. technical report, scientific paper) and word limit should be agreed and specified here. Submission date cannot be changed unless evidence of mitigating circumstances is provided in accordance with the standard BU Guidelines.

Any changes? ☒ **YES** ☐ **NO** If YES please provide details below:

- 10,000 words not including references, tables, figure legends etc.

Both of the undersigned parties agree to be bound by this learning contract:	
Student Signature:	ROSIE SMITH
PRINT NAME:	ROSIE SMITH
Date:	04/06/2022

Supervisor Signature:	
PRINT NAME:	P Gillingham
Date:	13/06/2022

9.3 The Questionnaire

Investigation into dietary choices

Please ask questions if anything you read is not clear or would like more information. Take time to decide whether or not to take part.

What is the purpose of the study?

Food production is responsible for around a quarter of global greenhouse gas emissions, and the food choices made by the general public can play a huge part in tackling this, to create a more sustainable future. When it comes to making better choices, knowledge is our most important asset, and where we obtain this knowledge can greatly influence our moral perspectives. This study aims to uncover the perceptions held by society about food, its production, and what is meant by a "sustainable diet", if such a thing exists. Following the results of this survey, a scientific report will be produced tackling some of the most common misconceptions and focusing on the greatest influences on public knowledge.

Why have I been invited?

We are inviting a wide range of people, from all age groups, occupations, and backgrounds. The aim of this study is to produce a large dataset with the capacity to make assumptions about the general beliefs held by the UK population.

Do I have to take part?

It is up to you to decide to take part in this survey. You are free to withdraw at any time, without giving a reason. I will include a checkbox at the beginning of the survey, to state that you are willing to take part and are giving consent for your answers to be used in this study.

What will happen to me if I take part?

You will be asked about your dietary choices, knowledge of UK food systems and beliefs about sustainable production. The data collected from you and other participants will be analysed anonymously and results will be included in a scientific paper which will be available upon request.

If you would like any more information or a copy of the paper when it is available please contact rosie.smith2011@hotmail.com. If you have any complaints about this survey, you can contact Phillipa Gillingham on pgillingham@bournemouth.ac.uk .

1. I confirm that I am completing this form willingly, and am giving consent for my answers to be used in a subsequent scientific report

*Required

Tick all that apply.

- Yes
- No

Section 1 - Your Personal Details

2. Age Bracket

Mark only one oval.

- 18-25
- 26-35
- 36-45
- 46-60
- 61-75
- 75+

3. Gender Identification

Mark only one oval.

- Female
- Male
- Non-Binary
- Other:

4. Geographic Location

Mark only one oval.

- Urban

- Countryside
- Sub-Urban
- Coastal

5.Occupation

-

Section 2 - Your Food Choices

6. How would you rank your knowledge/understanding of UK food production?

Mark only one oval.

Very poor

1

2

3

4

5

6

7

Excellent

7. What, for you, is the most important reason for adopting a certain diet?

Mark only one oval.

- Personal health and wellbeing
- Environmental health and sustainability
- Support of local producers
- Animal welfare
- Affordability/convenience

- Religious reasons
- Other:

8. How would you classify your personal feelings towards the farming community/agriculture as a whole in this country?

Mark only one oval.

Negative

1

2

3

4

5

6

7

Positive

9. Where do you look to inform your food choices? (Choose up to 3 answers)

Tick all that apply.

- The internet (health websites, scholarly articles)
- Social media
- Friends and family
- Food packaging/labels
- Role models
- Other:

10. How often do you consume meat?

Mark only one oval.

- Every meal
- Every day

- Every other day
- Once a week
- Once a month
- Special occasions
- Not at all

Section 3 - Your Beliefs

11.What do you perceive to be the most important feature of a sustainable diet?

Mark only one oval.

- Local and seasonal produce
- Exclusion of meat and animal products
- Low land, water and chemical input
- Optimum nutritional availability
- Traditional/Indigenous food systems and agricultural practices
- Guaranteed continuation for future generations.
- Other:

12. Which of the following do you believe is the most sustainable diet?

Mark only one oval.

- Vegetarianism
- High-meat diet
- Veganism
- Local produce only (including animal products)
- Ketogenic diet
- Mediterranean diet
- "normal" (omnivirous) diet
- "Flexitarian" diet (reduced meat and dairy products)
- Not sure
- Other:

13.Which factor(s) would hold you back from making changes to your diet to make it more sustainable?

Tick all that apply.

- Cost
- Inconvenience
- Accessibility (due to geographic location)
- Health reasons
- Judgement from peers
- Lack of knowledge about other options
- Other:

14. How environmentally friendly would you consider your own diet to be?

Mark only one oval.

Not at all

1

2

3

4

5

6

7

Very

15. How often do you consider the environmental impact of the food you buy?

Mark only one oval.

Never

1

2

3

4

5

6

7

Always

16. To what extent do you agree that sustainability within food production can be tackled with a grass-roots approach (i.e. through societal movements/changes in public attitudes as opposed to Governmental Policies)?

Mark only one oval.

Strongly disagree

1

2

3

4

5

6

7

Strongly agree

17. How easy would you find it personally to give up certain foods to achieve a more sustainable diet?

Mark only one oval per row.

	Very easy	Easy	Neutral	Hard	Impossible
Chocolate					
Bananas					
Red Meats					
Dairy					
Coffee					
White meats					

18.Which group(s) do you believe has the most impact on sustainability in the food production industry?

Tick all that apply.

- The agricultural sector
- Consumers
- Diet influencers
- Activists
- The Government
- Global food enterprises
- Other:

19.To what extent do you agree that meat and dairy production is a main contributor to unsustainable food systems?

Mark only one oval.

Strongly disagree

1

2

3

4

5

6

7

Strongly agree

9.4 Questionnaire Results

Section 1 – Your Personal Details

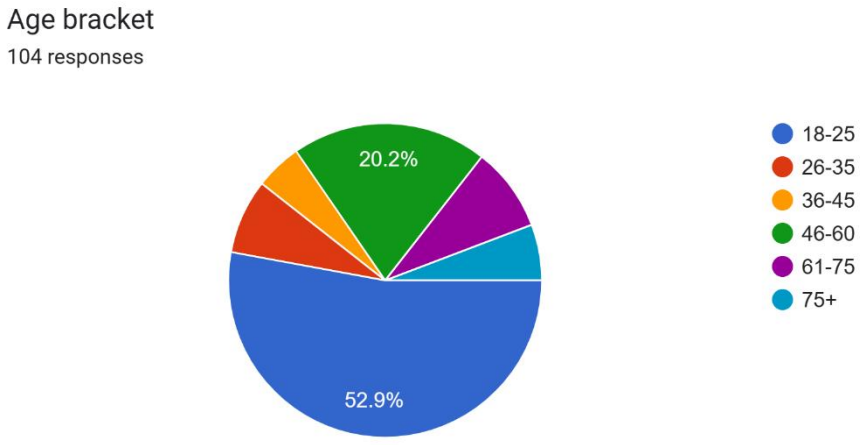

Figure 13 – Shows the number of respondents from each age bracket.

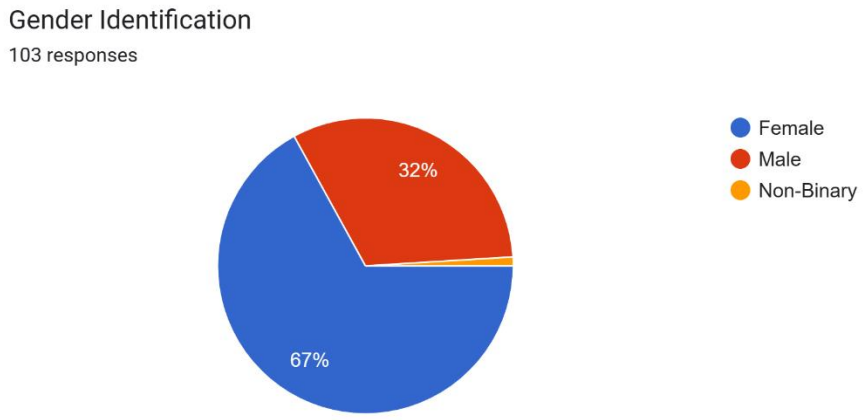

Figure 14 – Shows the number of respondents who were male, female or non-binary.

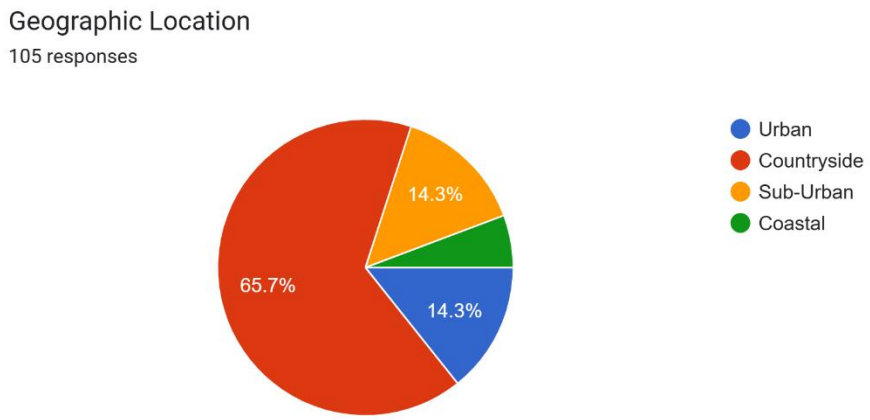

Figure 15 – Shows the percentage of participants from different types of geographic location.

Section 2 – Your Food Choices

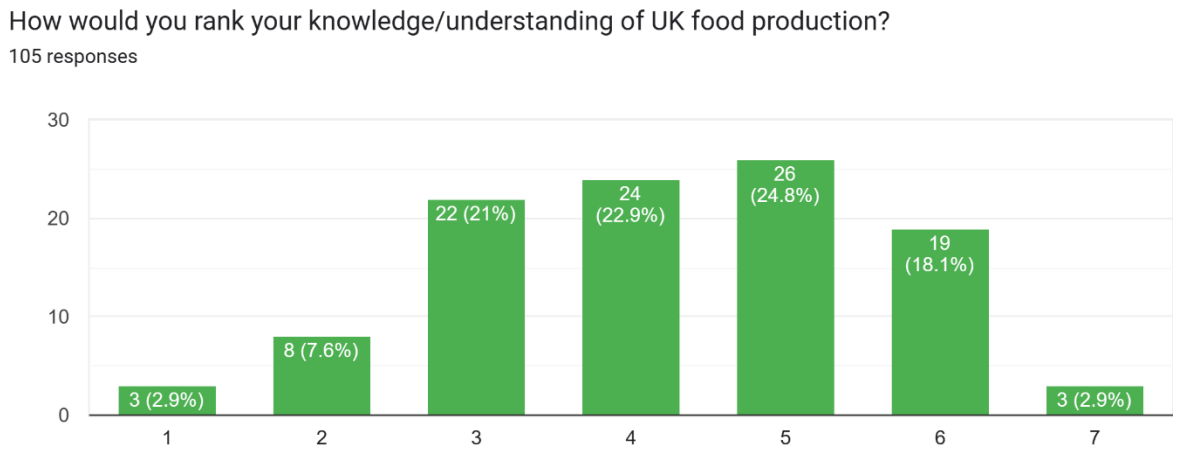

Figure 16 – Shows the participants self-reported ranking of their knowledge of food production.

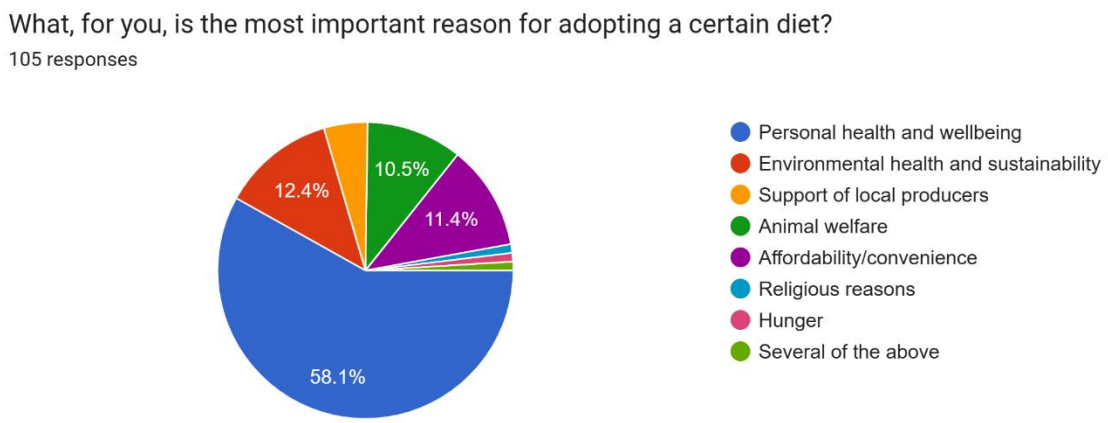

Figure 17 – Shows respondents thoughts on the most important driver to influence diet.

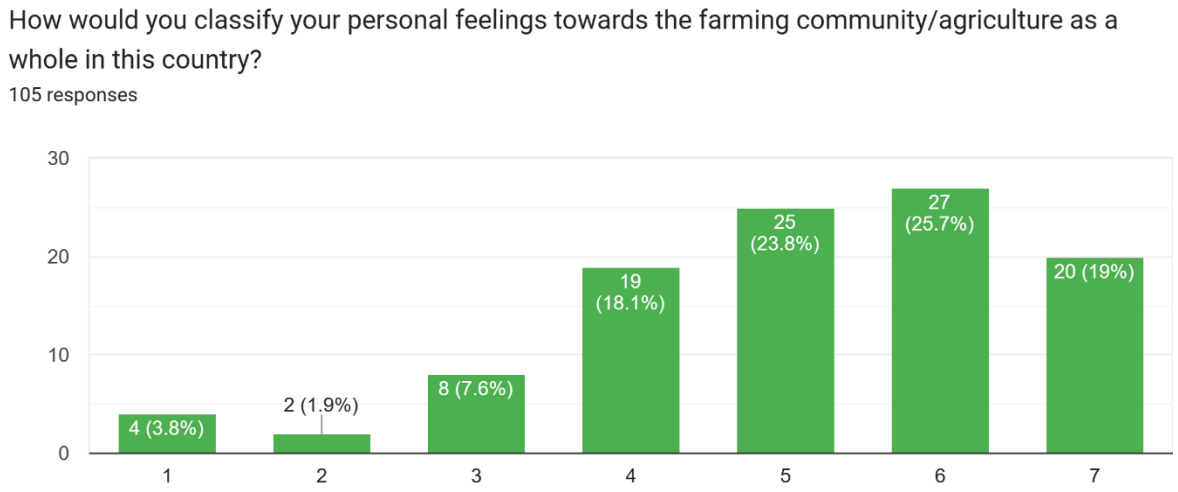

Figure 18 – Shows participants feelings towards the agricultural community in the UK.

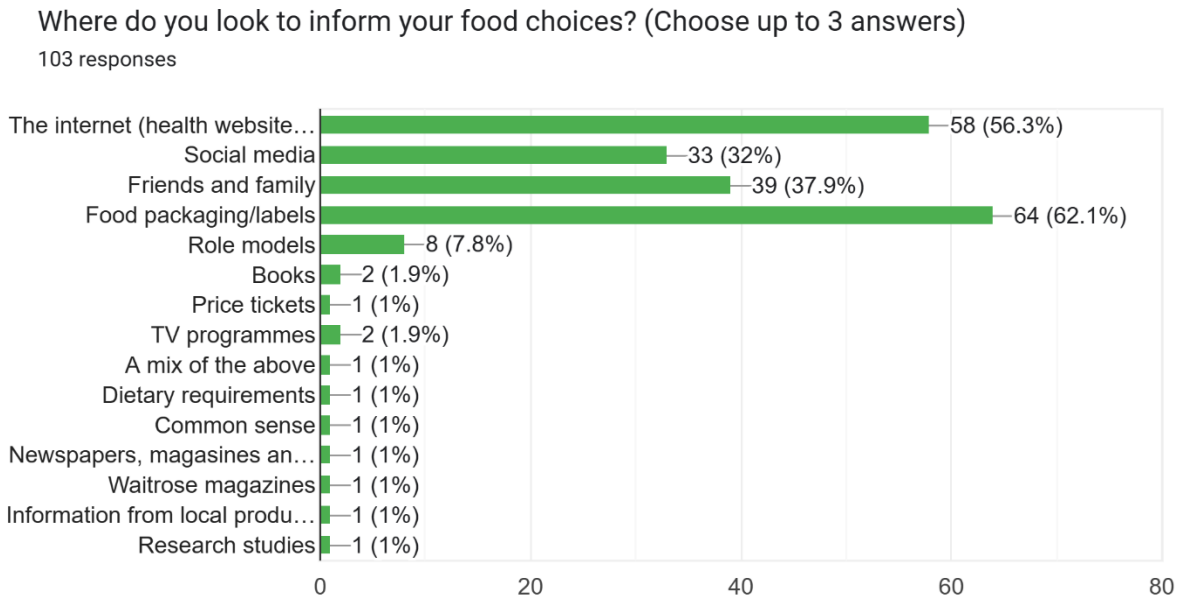

Figure 19 – Shows participants most common source of food or dietary information.

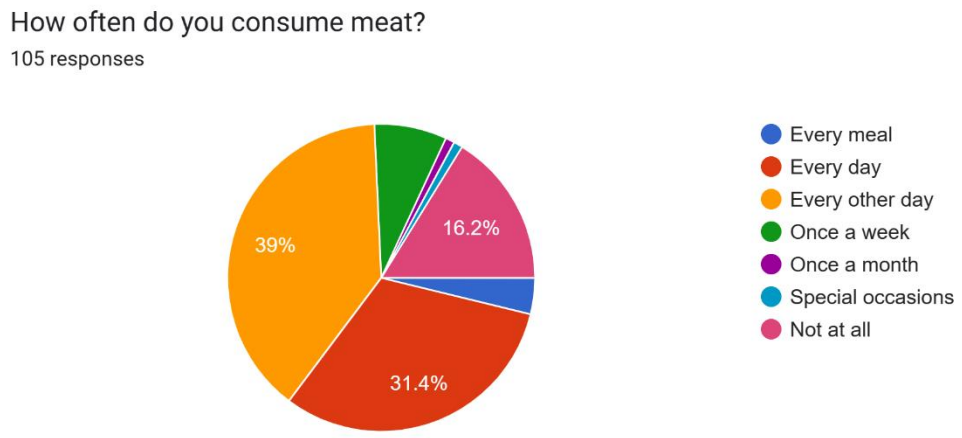

Figure 20 – shows participants self-reported meat consumption habits.

Section 3 – Your Beliefs

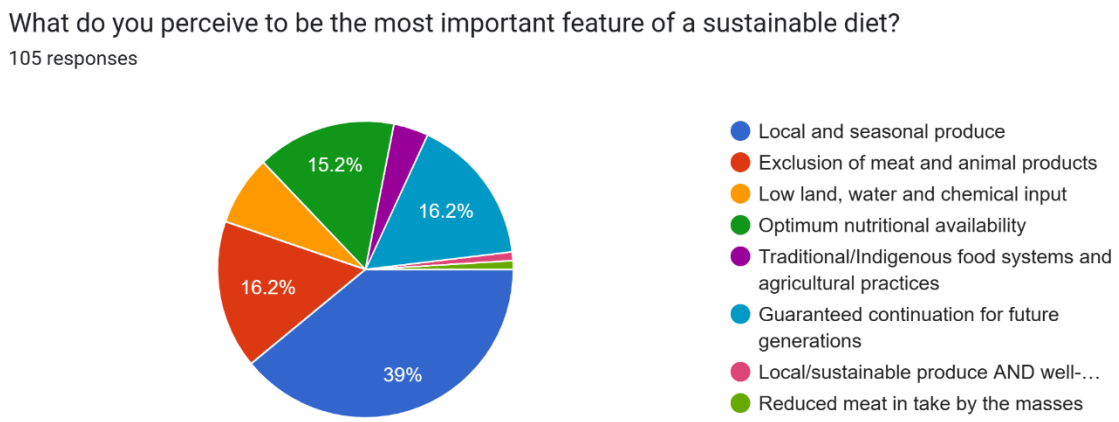

Figure 21 – Shows participants thoughts on the most crucial part of a sustainable diet.

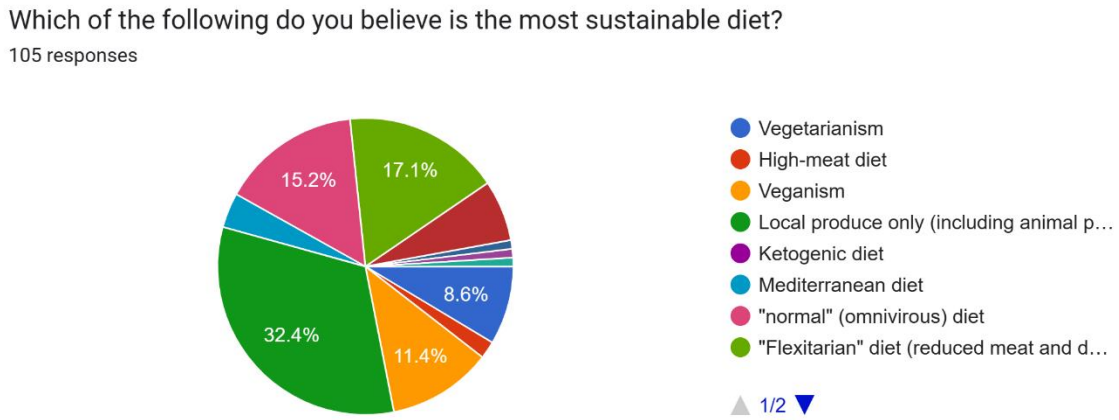

Figure 22 – Shows which diets participants believe to be the most sustainable.

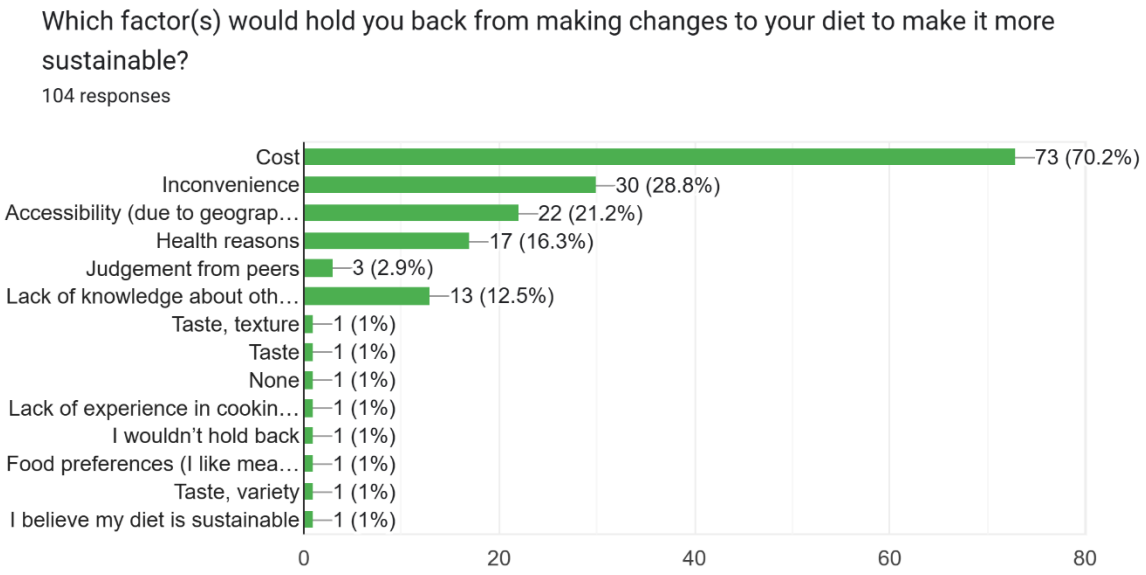

Figure 23 – Shows the factors which participants reported would stop them from following a more sustainable diet.

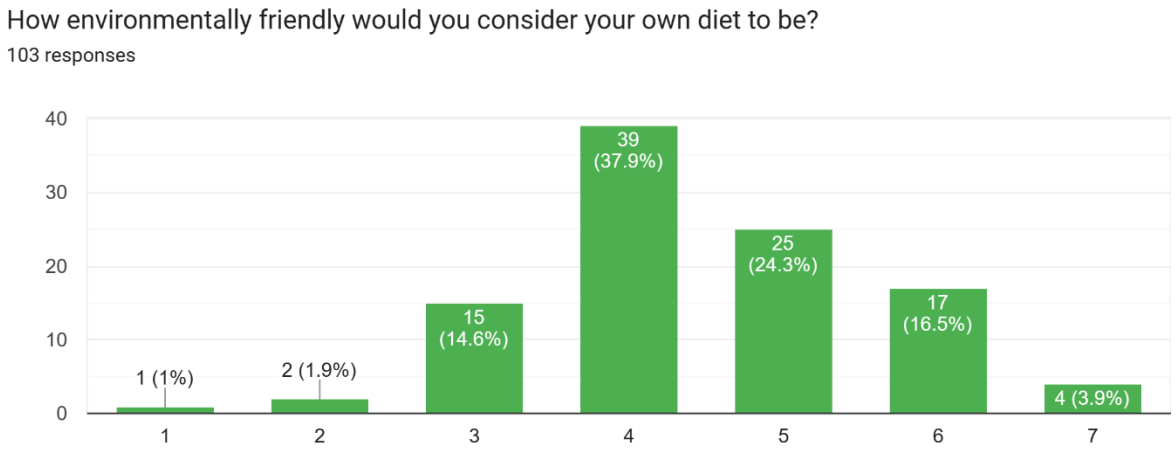

Figure 24 – Shows how sustainable participants believed their own diets to be.

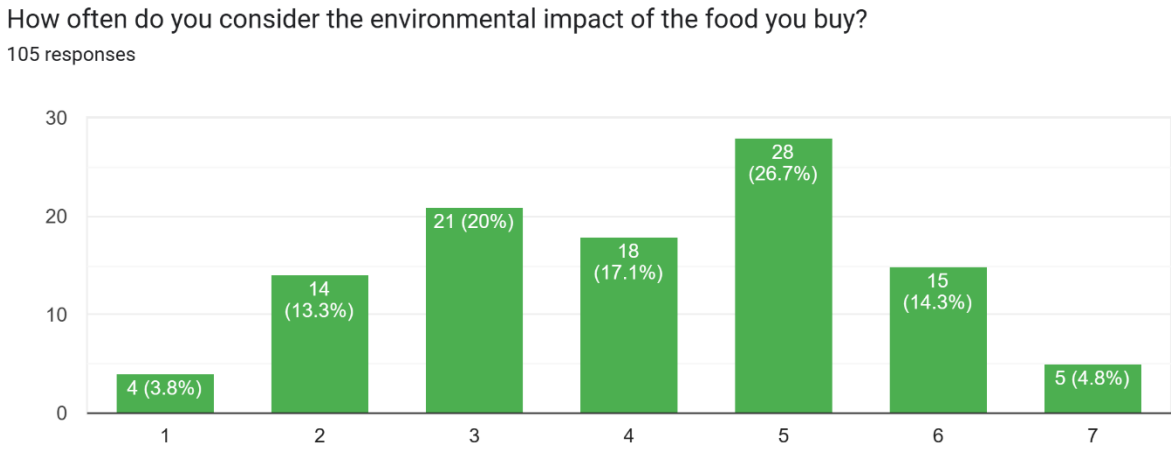

Figure 25 – Shows how often participants report to consider the environmental impacts of their food.

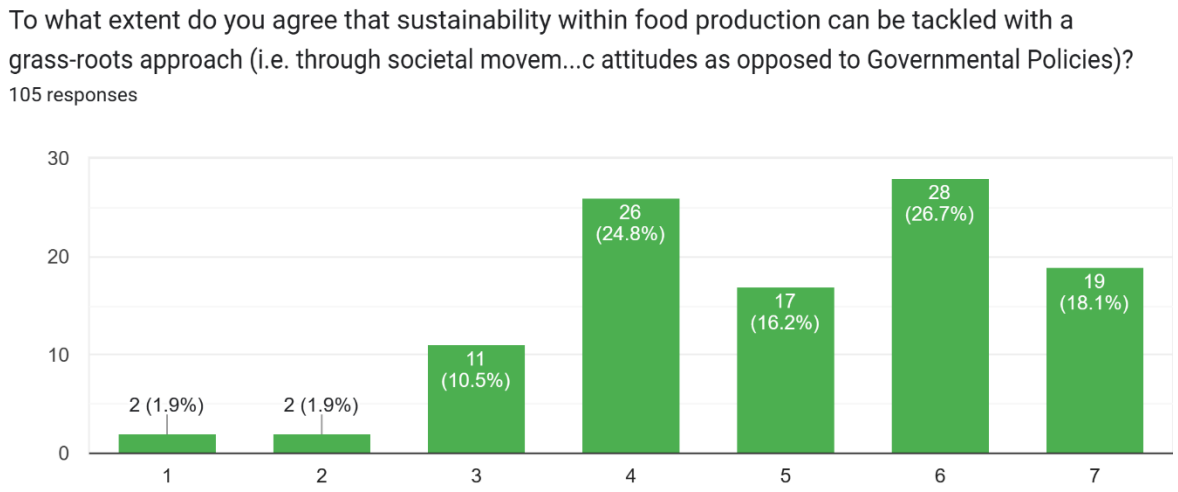

Figure 26 – Shows participant's opinions of how the food production industry might be changed to become more sustainable.

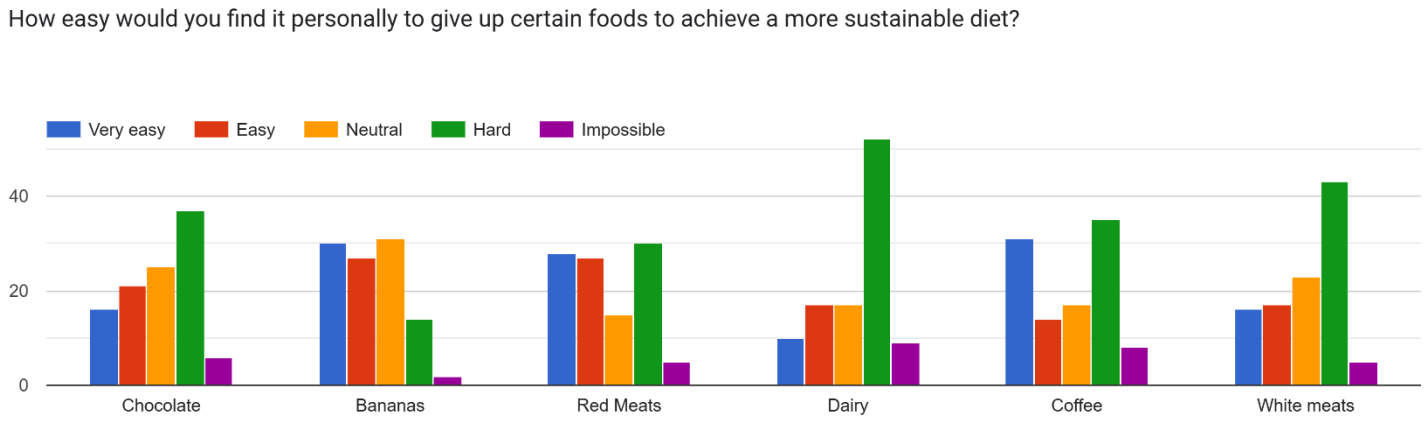

Figure 27 – Shows how participants rated different food items when asked how easily they could give them up in favour of a more sustainable lifestyle.

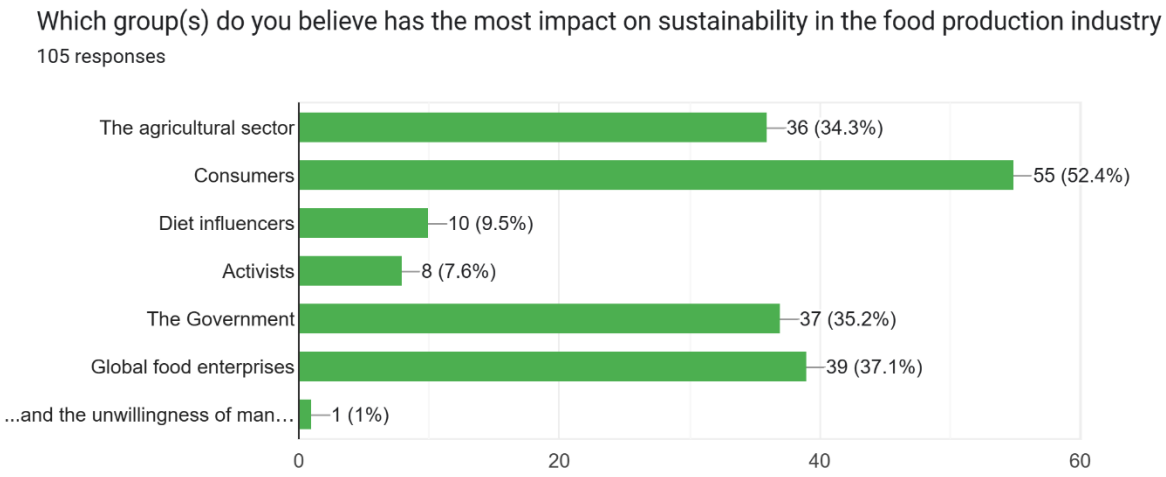

Figure 28 – Shows which industries participants believe have the most impact on sustainability within food systems.

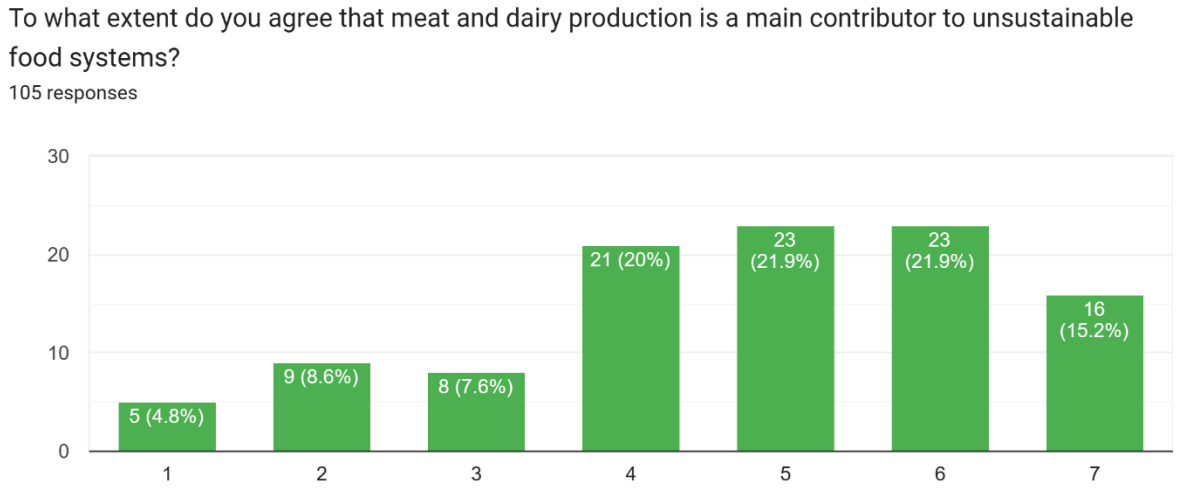

Figure 29 – Shows how much participants believe animal products contribute to unsustainable practices.