

# How natural is our food, and what does 'natural' mean anyway?



**Science** *for*  
**Sustainable  
Agriculture**



*Consumer research conducted by England Marketing Ltd.  
Commissioned by Science for Sustainable Agriculture*

*July 2022*

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## Background

**Science for Sustainable Agriculture (SSA)** was recently launched as a new policy and communications platform. It provides a focal point for information, comment and debate about the **role of science** in farming and food production, and the **importance of science** in safeguarding our food supply, tackling climate change and protecting the natural environment.

To support SSA's aims, England Marketing was commissioned to undertake a benchmarking exercise to understand consumer perceptions of key issues surrounding the use of science in agriculture.

## Objectives

The primary objective of this research was to generate a picture of how aware consumers are of where their food comes from, how it is produced, and how much scientific innovation goes into its production.

Another key objective of the research was to understand how food marketing terms such as 'natural' and 'sustainable' are understood by consumers, and how that influences perceptions of the degree of scientific intervention involved in modern farming and food production.

## Methodology

The study utilised the England Marketing Panel, which consists of engaged members of the public who have specific interest in food, agriculture, heritage and sustainability.

Given this group's predisposed interest in food-related issues, the England Marketing Panel was used for this research in anticipation that the findings would represent a 'best case' scenario of how aware consumers are generally of where their food comes from, how it is produced, and how much scientific innovation goes into its production.

England Marketing designed the survey. Information already held on panellists was used in the analysis of the data to detect trends and differences in opinion according to demographic representation and socio-economic positioning which included:

- Gender
- Age
- Marital status
- Household Income
- Location
- Number of children
- Primary shopper status
- Primary shop
- Secondary shop(s)
- Online or offline shopping preference
- Five factors influencing their purchase decisions relating to food
- Psychometric test results for big 5 personality type (openness, conscientiousness, extroversion, agreeableness and neuroticism)

The survey included a variety of question types in order to keep respondents engaged and interested, such as sliding scales, drop-down menus, plus some open-ended free text questions in order to gather valuable qualitative data.

The survey was distributed to the panel via email in May 2022. We achieved 386 responses in total, enough for a representative sample size to a 95% confidence level (+/-5%).

## Executive Summary

The data gathered from this survey has established a representative picture of public and consumer attitudes towards scientific intervention in agriculture and food production.

Whilst consumers generally consider that they are reasonably well-informed as to the meaning of terms such as “natural” in the context of food production, it is clear that they **are largely unaware of the level of scientific intervention that underpins the supply of fresh produce** and base ingredients that they would otherwise perceive as being largely natural and unaffected by human intervention beyond basic input.

Respondents were very surprised to discover that the ‘natural’ versions of everyday foods such as sweetcorn, carrots and bananas are almost unrecognisable (and inedible) compared to their modern equivalents. Very few consumers were aware that none of our familiar food crops – wheat, potatoes, oats, sugar beet etc – are native to this country, or that these crops have been imported and adapted, through scientific intervention and human ingenuity, to be grown on British farms.

In relation to food and agricultural innovations, many respondents reported feeling “**blinded by science**”, with highly scientific and technical terminology used, and a lack of accessible information communicated directly to the public.

**Trust is also a key factor** in consumers’ acceptance of scientific innovation, with 88% of the sample believing that it is the Government’s responsibility to communicate information around scientific developments in the sphere of food production, but just **11% believing the Government to be a trustworthy source of information**.

Farmers and public sector/academic scientists are felt to be more trustworthy, with 68% and 59% of consumers respectively stating they would trust information about the use of science in agriculture and food production from these sources. By contrast, less than 28% of consumers were likely to trust information from scientists working in industry.

It is clear that levels of **concern around habitat loss and the climate emergency are high**, and this presents an opportunity to highlight the potential contribution of scientific intervention in ensuring more sustainable approaches to food production.

Respondents are generally interested in the issues surrounding sustainable agriculture and food production, as evidenced by many using multiple information resources to gather information on key topics. However, **respondents felt that information could be more accessible and communicated in more consumer-friendly terms**.

Older generations tend to be more engaged and informed on the topic of sustainable agriculture, although millennials are also beginning to speak up more about the climate crisis.

Above all, it is evident from the research that while there is a clear understanding of many of the challenges facing our food supply, and the need for action to tackle those challenges, **consumers’ perceived knowledge of the level of scientific intervention in our everyday foods is greater than their actual knowledge**, leading to potential barriers in terms of consumer acceptance and awareness without more effective communication.

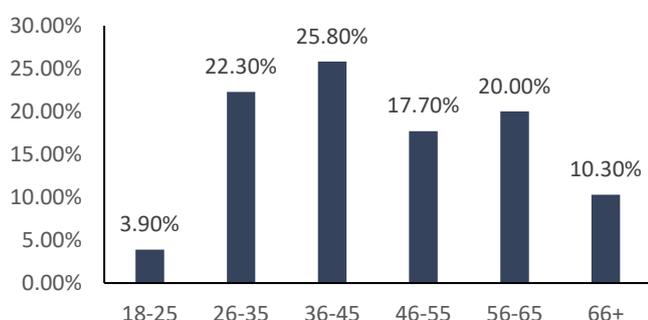
# Analysis

## Demographics

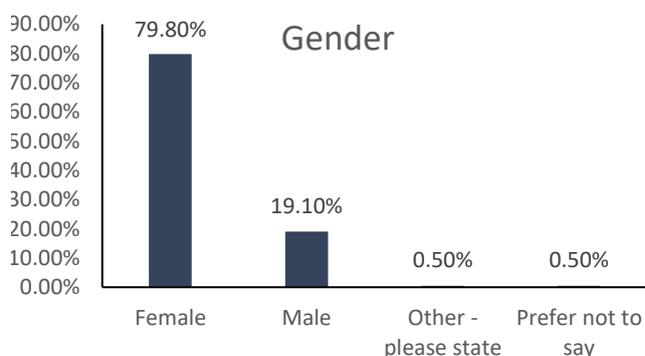
The majority of respondents were based in the East of England. They were asked to rate where they lived according to whether it was rural or urban from 0-100, with 0 meaning extremely rural, and 100 meaning extremely urban. There was a fairly even split, with a slight tendency towards more rural areas when looking at the mean score overall, which was 45.65 out of 100.

The majority of respondents were female, married, and employed. Around half were aged between 26 and 45. Almost half of respondents were educated to degree level or above. Very few had not completed secondary school.

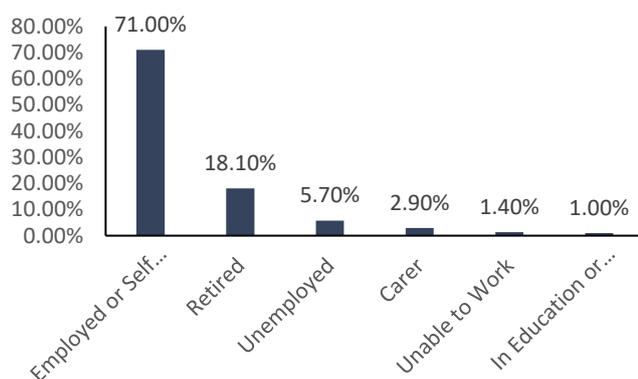
### Age Brackets



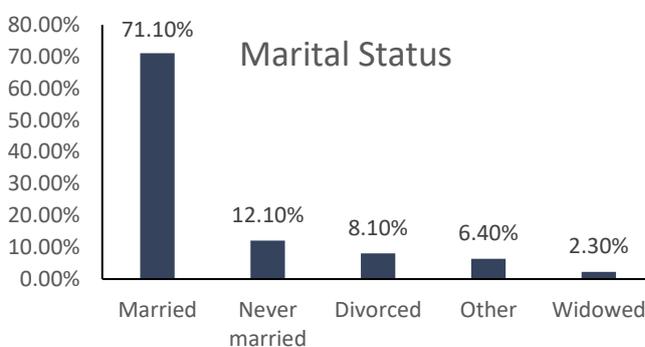
### Gender



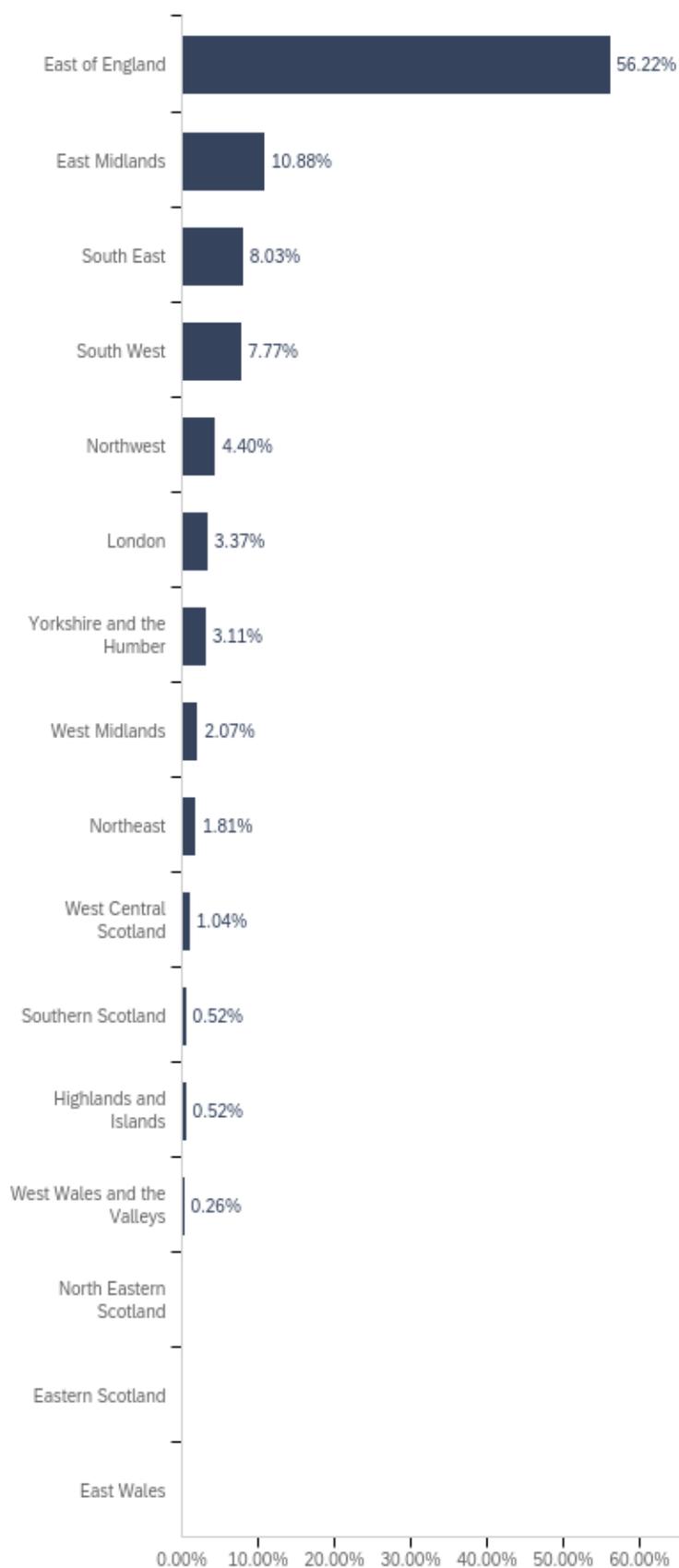
### Employment Status



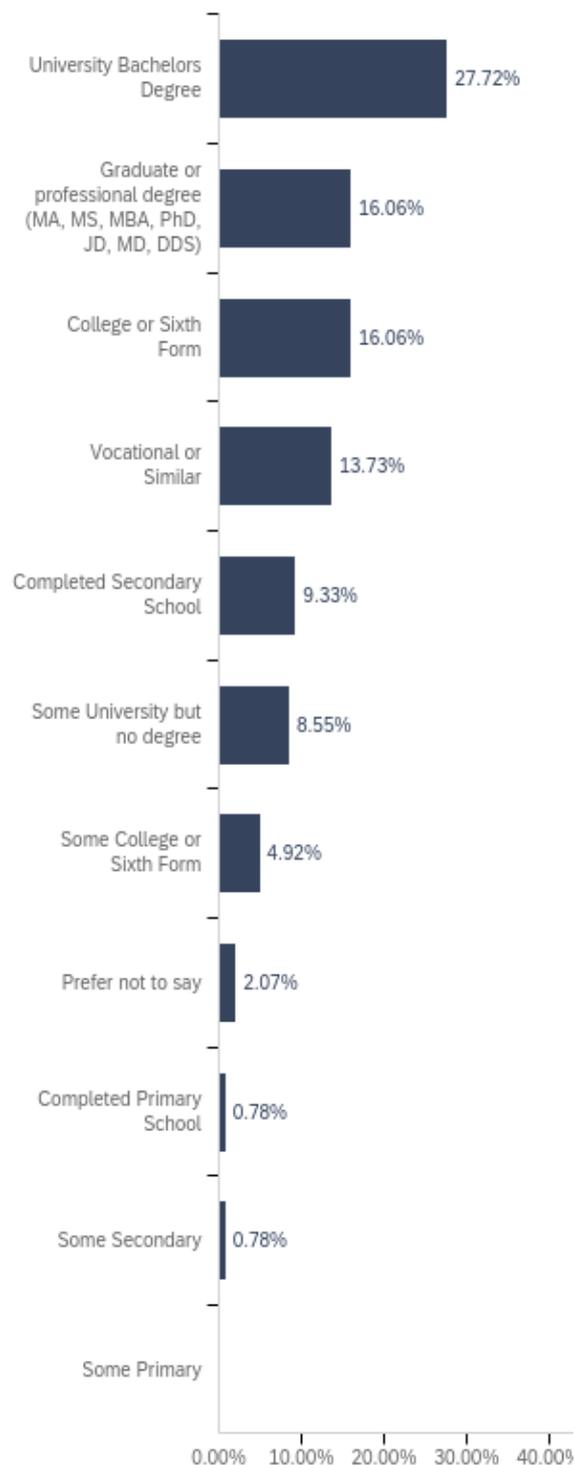
### Marital Status



### UK Region



### Highest Level of Education Completed



## “What is Natural?” – Audience Knowledge and Perceptions

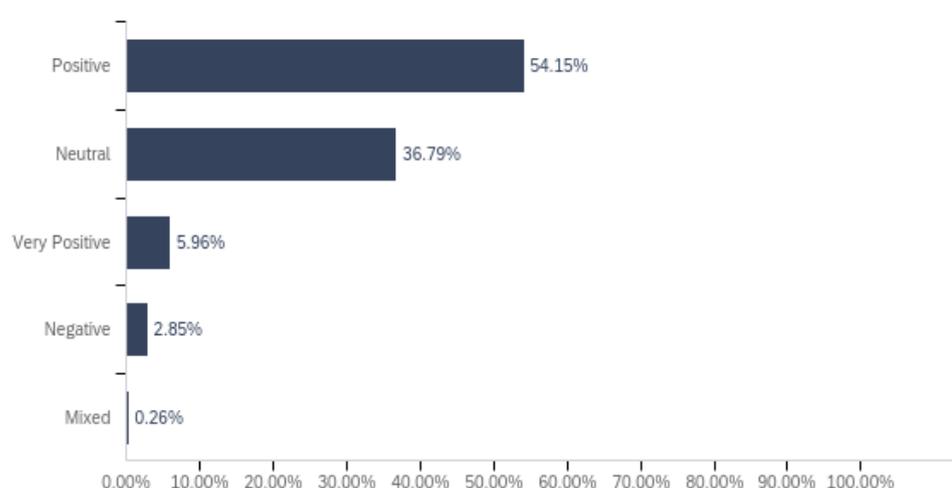
### Descriptors and their Meaning to Consumers in the Context of Food Production

Respondents were given a list of descriptive terms and asked to describe what these terms meant to them when considered in the context of food production. Their comments were then analysed to identify the sentiment (very positive, positive, neutral, negative, mixed, or negative), as well as the overriding themes and topics that came up when considering each specific word. Analysis for each word can be found below.

#### *“Natural”*

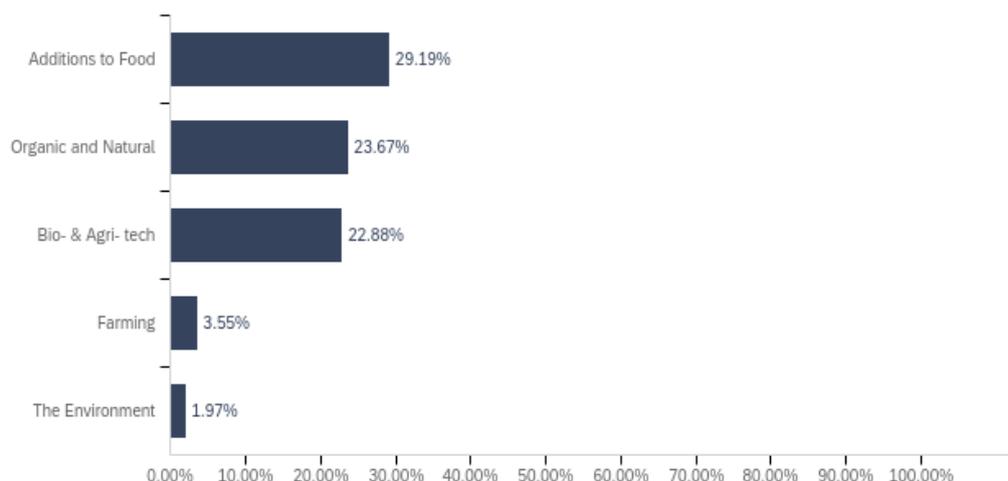
The majority of respondents expressed positive, or very positive, feelings about the word “natural” and its uses in food production.

#### “Natural” - Sentiment in the context of food production



The issue most frequently mentioned by respondents when thinking of the term “natural” in food production was potential additions to food, especially chemicals, in the production stage. This was closely followed by discussion of organic foods, with these being considered to be “natural”, and terms such as biotech and agri-tech, which respondents perceived as “unnatural”.

"Natural" - Topics in the context of food production



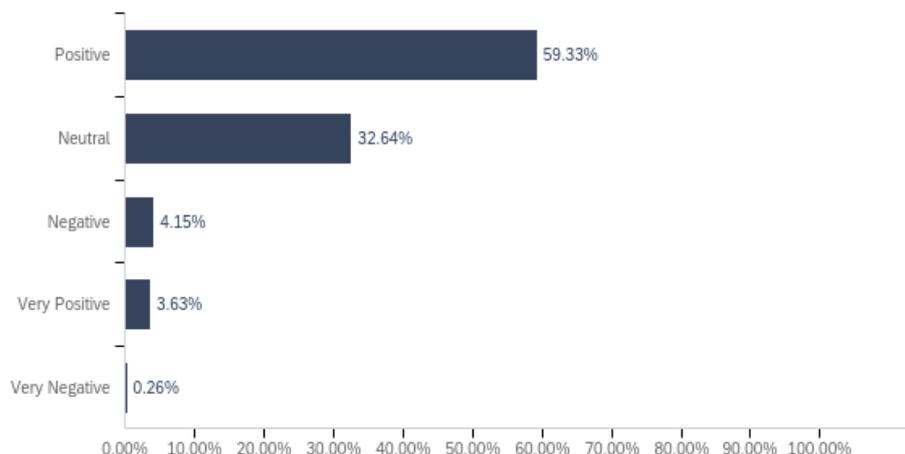
A word cloud can be found below, highlighting the words and themes commonly used by respondents when discussing the meaning of “natural” as a descriptor in food production.



### "Sustainably Produced"

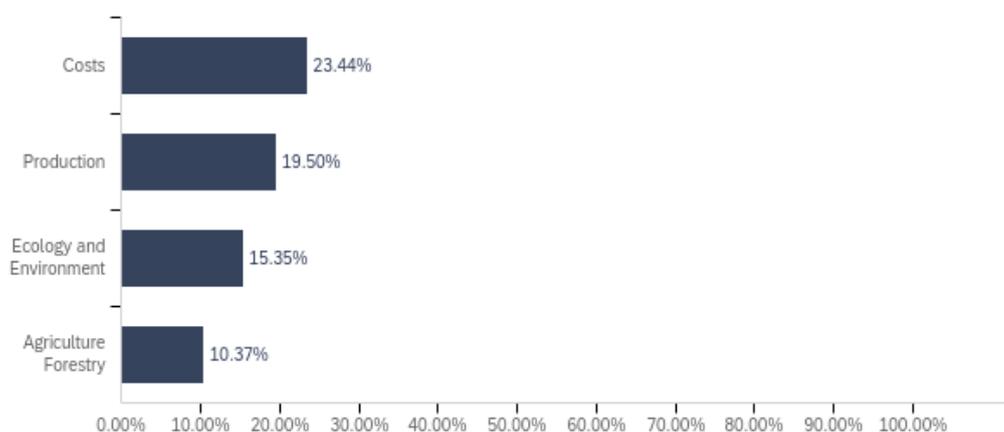
Once again, respondents were largely positive when discussing the descriptor "sustainably produced" in the context of food production.

#### "Sustainably Produced" - Sentiment in the Context of Food Production



There was little differentiation between the topics that occurred most commonly when discussing "sustainably produced" in the context of food production. However, costs came up most frequently in terms of environmental costs and the cost to the earth in producing that food, with respondents commenting that they would expect sustainably produced food to have a low to zero cost in terms of its impact on the environment.

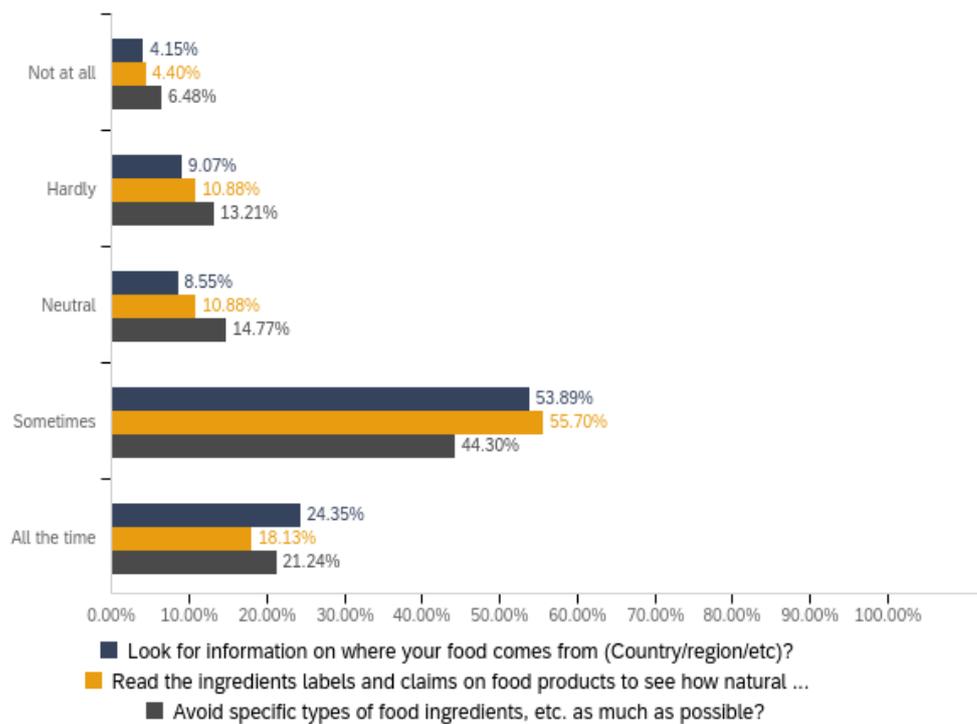
#### "Sustainably Produced" - Topics in the Context of Food Production



A word cloud below highlights the words that featured most prominently in respondents' comments.



To what extent do respondents do the following...?

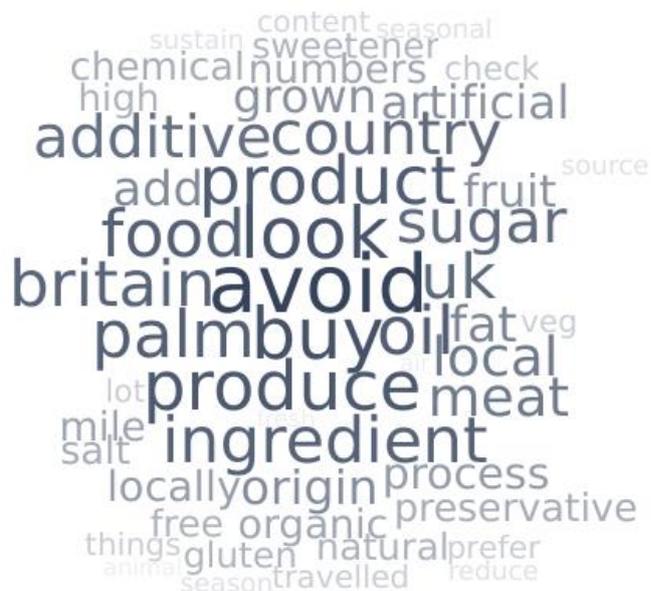


Where respondents answered that they looked for information on where their food comes from, and that they took care to avoid specific ingredients, they were asked to elaborate as to which foods they avoided and why they looked for food from a certain provenance.

While some avoided specific ingredients due to dietary requirements, such as being gluten and dairy-free, a high proportion avoided them due to environmental or ethical concerns, such as palm oil, and some avoided certain ingredients due to a concern around artificial or chemical ingredients.

Several commented on trying to be mindful of the food miles associated with the produce they bought and tried to purchase local, seasonal produce where possible.

A word cloud highlighting the most used words and themes can be found on the next page.



### Subject Awareness Relating to Food Production

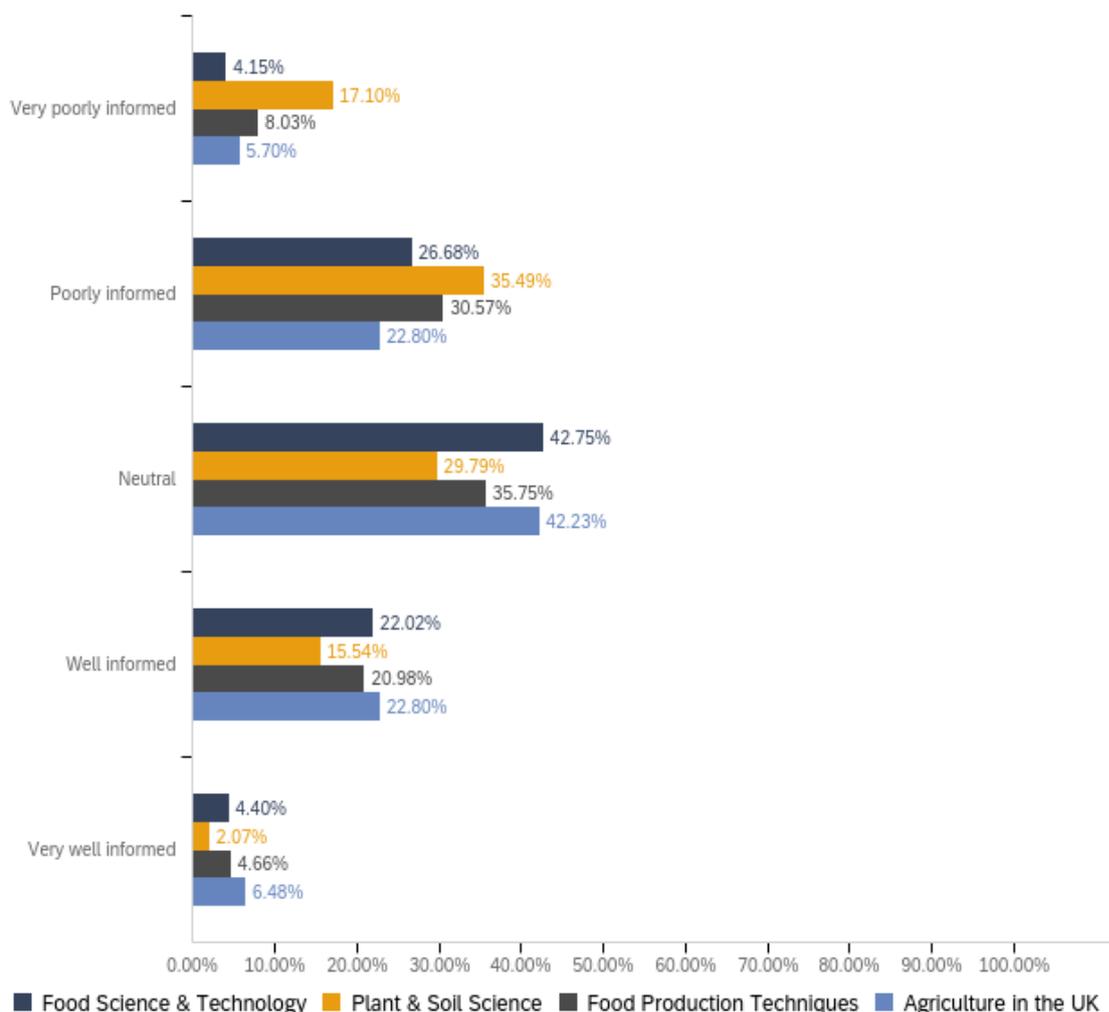
Respondents were asked to comment on their perceived levels of knowledge on topics relating to food production. These were:

- Food Science and Technology
- Plant and Soil Science
- Food Production Techniques
- Agriculture in the UK

Overall, respondents did not feel especially well-informed, with the most informed being represented by just over a quarter who stated that they felt they were well-informed about UK agriculture or food science and technology.

The majority of respondents felt that they were either neutral or poorly informed on all topics. Respondents felt least informed on plant and soil science. As the panel is largely situated in the East of England, a major arable farming region of the UK, and comprises self-identified “foodies” who are likely to be well-informed on topics relating to food and its provenance, they can reasonably be expected to be better informed on these topics than the general population.

## How Informed Respondents Feel on Topics Relating to Food Production

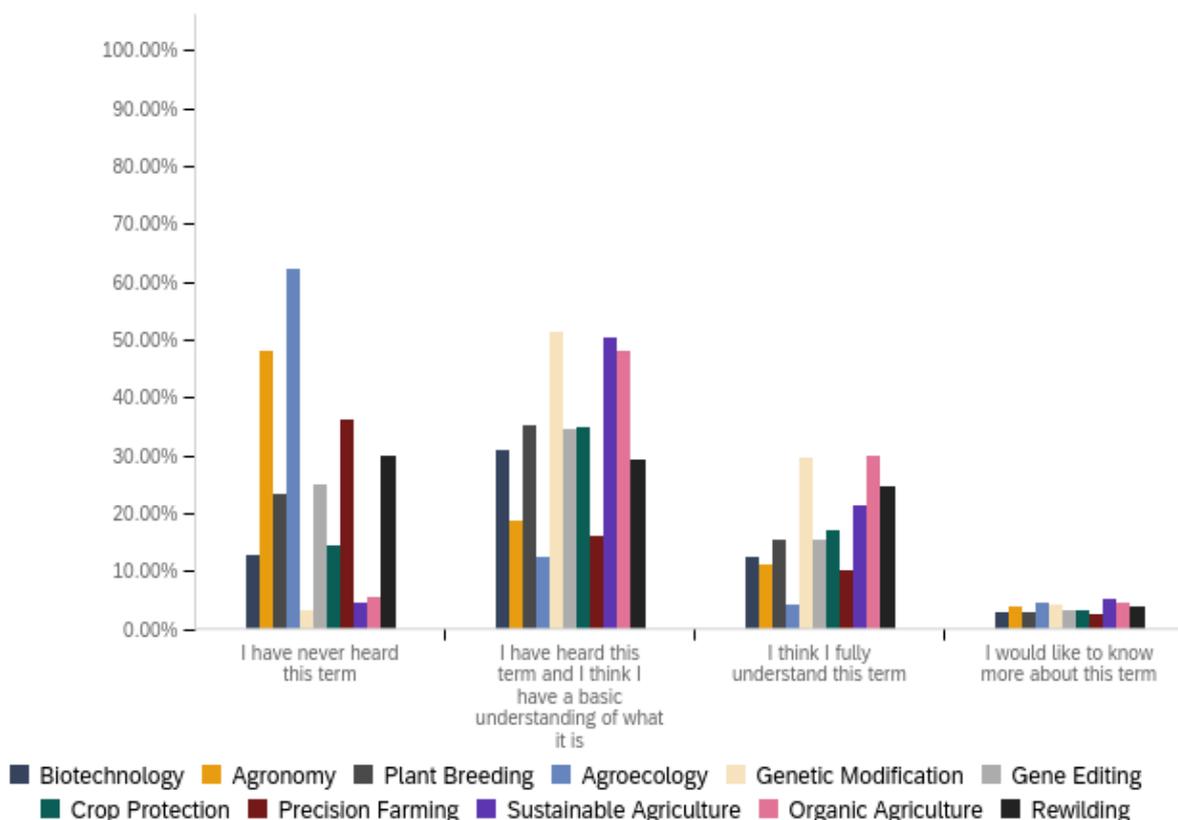


Respondents were then asked to outline how familiar they are with specific terminology relating to food production. Awareness of the various terms, especially those relating to agriculture, was quite low overall, with just under two-thirds of respondents never having heard of agroecology, just under half never having heard of agronomy, and over a third never having heard of precision farming.

Where respondents were aware of terms, understanding was fairly limited, with over half having heard of genetic modification and sustainable agriculture, but with only a perceived basic understanding of the terms' meaning. Perceived full understanding was highest for organic agriculture and genetic modification.

In general, the desire to know more about the terms was low, with under 5% of respondents wishing to develop their understanding. This could be reflective of the fact that, whilst respondents are generally engaged and interested in where their food comes from, the terms are not accessible and imply a degree of specialist knowledge that is required to fully understand them. More could be done to make communications around them more digestible and open to those without a specialist knowledge base or interest in these specific areas of food production and technology.

## Respondents' Familiarity with Terms



## The Environmental Crisis and Consumer Comfort Levels with Science in Agriculture

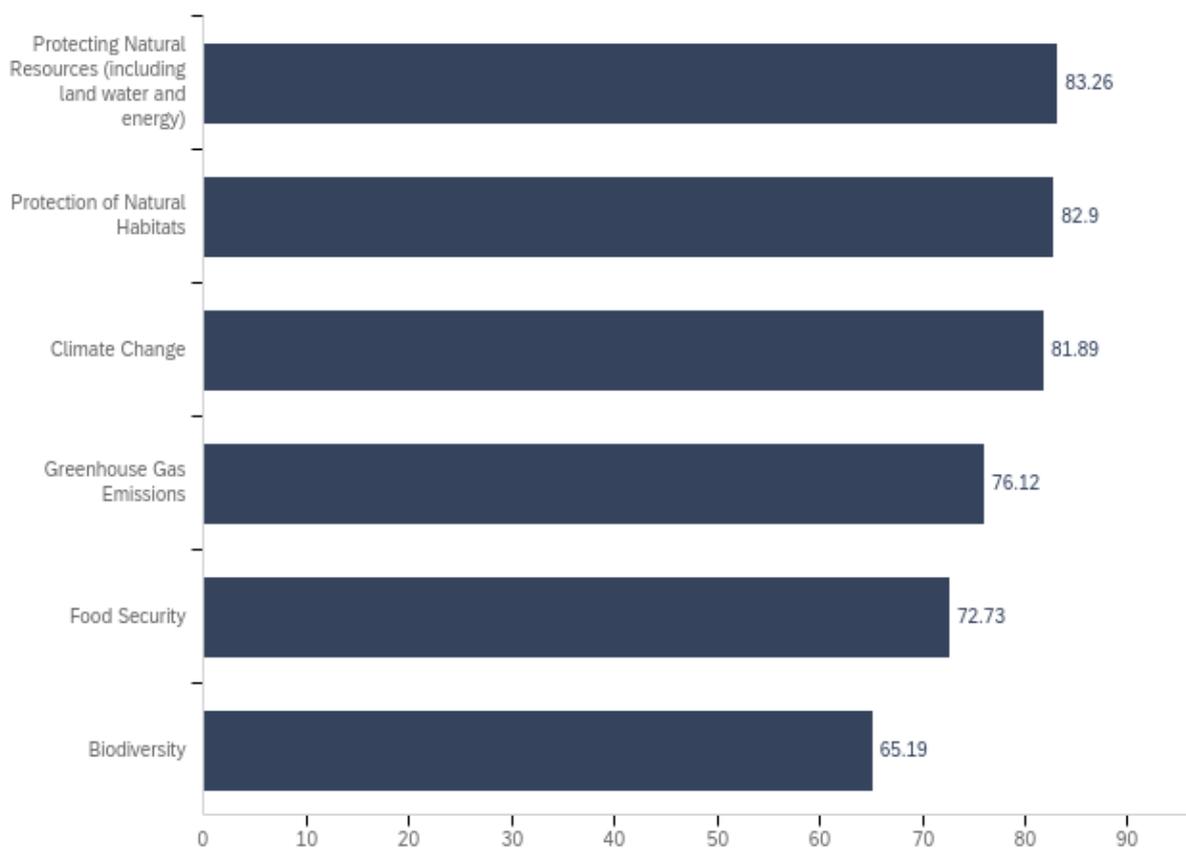
### Environmental Concerns

Respondents were asked to score the topics relating to the environment and climate that were of most concern to them out of 100, with 1 meaning that they were not concerned at all and 100 meaning that they were extremely concerned.

All topics were rated as being of high importance to respondents, with none scoring less than 65 out of 100. Rating most highly with over 80 out of 100 were protecting natural resources (rated as most important according to mean scores), protection of natural habitats (rated second highest), and climate change (rated third highest).

Perhaps surprisingly, in the context of current geopolitical tensions and threatened shortages of some key foodstuffs, food security was rated as less important, although still scoring relatively highly at 72 out of 100.

## Respondents' Concern Around Topics - Mean Score out of 100



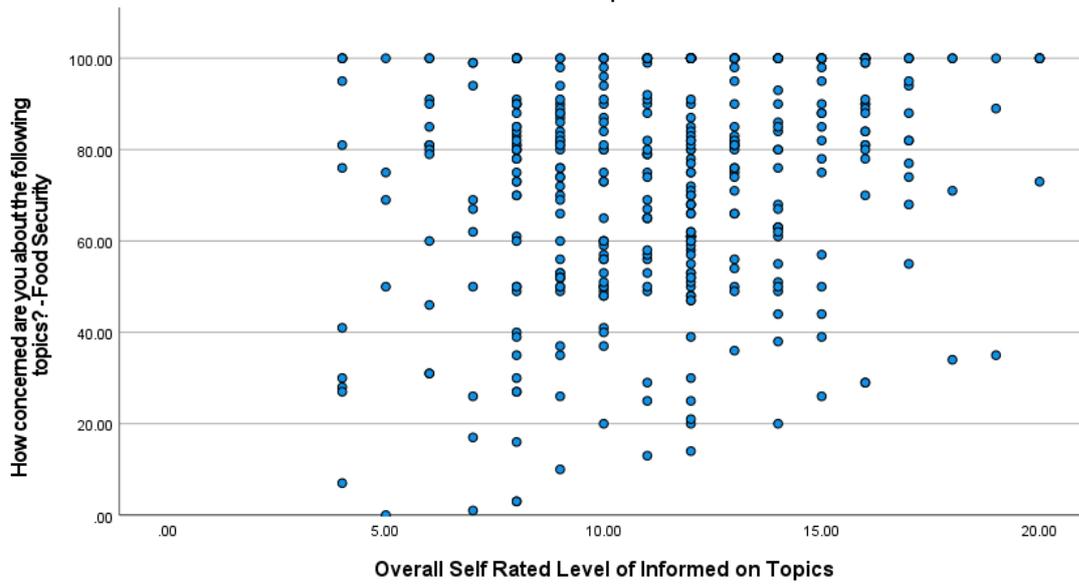
### Well-Informed Respondents Are More Concerned

A positive correlation was identified between respondents who rated themselves as being more informed on topics relating to food production and their levels of concern around the sustainability and the environment.

There was one notable, exception – climate change – suggesting that respondents are unanimously concerned about this, regardless of their levels of knowledge on topics relating to it.

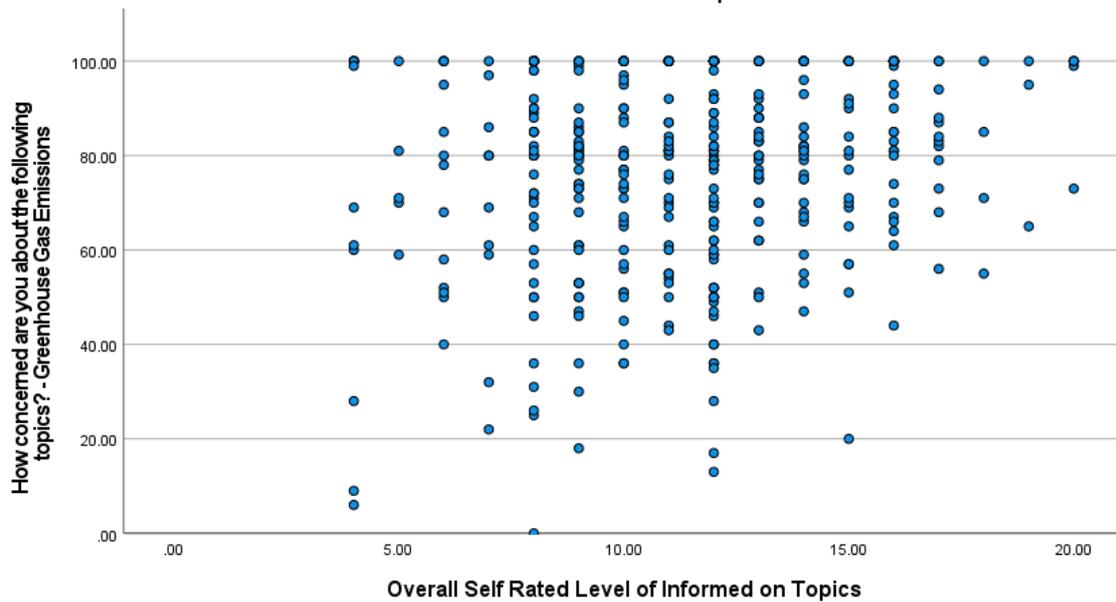
*Food Security Concern Level vs. How Informed Respondents Feel They Are*

Scatter Plot of How concerned are you about the following topics? - Food Security by Overall Self Rated Level of Informed on Topics



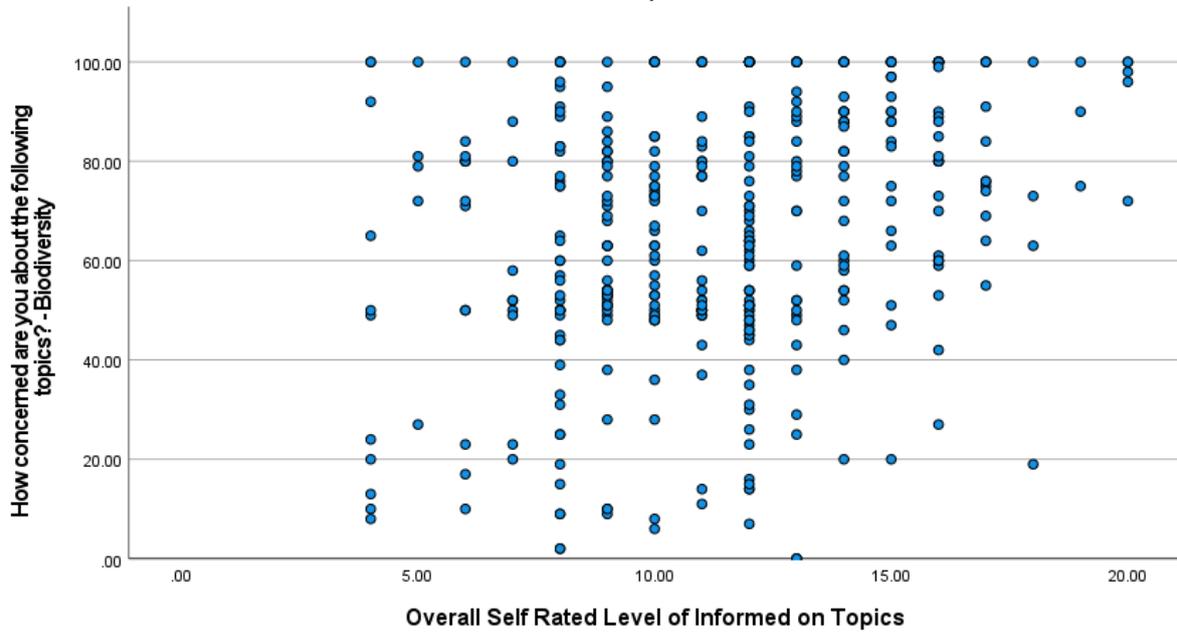
*Greenhouse Gas Emissions Concern Level vs. How Informed Respondents Feel They Are*

Scatter Plot of How concerned are you about the following topics? - Greenhouse Gas Emissions by Overall Self Rated Level of Informed on Topics



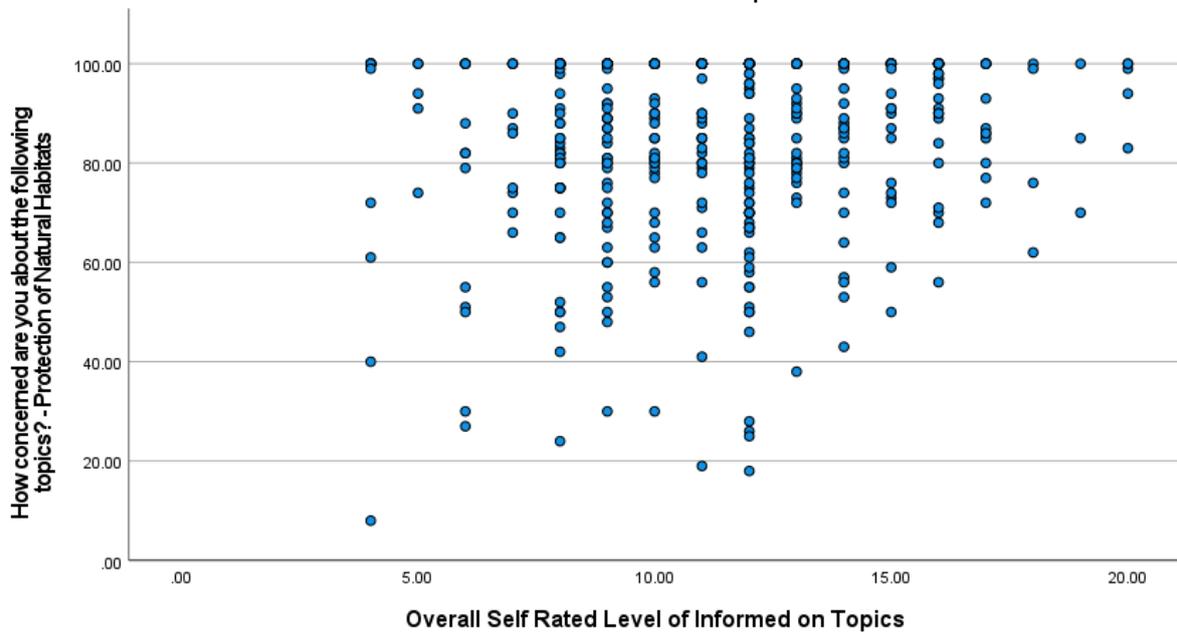
*Biodiversity Concern Levels vs. How Informed Respondents Feel They Are*

**Scatter Plot of How concerned are you about the following topics? - Biodiversity by Overall Self Rated Level of Informed on Topics**



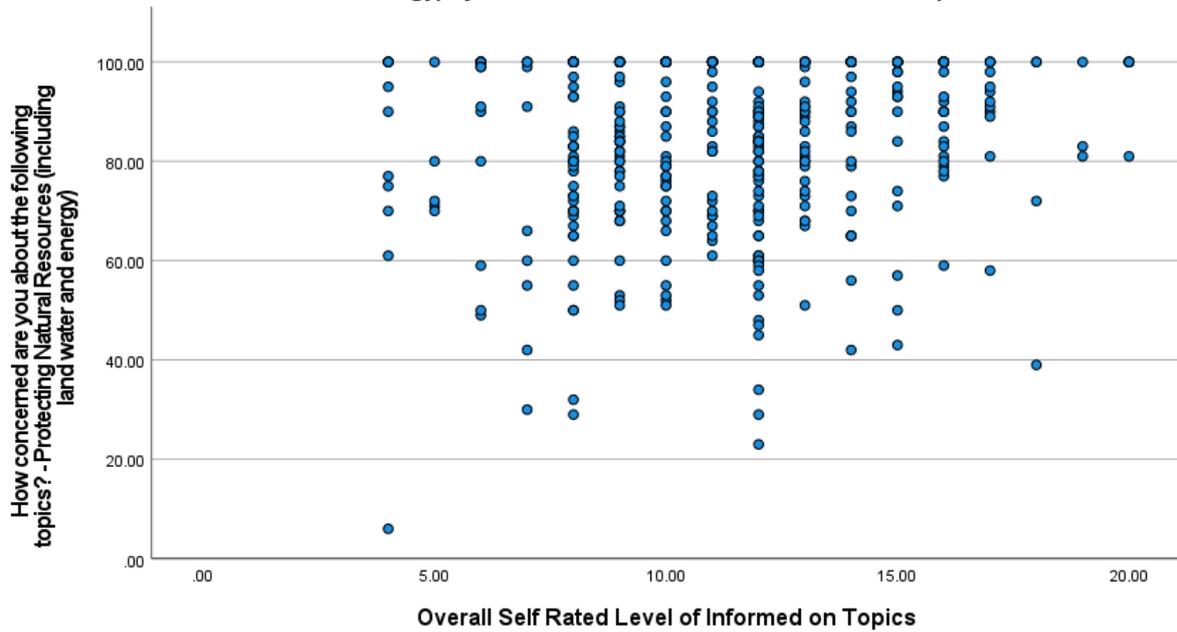
*Protection of Natural Habitats Concern Levels vs. How Informed Respondents Feel They Are*

**Scatter Plot of How concerned are you about the following topics? - Protection of Natural Habitats by Overall Self Rated Level of Informed on Topics**



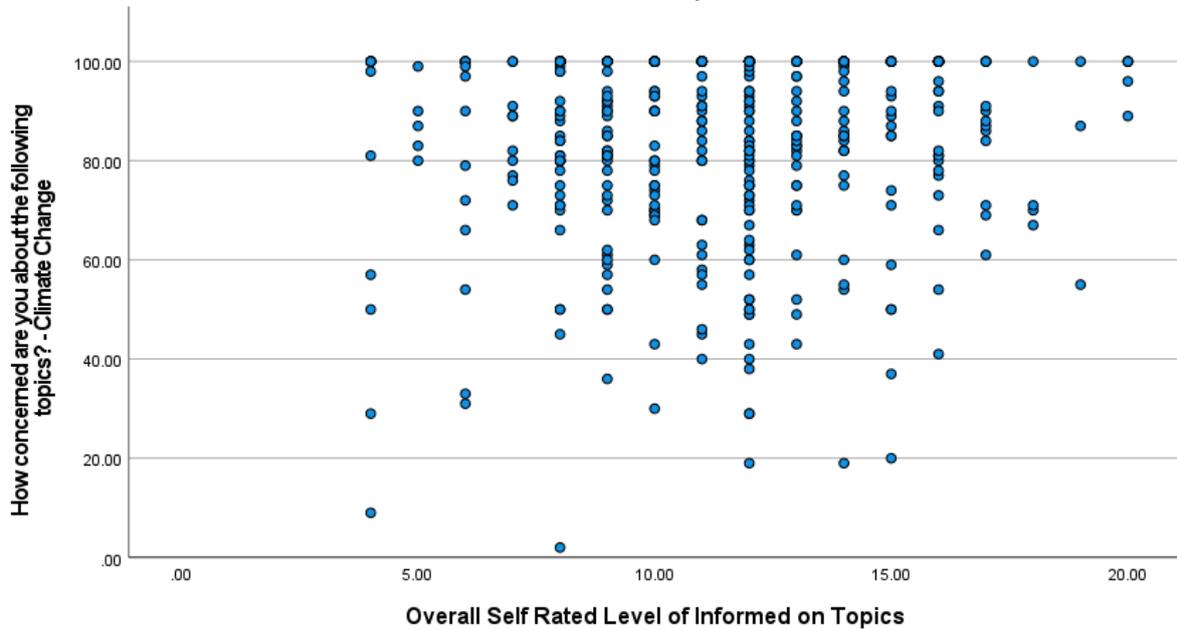
*Protecting Natural Resources Concern Levels vs. How Informed Respondents Feel They Are*

**Scatter Plot of How concerned are you about the following topics? - Protecting Natural Resources (including land water and energy) by Overall Self Rated Level of Informed on Topics**



*No significance found between Climate Change Concern Levels vs. How Informed Respondents Feel They Are*

**Scatter Plot of How concerned are you about the following topics? - Climate Change by Overall Self Rated Level of Informed on Topics**

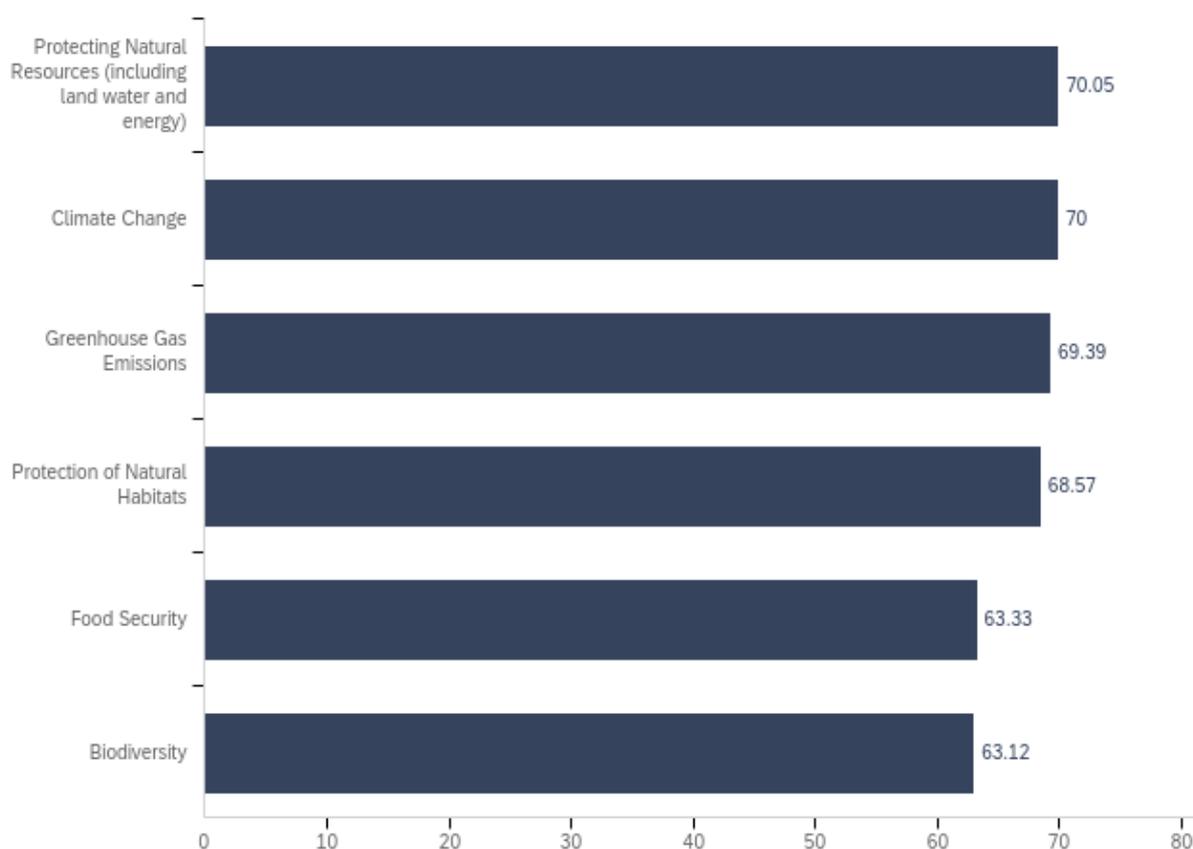


### Comfort Levels with Issues Being Addressed by Science

Respondents were then asked to score their comfort levels with the idea of these environmental and food security challenges being addressed through the use of agricultural science and technology. Whilst comfort with science and technology was relatively low in comparison to their concern for these factors, respondents were, overall, comfortable with the idea of science playing a part in delivering solutions to these problems, with no score below 63 being achieved.

Once again, food security was among the lowest scoring in terms of respondents' comfort levels with scientific intervention. However, this is unsurprising as food security also scored among the lowest in terms of respondents' concern levels. This suggests that they are currently not worried enough about food security, availability and cost to believe that scientific intervention is absolutely necessary and required to address this issue.

### Comfort Levels with Using Science and Scientific Technology to Address These Issues - Mean Score out of 100



### “Biotechnology” – Knowledge Equals Comfort

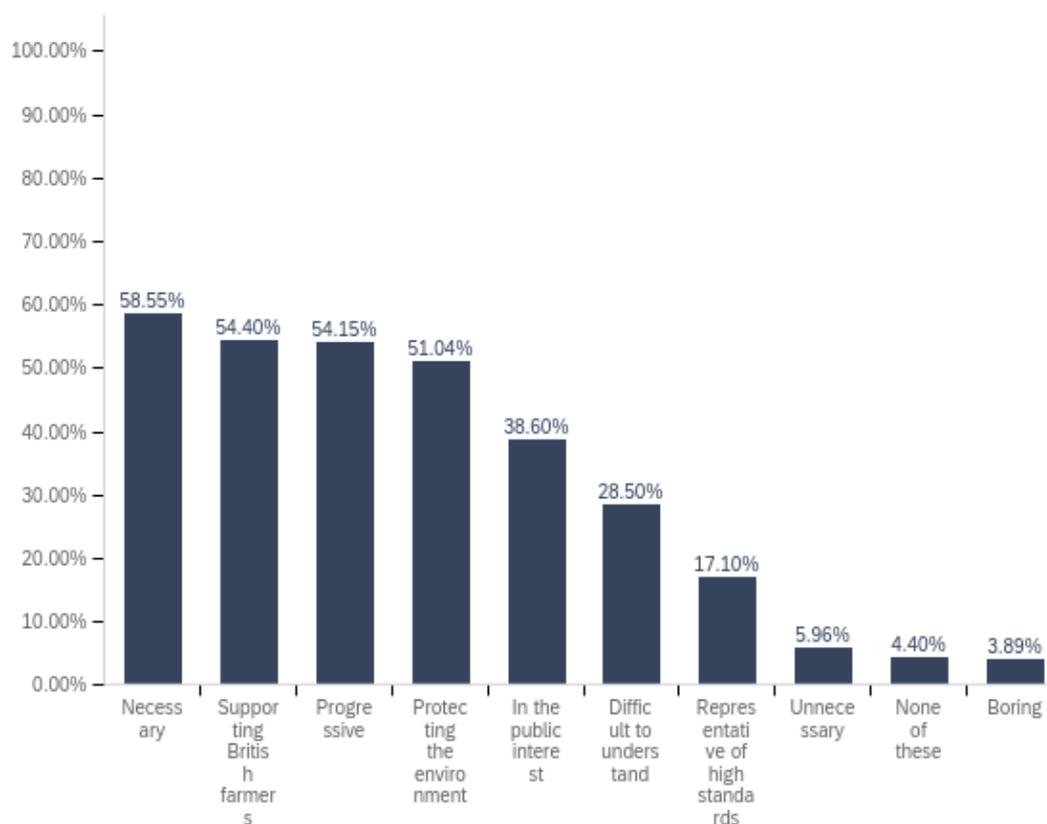
Respondents who reported being more well-informed generally tended to be more concerned about key topics around sustainability and the environment, but also more comfortable with the potential use of agricultural science and technology as a source of possible solutions. Those who reported knowledge or understanding of the term “biotechnology” also had greater levels of comfort with the potential use of science and technology to mitigate against the key climate concerns listed above.

## Words Respondents Associate with Science in Agriculture

Respondents were given a list of words and asked to identify those that they would associate with the use of science in agriculture.

Despite respondents not always feeling comfortable with the use of scientific intervention in food production, it is clear that the majority do view it as necessary – especially in the interests of supporting British farmers and protecting the environment.

### Words Associated with the Use of Science in Agriculture



## Understanding of Scientific Intervention in Food Production

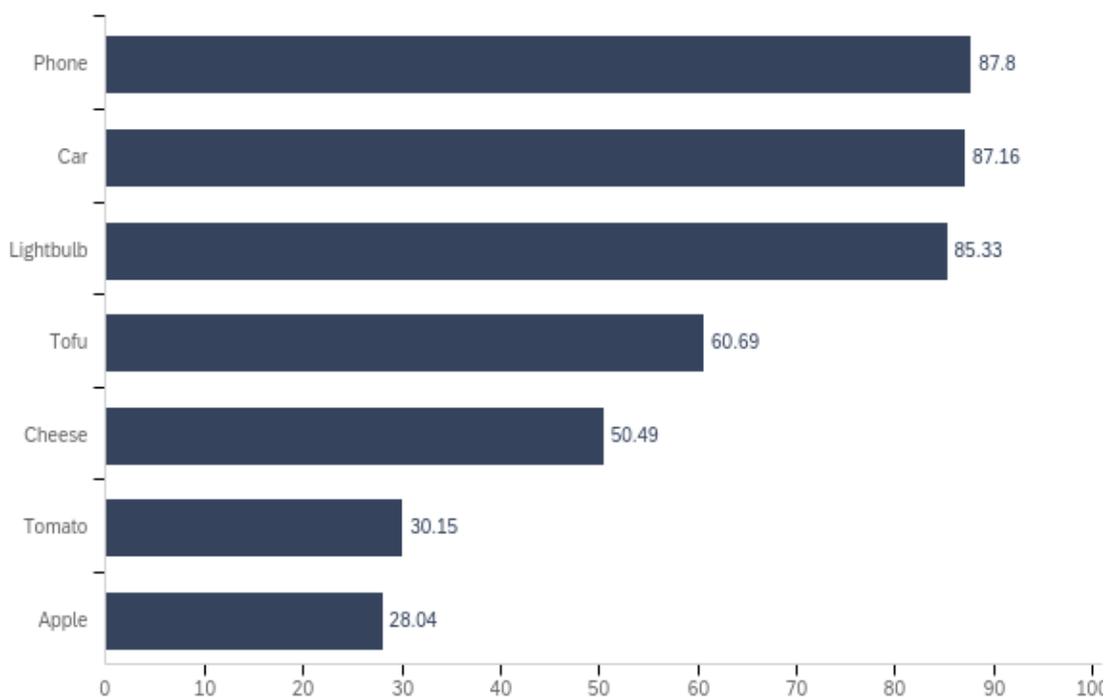
Respondents were then asked to rate different products on a scale of 1 to 100, where 1 meant that they were entirely natural and 100 meant they were entirely created by humankind.

The items respondents were asked to rate were:

- Phone
- Tomato
- Car
- Lightbulb
- Apple
- Tofu
- Cheese

Results were broadly in line with what might be expected, with respondents rating the phone, car, and lightbulb highly for having been made by humankind, and the tomato and apple as being much more natural and lacking in human intervention in their production.

Created by Nature or Humankind - Mean score out of 100



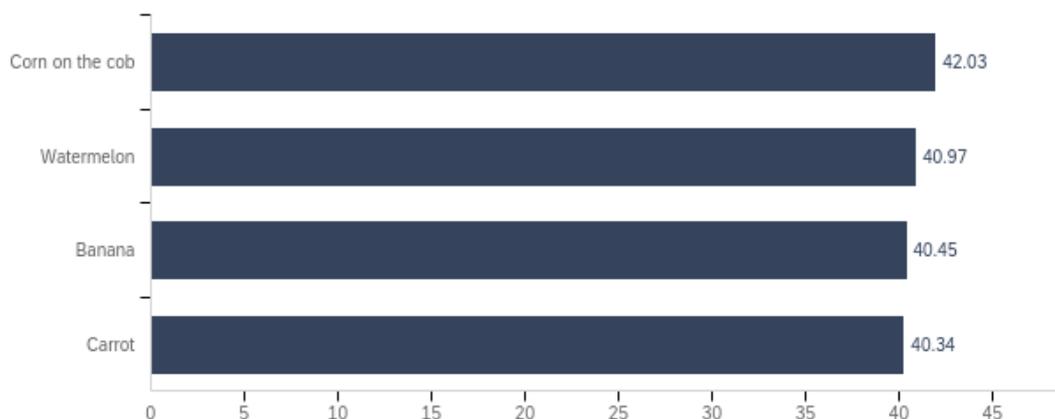
Following this initial rating question, respondents were asked to rate the extent to which they believed the below items of fresh produce to be natural/presented as nature intended:

- Carrot
- Corn on the cob
- Banana
- Watermelon

The scoring was once again done out of 100, with 1 meaning they were totally natural, and 100 meaning they were totally influenced by human intervention.

Overall, respondents scored the produce listed fairly low, with corn on the cob rated as having the most intervention and a carrot as the least.

The Extent to Which Respondents Believe Fresh Produce is Influenced by Human Intervention



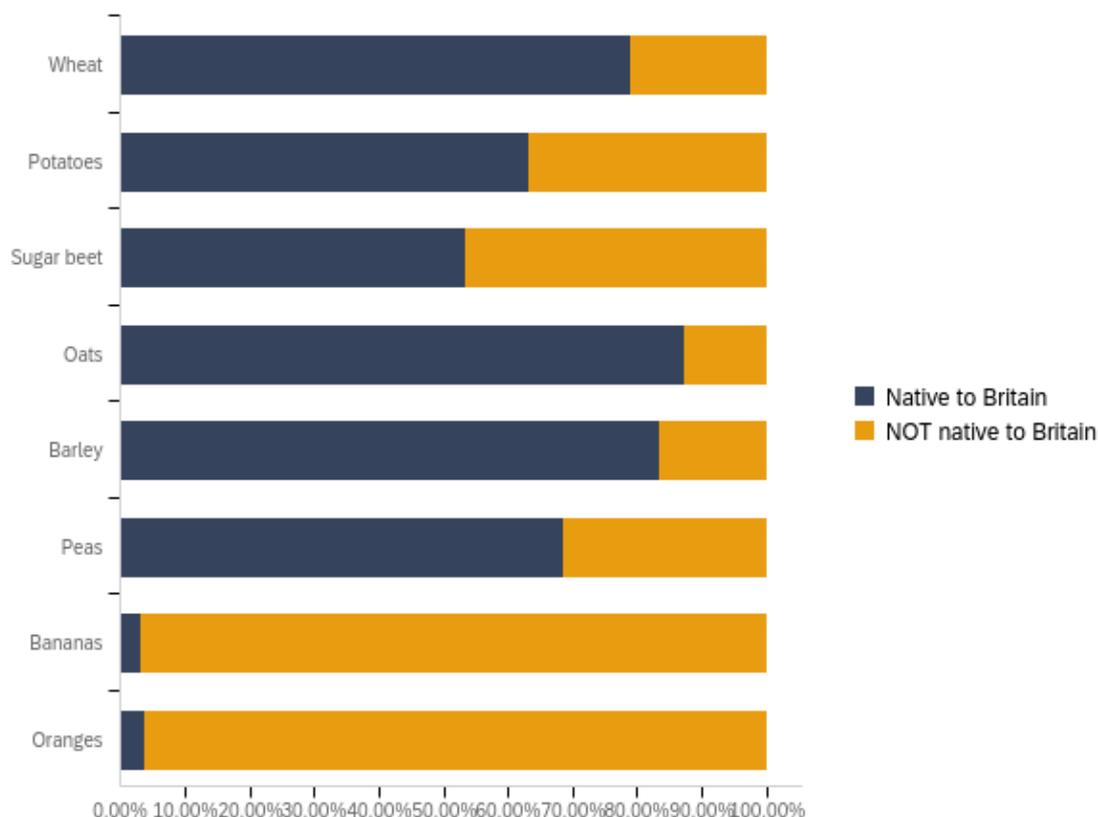


## Understanding of British Food Production

To gauge awareness of the 'naturalness' or otherwise of different food crops, respondents were also shown a list of crops and asked to identify whether they were native to Britain or not.

Their results are shown below:

### Knowledge of Food Crops' Provenance - Are They Native to Great Britain?



Most respondents assumed that the majority of the crops listed were native to Britain, with the exception of bananas and oranges and, to a lesser extent, sugar beet and potatoes. In fact, all the crops on the list originated in other parts of the world, e.g. wheat, barley and oats from the Middle East, and potatoes from South America. All have been adapted to our growing conditions and markets by scientific intervention and human ingenuity, and most of the food crops grown today bear only a passing resemblance to their 'wild' or 'natural' versions.

This highlights a surprising lack of knowledge as to the true provenance of many familiar food crops, and the modifications they have undergone in order to be grown in the UK.

When discussing topics such as the use of gene editing which introduce relatively small and precise changes to modern crop varieties, it is important to set this in context against the transformational changes those crops have been subjected to, and which are often regarded or referred to as 'natural'.

## Communicating with Consumers Around Science in Agriculture

### How Consumers Stay Informed

Respondents were asked how they tended to hear, or seek out, information about scientific intervention and technologies used in food production.

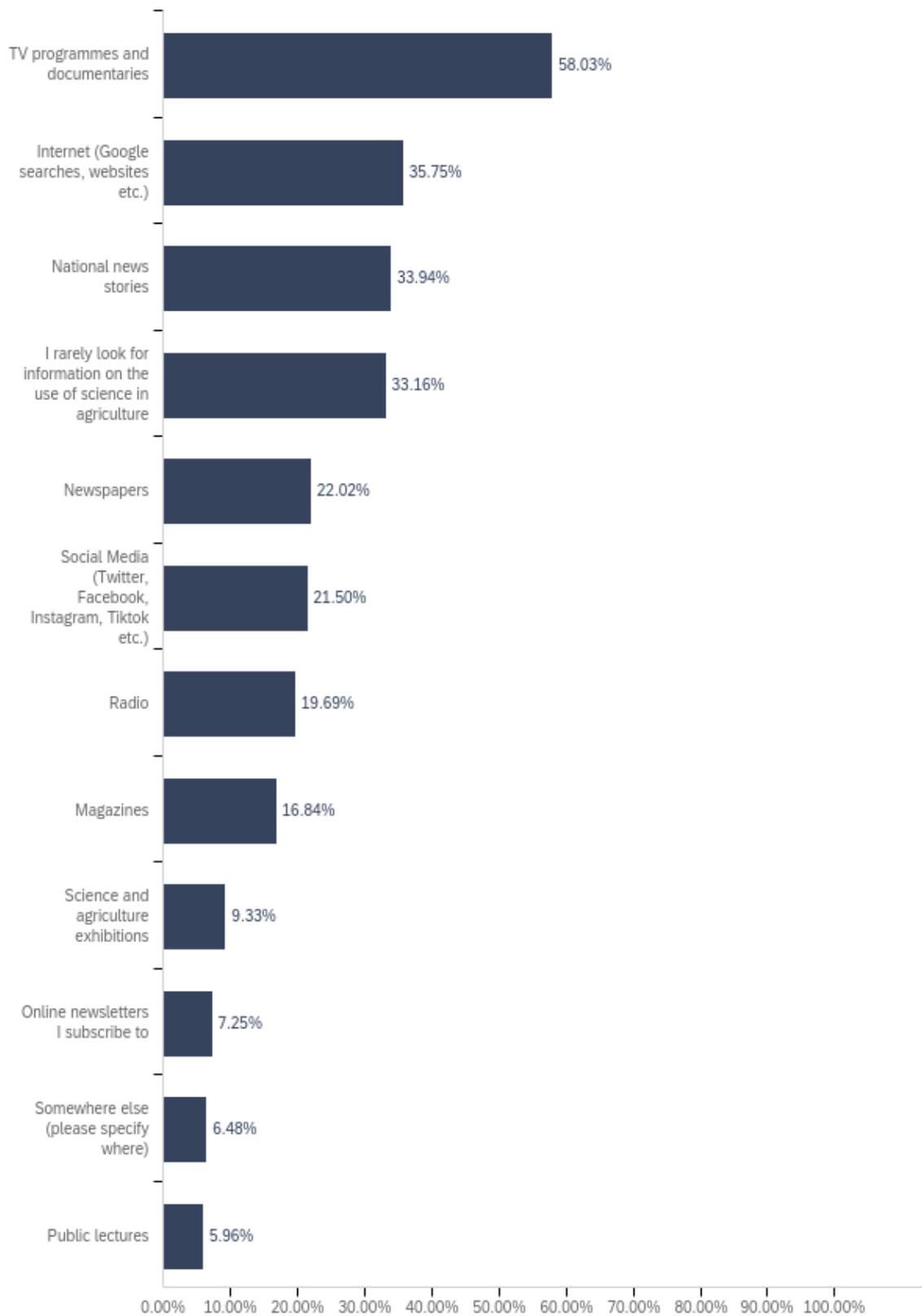
Generally, respondents sought, or heard, information on science and its use in agriculture and food production through TV programmes and documentaries, or via the internet through search providers and websites. Very few attended or listened to public lectures. Around a third reported that they did not tend to look specifically for information on the use of science in agriculture, a surprisingly low number, and given the make-up of the panel as self-identified “foodies”, this number would be likely to be lower with a consumer group who are less actively engaged with food and its production.

There is a significant positive relationship between the number of information sources accessed and the level of familiarity with specialist terms, as well as the level of feeling informed. The number of information sources also correlated to higher levels of education among respondents.

A significant positive relationship was identified between the number of information sources and respondents’ age groups. Those from higher age brackets tended to access information from a greater number of resources.

The resources used also differ according to age group, with respondents from older age brackets tending to access information from radio and newspapers more than those in younger brackets, while those in younger brackets tend to use social media for their information gathering.

## Scientific Topics Relating to Food Production - How Consumers Stay Informed

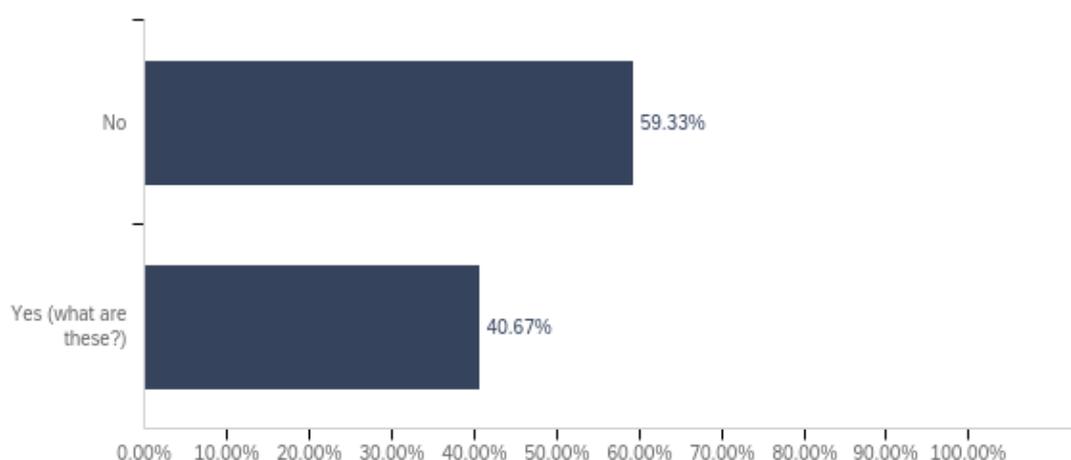


## Multiple Sources of Information Equals Greater Overall Confidence

There was a positive correlation between those respondents who reported obtaining information from multiple sources and their overall confidence levels in scientific intervention in food production.

This aligns with previous findings that a higher level of knowledge of specific terms equates to a greater concern around key issues of sustainability and environmental concerns. It suggests that respondents who seek information from multiple sources, and thus feel better informed, also tend to be more concerned about issues relating to the environmental, climate and food security challenges, and are also more willing to accept scientific intervention to help solve them.

## What Prevents Respondents From Obtaining Information? Barriers to Obtaining Information?



Respondents were also asked whether they felt there were any barriers to obtaining information about scientific intervention in food production. The majority did not feel there were any barriers, although just over 40% indicating that they had encountered barriers to obtaining such information.

Respondents who felt there were barriers to finding out more information on science in agriculture and food production tended to feel that they were unsure who to trust in gathering such information, due to misinformation in the media, and company interests in selling them products making them a biased source of information.

Some commented that a lack of knowledge was a barrier to them in knowing where to start looking for information, particularly when it came to knowing which sources to place their trust in, and their understanding of the language and terminology used. It is clear that improvements can be made in the communication of these topics to create more accessible, digestible information in a central location for consumers to access.

The word cloud below outlines the most common words and themes that came up in respondents' comments on the barriers to gathering information.



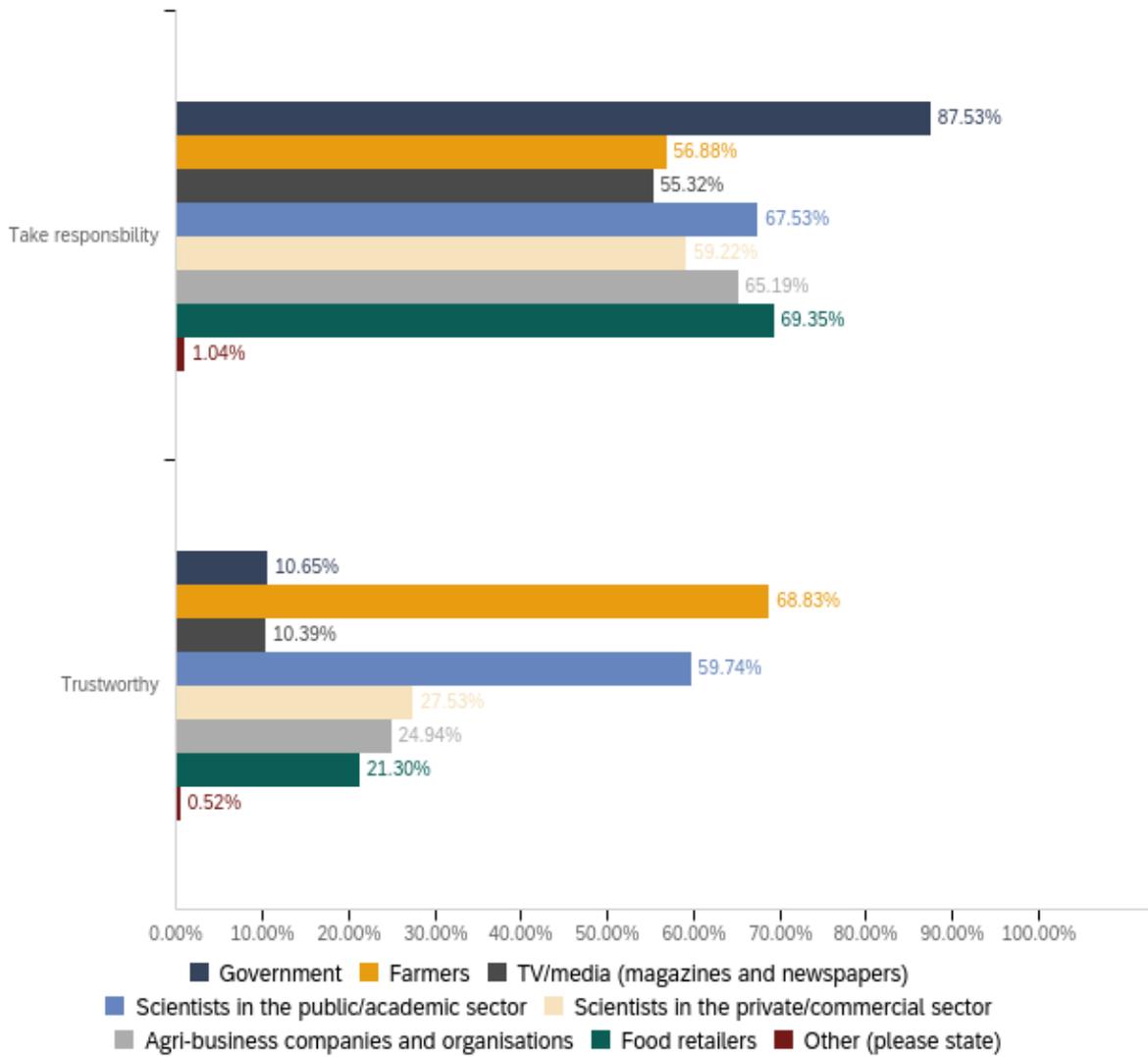
### Communicating New Developments about Science in Agriculture to Consumers

Respondents were asked where they felt primary responsibility for communicating new developments and methods of using science in agricultural production should lie, as well as the perceived trustworthiness of these sources.

A large majority of respondents felt that responsibility for communicating any changes to them should lie with Government. However, this was mirrored by a significant lack of trust in Government, suggesting that respondents would be unlikely to have confidence in government communications around these topics.

Respondents generally felt that farmers were the most trustworthy group who might communicate these new methodologies to them, followed by scientists working in the public sector, with both groups also scoring fairly highly for perceived responsibility for communicating any changes.

### Responsibility for Informing the Public About New Science in Agriculture





**Science** *for*  
**Sustainable**  
**Agriculture**

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