

Consumer principles on the use of food additives and enzymes

Research report
Kantar Public – March 2017



Contents

1. Executive Summary.....	1
2. Research Design.....	4
3. Awareness, familiarity, and associations.....	8
4. Benefits and concerns associated with additive and enzyme use.....	12
5. Response to the approvals process.....	17
6. Consumer principles: how participants weigh up the acceptability of additive and enzyme use.....	20
7. Conclusions.....	28
Appendix A: Achieved sample.....	30
Appendix B: Topic guides.....	32
Appendix C: Stimulus materials.....	50

1. Executive Summary

The Food Standards Agency (FSA) is an independent Government department set up to protect the public's health and consumer interests in relation to food. The FSA's remit extends to assessing and mitigating the risks of human exposure to chemicals in food. Use of additives and enzymes in food and food production is regulated by the European Union (EU). Consumer interests must be taken into account when developing policy on food additives and enzymes as a matter of law. This research has sought to gain a greater understanding of consumer perspectives on the use of food additives and enzymes.

Research design

The primary objective of this research was to establish **consumer principles** on the use of additives and enzymes that can be applied by the FSA when helping shape policy. More specifically, the research aimed to:

- Understand how participants weigh up the acceptability of additives and enzymes used in food
- Determine whether there are particular areas where the use of additives and enzymes is less acceptable or unacceptable to consumers (and where it might be more acceptable)
- Identify any circumstances in which participants would not want a food additive or enzyme to be approved despite successfully passing the safety assessment process
- Gauge which issues around food additives and enzymes are of greatest importance and of lesser importance to participants around the approval of food additives and enzymes, including any that are not explicitly covered by the current approval systems

Two waves of qualitative research were conducted with participants including six Citizens' Forums (90 minute focus groups collecting spontaneous and prompted views) with 47 participants followed by a 2 week mobile phone application research exercise with 25 participants. Citizens' Forums utilise a qualitative, deliberative group discussion method, whereby during the sessions, educational materials provide context and in-depth information to the group, informing participants' discussions. The research reflected a range of demographic groups, the primary sampling criteria of which was social grade. The research was conducted in London, Exeter, Leicester, Swansea, Bangor and Newcastle in November/December 2016 and January 2017.

Key findings

Overall participants found the use of food additives less acceptable than the use of food enzymes. Participants in the sample made a strong association between 'unnatural' synthetic food additives and enzymes and the potential for serious long-term health risks. Participants feared that synthetic chemicals were unsafe and consequently, felt that they should restrict intake to reduce their exposure to health risks. Consequently, participants felt that their use was more acceptable when they served what was perceived to be an essential or necessary function in the food, and less acceptable when they served purposes which were seen to be less necessary such as for aesthetic reasons.

Participants wanted more information to be made available about the use of food additives and enzymes and for that information to be accessible. Participants felt that this would give consumers greater confidence to make informed decisions about their chemical intake and, if necessary, make trade-offs in their food choices in line with their priorities and values. There was a perceived need among participants for greater transparency about the approvals process for new food additives and enzymes (which is conducted at the EU level); some questioned the role of manufacturers in the approvals process and the potential impact this had on its independence, impartiality and credibility.

Awareness, familiarity and associations

Participants' attitudes to additives and enzymes strongly influenced the ways in which they negotiated the acceptability of their use and made trade-offs about their use. Participants knew more about additives than they did enzymes and were able to provide a range of examples of the use of additives in food. Participants' awareness of enzyme use was low, particularly among lower socio-economic groups, and did not extend much beyond the basic knowledge they had gained

from GCSE science lessons. Participants felt that more information was available about additives than enzymes and from a wider range of sources. However, they expressed reservations about the accuracy, independence and consistency of this information, particularly when it came from online, print and social media sources. There was a desire for reliable and consistent information about additives and enzymes and their uses in food and food production.

Participants viewed additives as substances which were new and synthetic and, by association, unnatural, and therefore potentially unsafe and unhealthy. Conversely, the perceptions of enzymes were more positive; they were seen as established and more natural and, therefore, as healthier, safer and more acceptable.

Benefits and concerns

Participants widely accepted that additives and enzymes were not entirely avoidable and that they made a valuable and important contribution to modern shopping, cooking and eating habits and lifestyles. There was common acknowledgement of a range of benefits associated with the use of these food chemicals such as convenience, variety, cost, quality, taste and appeal.

However these benefits did not alleviate the widely-held view that synthetic chemicals could potentially pose serious and long-term risks to health. This association was deeply entrenched among participants in the sample and could be difficult to address.

Participants were also concerned about their lack of knowledge and understanding of the chemicals used in their food and this was a source of some anxiety (particularly for parents). Lack of knowledge about the sources of additives and enzymes drove concern, specifically when the sources of enzymes were discovered through the stimulus material to include animals as well as more commonly plants and microorganisms¹. Participants were concerned about animal welfare implications (a concern driven by the misconception that enzymes are 'extracted' from animals) and noted that enzymes from animal sources could be an issue for certain consumer groups (e.g. vegetarians/vegans and certain religious groups). Concerns about animal welfare focused on whether animals were harmed in obtaining enzymes and participants' concerns focused on the term 'extraction'. However, this appeared to be based on a misconception that enzymes are obtained from live animals, whereas they are obtained from by-products of meat production after animals have been slaughtered (e.g. rennet obtained from animal stomachs). Meanwhile concerns about consumer groups focused on whether food produced using enzymes from animal sources would be suitable for consumers according to their religious beliefs or otherwise meet with consumers' personal preferences and values (particularly vegetarians and vegans). Food labels were frequently cited as being confusing, overwhelming and unhelpful. Participants felt that labels did little to address concerns and were of limited use in enabling participants to confidently make informed food choices in accordance with their priorities and values.

Response to the approvals process

New additives are assessed and approved at EU level before they go to market. Information outlining the approvals process initially provided reassurance to participants because the process was seen to be thorough and robust. The length of the process (two years), the involvement of 'expert' scientists and the opportunity to review decisions were factors which provided reassurance to participants. Participants, however, remained concerned about the role of manufacturers in the process and whether they were able to influence the decisions and outcomes. Participants were generally cynical about food manufacturers; and commonly believed that industry prioritised profit over consumer health. Participants wanted the approvals process to be more transparent and for there to be greater restrictions on the role of manufacturers in it.

Consumer principles

While the discussions about the approvals process provided participants with some initial reassurance, this proved short lived. The approvals process was generally unable to address consumers' deeper concerns about chemical use which was driven largely by the strong association between synthetic chemicals and potential health risks. As a result, participants generally wanted to reduce their intake of synthetic chemicals to minimise exposure to risks, but wanted more information on which they could balance the risks with the perceived benefits (notably convenience and cost). Some participants also wanted to know more about natural alternatives to synthetic chemicals in this context to help them make informed choices. The following principles emerged from analysis of the data. The use of additives and enzymes was found to be more acceptable when it is in accordance with the following principles which are outlined here and explored in detail in chapter 4:

¹ The stimulus material stated that 'enzymes can be extracted from animals, plants and microorganisms' (see Appendix C).

- (1) **Health risks** (including long term and suspected risks) have been assessed before the chemical goes to market by **independent scientists** and are able to be **reviewed** by scientists
- (2) There is a **clear use case** - use is essential to the nature of the product or has a clear functional rather than an aesthetic use
- (3) There is **accessible** information available about their **source and purpose** – to give consumers confidence and enable them to make informed choices
- (4) Their use **does not mislead consumers** – they do not change fundamental characteristics, or create unnecessary expectations, of food
- (5) **Labels do not mislead consumers** – ‘fresh’, ‘natural’ and ‘healthy’ labels are consistent with the contents of the products
- (6) They are consumed by **strong rather than vulnerable** people (particularly less by children, babies, the sick and elderly)

Participants were keen that the following points were also observed and that food additives and enzymes are:

- (1) Consumed in **moderation** and as part of a balanced diet
- (2) Consumers have access to and are able to choose **natural alternatives to synthetic chemicals**
- (3) Their use **lowers costs** which benefits consumers rather than manufacturers
- (4) Their use does not compromise **animal welfare**.

2. Research Design

2.1 Background

The FSA is an independent Government department set up to protect the public's health and consumer interests in relation to food. In line with the Agency's strategic plan there is a need to ensure that the consumers can make informed choices about what they eat, and have rights and responsibilities with regard to the food that they eat. This remit extends to assessing and mitigating the risks of human exposure to chemicals in food.

Use of additives and enzymes in food and food production is regulated by the EU to minimise risks to consumers and ensure that food safety is not compromised. EU legislation on the use of these chemicals aims to ensure the effective functioning of the EU single market whilst delivering a high level of protection of human health and a high level of consumer protection, including the protection of consumer interests. The legislation requires that additives and enzymes must be safe when used, there must be a technological need for their use, and their use must not mislead the consumer. Consumer interests must be taken into account when developing policy on food additives and enzymes as a matter of law. This research has sought to gain a greater understanding of consumer perspectives on the use of additives and enzymes in food and food production.

Chemicals in food, particularly food additives, can be an emotive issue. Past research Kantar Public (formerly TNS BMRB) conducted on chemicals and food found that the public can harbour strong concerns about these issues. Worries tend to stem from (a) the public's recognition of their low understanding of the area; (b) their increased consumption of 'processed foods'; and (c) the unknown or unclear health impacts of the chemicals and additives used in foods. Concerns are further heightened in the context of affordability and the fact that these kinds of chemicals are most associated with cheaper food².

Kantar Public conducted a small-scale study in June 2015 to explore consumer awareness and understanding of chemicals in food³. This consisted of 4 citizens' forums and an online survey of 2,708 consumers. The outcome of this research showed there was generally low awareness and understanding of risks presented by chemicals in food, apart from additives and pesticides. The research also highlighted some of the challenges associated with communicating with consumers about the use of chemicals in food, as participants felt information could be overwhelming - particularly in relation to chemicals they felt they were unable to do anything about. The research, however, highlighted that participants welcomed messaging that they saw as empowering and practical.

2.2 Research objectives

This research aims to provide robust evidence on the views and priorities of the public about the regulation of chemicals in food and food production. The primary research objective was to:

- Establish consumer principles on the use of additives and enzymes that can be applied by the FSA when helping shape policy to ensure that consumer interests are taken into account in line with the regulatory framework.

More specifically, the research aimed to:

- Understand how participants weigh up the acceptability of additives and enzymes used in food

² TNS BMRB and FSA (2016). Our Food Future (<https://www.food.gov.uk/news-updates/campaigns/ourfoodfuture#ror>). TNS BMRB and FSA (2015). Consumer understanding of food risk (<http://www.food.gov.uk/sites/default/files/consumer-understanding-of-food-risk-chemicals.pdf>) . TNS BMRB and FSA (2014). FSA Strategy 2015-2020 ([https://www.food.gov.uk/sites/default/files/FSA%20strategy%20document%202015-2020_April%202015_interactive%20\(2\).pdf](https://www.food.gov.uk/sites/default/files/FSA%20strategy%20document%202015-2020_April%202015_interactive%20(2).pdf)). TNS BMRB and RSC (2015). Public Attitudes to Chemistry (<http://www.rsc.org/campaigning-outreach/campaigning/public-attitudes-chemistry/>).





³ FSA and TNS BMRB (2016) Consumer understanding of food risk: chemicals

- Determine whether there are particular areas where the use of additives and enzymes is less acceptable or unacceptable to consumers (and where it might be more acceptable)
- Identify any circumstances in which participants would not want a food additive or enzyme to be approved despite successfully passing the safety assessment process
- Gauge which issues around food additives and enzymes are of greatest importance and of lesser importance to participants around the approval of food additives and enzymes, including any that are not explicitly covered by the current approval systems

2.3 Methodology

Two waves of qualitative research were conducted with participants including six Citizens' Forums (90 minute focus groups exploring spontaneous and prompted views) followed by a 2 week mobile research exercise. The methodological approach is summarised below in figure 2.1.

Figure 2.1: Summary of methodological approach

Additives & Enzymes	
PHASE 1	<p>x6 Citizens' forums X7-8 participants in each 90 mins Including: additives ranking exercise</p>  
INTERIM TASK	
PHASE 2	<p>Mobile phone diary exercise x25 participants 2 week Including: 'Go find' competition</p>  

Six Citizens' Forums were convened each comprising 7-8 participants. Citizens' Forums use a qualitative, deliberative group discussion method, whereby during the sessions, educational materials provide context and in-depth information to the group, informing participants' discussions. The forum setting facilitates systematic and in-depth testing of complex stimulus materials with participants, which researchers present to unpick the reasons behind responses. These forums therefore provide a deeper understanding of attitudes than traditional focus group discussions: uncovering existing levels of knowledge; and providing a deeper understanding of how people respond to additional information. Each forum lasted approximately 90 minutes and took place between the 28th November and 9th December 2016. The forums explored spontaneous awareness, understanding and perceptions of food additives and enzymes and associations with these chemicals. Participants were asked to rank a selection of 10 food items according to the number of additives they believed them to contain, in order to explore perceptions of these chemicals. Participants were provided with information about the reasons and circumstances under which additives and enzymes are used in food and prompted to discuss benefits and concerns and acceptability of the use of these chemicals. The forums also explored participant responses to the current additives approval process and their views on what the most important issues were around this. The topic guides used to structure the sessions and stimulus materials shown to participants are provided in appendices B and C.

Between the waves, participants were given an interim task over Christmas to help keep them engaged with the topic during the break. This asked them to reflect on the additives and enzymes used in their festive food and its production, and their feelings about the acceptability of this.

The second wave of the research consisted of a 14 day smartphone-based exercise which was conducted with the same participants from wave one. The phone exercise was conducted 4 weeks after the forums to allow participants time to

digest and reflect on what they had learnt. It was designed to take approximately 90 minutes. Fieldwork took place between the 9th and 22nd January 2017. The aim of this exercise was to explore participant perceptions of the use of these chemicals in the context of their daily lived routines. Participants were invited to download an app onto their smartphones and create a secure login to confirm their participation. The app included a variety of exercises including rating scales, open-ended text and multimedia responses. During the first week, participants were introduced to three additives and three enzymes and asked to reflect on their use in food and food production. In the second week, participants were asked to take part in the 'Go Find the additives and enzymes' competition, where they were required to upload photos of products using these chemicals and reflect on their feelings about this. The activity guide and stimulus materials can be found in appendices B and C.

2.4 Sampling

To ensure a range of views were reflected in the research, the forums comprised a mix of social grades and locations. Social grade was the primary sampling criteria; three forums consisted of social grade ABC1 and three of social grade C2DE. Participants were recruited according to the profession of the occupation of the chief income earner of the household. The forums were held in six locations across England, Wales and Northern Ireland (avoiding capital cities in Wales and NI) in: London, Exeter, Leicester, Swansea, Bangor and Newcastle. Participants were screened to ensure that a range of demographics were reflected in the groups, namely a mix of genders, ages, ethnicities, work status, life stages, and attitudes to risk. Levels of interest in science were also monitored. For phase two, participants from all locations were reconvened except for Newcastle where there was less interest in taking part. A breakdown of the coverage across location and social grade can be found in Figure 2.2 below. The full break down of the achieved sample can be found in Appendix A.

Participants were recruited through the in-house recruitment team via face-to-face, telephone, and database recruitment methods. A screening questionnaire was used to ensure robust recruitment. Participants received a £40 incentive for taking part at each wave of the fieldwork to thank them for their time.

Figure 2.2: Sampling approach

			Wave 1	Wave 2
W1 only	Newcastle	ABC1	8	0
W1 & W2	London	C2DE	8	4
	Exeter	ABC1	8	6
	Leicester	C2DE	8	3
	Bangor	ABC1	8	6
	Swansea	C2DE	7	6

2.5 Analysis

Analysis was conducted iteratively across each phase of the qualitative research, building understanding of participant priorities and concerns, uncovering the reasons for views, and exploring what this means for participant expectations of regulation.

The analysis drew on multiple data sources, including: moderator notes from the forums (including audio recordings and materials completed by participants in workshops) and data generated through the online/mobile platform (including rating scales, open-ended text, discussion threads and photos). Matrix mapping was used to analyse the large volumes of data. This is a thorough and robust approach to qualitative data analysis whereby structured pro-formas and charts

are used to map data against the research objectives and emergent key themes. The data were systemically analysed to look for themes and explore variation across sub-groups. Formal analysis brainstorm sessions were held following each phase of research, where researchers explored findings against each of the key themes in detail, as well as against the overarching objectives.

Verbatim quotes are used throughout this report to illuminate findings and are attributed as follows:

“Quote.” (Location, social grade, wave).

3. Awareness, familiarity, and associations

This chapter reports on participants' awareness of and familiarity with additives and enzymes, and then explores participants' sources of information about the use of these chemicals in food and food production.

Overall, participants had greater awareness of and familiarity with food additives than enzymes. Awareness of food additives among the participants was high and they were able to report a wide range of examples of additives and their uses. This was not the case with enzymes - awareness was relatively low and did not extend much beyond knowledge gained from GCSE science. More information was reported to be available on additives than enzymes and from a wider range of sources. There were, however, concerns about the accuracy, independence and inconsistency of this information, particularly from online, print and social media sources. Lack of familiarity with enzymes tended to mean participants had more neutral views towards these chemicals.

There was a strong association among participants between the perceived naturalness of food and its healthiness and safety. Additives were seen by participants as substances which were new, synthetic and unnatural and by association were viewed as unhealthy and potentially unsafe. In contrast, enzymes were perceived as more natural, safer and beneficial to health. These associations are central to an understanding of consumers' attitudes and behaviours relating to additives and enzymes reflected in this research report.

3.1 Awareness of and familiarity with additives and enzymes

3.1.1 Additives

Awareness of use of food additives was high, across the different social grades and locations. Additives were generally understood to be substances which are 'added' to food and not 'naturally occurring'. Participants were commonly able to report a wide range of examples of additives and their uses in food and food production, including colourings, sweeteners, flavourings and preservatives. They also understood salt, sugar and vitamins to be additives as these were seen to be 'added' to foods. Participants spontaneously reported being familiar with E-numbers but had limited understanding of their functions and were unable to give specific examples.

"Something that's not naturally occurring within food. You have to add it." (Bangor, ABC1, Wave 1)

Participants provided a range of views on food additives and cited a number of benefits and concerns (see chapter 4). Additives were perceived to improve the shelf life, taste, quality, cost, choice and the appearance of food, but were, in general, also associated with fast, processed, packaged, convenience and sweet or luxury foods. While food additives were seen to serve a number of practical functions there was a clear association between additives and foods that were unnatural and unhealthy. Participants in Bangor were particularly sceptical about manufacturers' motives for using additives in food; seeing the use of additives as a way to drive profits which could be contrary to the interests of consumers.

3.1.2 Enzymes

There was generally low awareness of enzymes and very low awareness of enzyme use in food and food production processes among consumers. Participants from social grade ABC1 tended to recall enzymes from GCSE science and had some awareness of their function as catalysts and presence and role in the digestive system. Participants from social grades C2DE had little or no knowledge of enzymes. Knowledge of the use of enzymes in the food industry was low across the social grades and locations. What knowledge did exist was limited to the presence of enzymes in probiotic yoghurts and cheese; advertising was cited as source of this information by some. A few C2DE participants were aware that enzymes were present in biological washing powders. Participants tended to have neutral views about enzymes and their use in food, due to this lower knowledge base.

"Breaking things down...chemical reactions... catalysts." (Bangor, ABC1, Wave 1)



3.2 Sources of information

Participants were more aware of additives than they were of enzymes, largely due to the fact that had been exposed to more information about them. Participants reported that there was more information available to them about additives from a wider range of sources. In particular, information about additives was available in the media and on food packages but they felt that this was not the case for enzymes. Participants also noted that there were TV programmes and documentaries being shown about additives (e.g. Food Unwrapped). Meanwhile, across the social grades, sources of information about enzymes were limited to yoghurt packs, adverts and knowledge from GCSE science.

There were differences in sources of information about these chemicals between the social grades. Sources of information about additives among ABC1s included celebrity chefs, health magazines and health care professionals. Sources for C2DEs did not include these sources but models, *Slimming World* and word of mouth instead. There was also a difference between social grades for enzymes, with ABC1s citing educational and professional sources of information and C2DEs citing washing powder adverts. The sources of information are summarised in Figure 3.1 below.

Some participants thought that groups with particular interests in food would be more proactive in checking ingredients and as a result were likely to have greater awareness of chemicals, particularly: vegetarians and vegans, weight watchers, religious groups and those with health conditions affected by food (e.g. diabetics).

Figure 3.1: Sources of information about additives and enzymes

	Information sources 	Information sources 
All	<ul style="list-style-type: none"> Media – print, TV, online Packaging TV documentaries Health campaigns (Change4Life) 	<ul style="list-style-type: none"> Yoghurt packaging / adverts
ABC1	<ul style="list-style-type: none"> Celebrity chefs Health / nutrition magazines Doctors / HCPs 	<ul style="list-style-type: none"> GCSE science University studies Scientific careers Health magazines
C2DE	<ul style="list-style-type: none"> Models / celebrities Slimming World Word of mouth Children's schools 	<ul style="list-style-type: none"> School science Washing powder adverts

Across the social grades, participants were concerned about the information they received about chemicals in food, particularly additives. Participants were anxious about the accuracy, independence and lack of consistency of the information to which they were exposed, particularly from online, print and social media. Participants commonly expressed concern about sensational stories in the media about health risks associated with chemicals, and were anxious about what they perceived to be changing and confusing dietary advice. There was a desire for more accurate and consistent advice from independent and trustworthy sources to address these concerns, but also an appreciation of the fact that advice was subject to change.

“You are told [chemicals are] bad, you don’t have any facts about them, it’s just seen as bad so you avoid it.” (Exeter, ABC1, Wave 1)

“There are so many places telling you what to eat and what not to eat you don’t know what to eat any more, in terms of the information....social media is one of the biggest things about it. You see all these models who eat this and that but some of it can be completely not true but you just don’t know!” (Leicester, C2DE, Wave 1)

“Scientific opinion changes all the time, one week it’s bad for you, next minute it’s good for you...” (Swansea, C2DE, Wave 1)

3.3 Associations with additives and enzymes

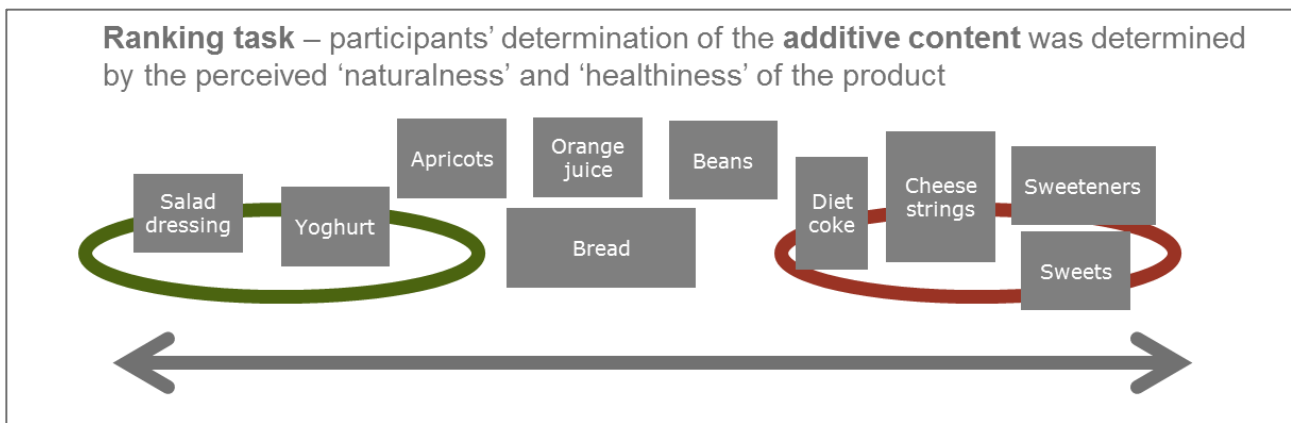
There was a strong association among participants between the perceived naturalness, healthiness and safety of food. Participants generally associated additives with being unnatural and unhealthy and enzymes with being more natural and healthier. This meant that, overall, enzyme use was therefore seen to be more acceptable than additive use.

In wave 1, participants were asked to rank a selection of food items according to how many additives they contained. Across the locations, consumers' rankings were determined by how 'natural' and 'healthy' the group perceived the item to be. As shown in Figure 3.2, they tended to place items deemed to be 'healthy' nearer the 'low' end and vice versa.

"You'd feel bad if you had skittles for breakfast but you wouldn't feel bad if you had yoghurt. That's [Yoghurt] acceptable but it probably does have the same amount of sugar." (Exeter, ABC1, Wave 1)

"The diet Coke, I know it's full of chemicals but I still drink it because it's my guilty pleasure." (Newcastle, ABC1, Wave 1)

Figure 3.2: Additive content ranking exercise



Additives were perceived by participants to be man-made chemicals which were understood to be made in laboratories by scientists and manufacturers. Additives tended to be seen as substances which are new (a recent invention) and synthetic/artificial and therefore unnatural. This meant they were perceived to be unhealthy, potentially unsafe and therefore less acceptable for use in food.

"Quite a negative kind of connotation... they're unhealthy." (Bangor, ABC1, W1)

"I try to avoid [additives] if possible to be healthy really and for the kids. I can't be eating all that rubbish food." (Exeter, ABC1, Wave 1)

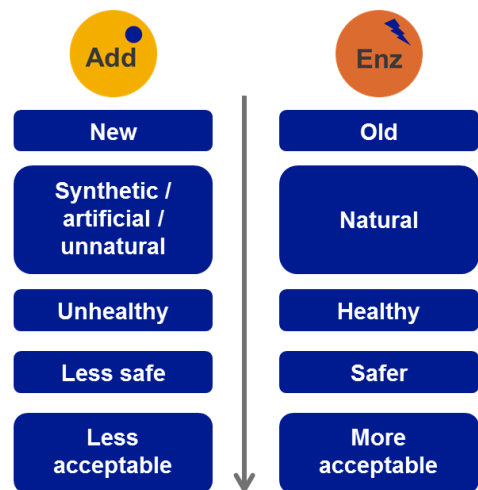
"If it is natural colouring then it is more acceptable because it is better for your health." (Swansea, C2DE, Wave 2)

Conversely, enzymes tended to be viewed as older substances which have existed and been consumed by people for centuries. After seeing stimulus material outlining the sources of enzymes as animals, plants and microorganisms (see appendix C), participants tended to understand enzymes to be substances occurring in nature, and were therefore perceived to be healthier, safer and that their use in food was therefore more acceptable. Throughout the research, enzymes from natural sources were more acceptable whereas man-made enzymes were subject to the same associations and concerns as synthetic additives. This association is summarised above in Figure 3.3.

"As far as I can see, it's [enzyme] a natural ingredient, so no problem." (London, C2DE, Wave 2)

"Enzymes are easier to comprehend because they are using natural ingredients so it feels that it will not cause any harm." (Exeter, ABC1, Wave 2)

Figure 3.3: Consumer associations with additives and enzymes



"I have always felt, perhaps wrongly, that enzymes are far more natural than 'additives' and tend not to have any concerns about their use. Maybe it's because they've been for centuries, even before people really knew they were using enzymes specifically." (Swansea, C2DE, Wave 2)

"I think you would rather they were naturally occurring enzymes, than chemical, or synthetic...I just don't know what's in it, think that there shouldn't be something artificial in your body. It just seems unhealthy." (Bangor, ABC1, Wave 1)

4. Benefits and concerns associated with additive and enzyme use

This chapter reports on perceptions of the benefits associated with food chemicals. It then presents five participant concerns about the use of additives and enzymes in food and food production processes.

Participants generally both acknowledged benefits of and reported concerns about the use of additives and enzymes, commonly producing balanced views overall about their use. There was wide acceptance that additives and enzymes are not entirely avoidable and acknowledgement that they make an important contribution to modern shopping, cooking, eating habits and lifestyles. Participants commonly acknowledged a range of benefits associated with their use including: improving convenience, variety, cost, quality, taste and appeal.

However, these benefits did not alleviate widely held concerns among participants about an association between synthetic chemicals and the potential for long term, serious and unknown health risks. There was widespread anxiety among participants' around a perceived lack of knowledge and understanding of the chemicals in their food and what the implications of this might be. Participants were concerned about whether enzymes sourced from animals compromised animal welfare and that vegetarians/vegans and religious groups might unknowingly consume food that is unsuitable for them. Food labels were commonly seen to be often confusing, overwhelming and unhelpful and as such did little to alleviate participant concerns; they did not empower participants to confidently make informed choices in accordance with their priorities and values. There was therefore a need for greater levels of accessible information to enable participants to make informed choices and trade off decisions about consumption of synthetic chemicals in accordance with their priorities and values.

4.1 Perceptions of benefits associated with additives and enzymes

Participants widely accepted the use of additives and enzymes in food and were of the opinion that their use in food and food production was likely to continue or not change substantially. Participants generally acknowledged that these chemicals made a valuable and important contribution to modern shopping, cooking and eating habits and lifestyles and that they made life easier for consumers. Participants tended to acknowledge that it would not be practical or feasible to avoid these chemicals entirely, because this would reduce convenience and seriously limit the choices available to them and their families. Participants regarded that the consumption of chemicals is habituated into their everyday routines and expectations.

"[Additives] help to improve taste, appearance, shelf life, affordability and convenience when eating and meal planning ... I don't think I would sacrifice the eating habits that I am now so acclimatised to in order to eat more naturally." (London, C2DE, Wave 2)

"You can only do so much unless you want to grow everything which in life just isn't going to happen." (Leicester, C2DE, Wave 1)

"Everybody's getting up in the morning and rushing off to catch the train, they haven't got time to sit and have a scrambled egg on toast, its quick to have your cereal." (London, C2DE, Wave 1)

Participants commonly acknowledged a wide range of benefits associated with these chemicals such as increasing convenience, variety, quality, taste and appeal and lowering cost. There were differences between the benefits that were associated with additives and enzymes, in accordance with what participants understood their functions to be. These are summarised below in figure 4.1.

Additives were seen to be able to enhance and improve food for consumers. Preservation tended to be the most valued benefit of additive use among consumers. Participants acknowledged that preservatives increased shelf life, safety, convenience and also helped to reduce food waste. They also increased availability, variety and choice of food for consumers, all of which were seen to be important. Flavourings and emulsifiers were seen to help improve the quality

and taste of food by improving taste, texture, and viscosity. Meanwhile, colourings were understood to improve the appearance and enjoyment of food and could make it more fun. Participants acknowledged that use of additives was able to reduce the cost of food for consumers; by reducing production costs; extending shelf-life; and enabling storage and the import of food. This was thought to be a particular benefit to families and those on lower incomes. Some participants also noted that chemicals which they understood to be additives can provide health benefits; such as when vitamins and minerals are added to food or when additives are used to lower sugar or increase fibre.

"I'm quite rubbish at buying food cos I work so much ... it's just easier for me to just get it...it's keeping things in the cupboards and just picking it out when you need it like." (Swansea, C2DE, Wave 1)

"Giving more choice of food because a lot of these foods that are available, they wouldn't have them if it wasn't for some sort of preservative aspect ... because of where they've come from." (Newcastle, ABC1, Wave 1)

"I feel that additives are acceptable in preserving food, this is good for people on low incomes or for those who have time constraints in buying fresh food." (Exeter, ABC1, Wave 2)

"Food is about enjoyment so a thicker sauce or soup may be more enjoyable." (Leicester, C2DE, wave 2)

However, tensions emerged concerning the idea of 'quality'. Whilst participants commonly agreed that additives could improve the quality of food (including its taste, texture and appearance), some participants raised concerns about the expectations that use of additives has created. Some participants were concerned that the taste of items containing additives has been normalised and that natural and fresher items may actually taste better. Others were concerned that the use of additives was creating unnecessary expectations of food items which may be contributing to food waste. There was particular concern about the creation of expectations for 'perfect' fruit and vegetables creating unnecessary food waste when items were not seen to meet the expectations created by the use of additives (e.g. when wax is applied to the surface of fruit to create a shiny appearance). Some participants were concerned that food perceived to be imperfect may be wasted if enhanced aesthetics are prioritised over taste or other characteristics. Some parents were also concerned that additive use may mean children are less likely to consume natural items which they regarded to be healthier, because they are perceived to be less attractive and appealing by children.

"Modified starch, maltodextrin, more E additives with all these E additives ... does it make our food tastier? .. or would it taste better if it were more natural / fresher?" (London, C2DE, Wave 2)

"I read apples aren't meant to be shiny, they spray pesticides on it to make it look glittery, cos as humans if we see something that's glittery we think 'wow, must be great'." (London, C2DE, Wave 1)

Meanwhile, the benefits participants associated with enzymes were focused on their ability to speed up processes and their fundamental role in the creation of certain foods. Participants acknowledged that they would not have access to some foods without the use of enzymes – notably beer, wine, champagne and cheese. Enzymes were, therefore, seen to provide access to luxury products and to increase consumer choice and enjoyment. Enzymes' role in production processes were seen to increase speed and efficiency and therefore also to reduce waste and save energy. Participants understood that enzymes could therefore reduce costs and help to create more consistent products.

"Without enzymes there would be no more bubbles in champagne!" (Bangor, ABC1, Wave 1)

"I can't think why [chymosin] wouldn't be beneficial if it's required in [cheese]." (Swansea, C2DE, Wave 2)

"The world is growing so fast ... you need ways of producing food quicker." (Swansea, C2DE, Wave1)

Figure 4.1: Summary of benefits associated with additives and enzymes

	Add	Enz
BENEFITS	<ul style="list-style-type: none"> • Shelf life – safety/ convenience / reduce waste • Availability – variety / choice • Quality – taste / texture / viscosity • Appeal • Cost • Health benefits (e.g. vitamins, lower sugar) 	<ul style="list-style-type: none"> • Luxury products – choice / enjoyment • Processing speed • Consistency of products • Efficiency; reduce waste; save energy • Cost • Quality

4.2 Concerns about the use of additives and enzymes

Whilst participants acknowledged this range of benefits, they also retained some important concerns regarding the use of food additives and enzymes. Participants reported concern about five issues: health risks; information accessibility; animal welfare; meeting dietary requirements; and manufacturers profiteering at the expense of consumers.

4.2.1 Health risks

There was a strong association between synthetic chemicals and potential health risks and this was participants' primary concern regarding their use in food. Participants across the locations and social grades raised health risks spontaneously and these worries persisted throughout the research, remaining consumers' primary concern in wave 2. This association was deeply entrenched across social grades and could be difficult to shift and address.

"The long terms effects of these chemicals that are being put in the food. Some of these things you're starting to hear about ... the effect that it's having on people's bodies and things like, obviously cancer is a big one, you don't know what's associated with that. It's all those unknown elements because they've been out in our food for so many years, nobody has really actually been monitoring what these things have been doing to you."
(Newcastle, ABC1, Wave 1)

Participants appeared relatively unconcerned about food poisoning and short term conditions. They associated synthetic chemicals with the potential to cause serious and long term health conditions and unknown or uncertain conditions which participants feared may become apparent in their futures. Synthetic chemicals (particularly additives) were commonly linked by participants to cancers; ADHD and hyperactivity in children; and obesity and chronic poor health conditions. Some participants linked colourings in orange juice and Smarties and other sweets to hyperactivity in children. Participants in Bangor were concerned that chemicals such as MSG could be physically addictive. Participants were troubled by the idea that health risks arising from chemicals may currently be unknown or uncertain and become more apparent in the future when they or people they know have a condition and it is too late to address this, cancer in particular.

"This made me feel like 'no wonder cancer is so common among all types of people and ages'." (London, C2DE, Wave 2)

"We all know what aspartame is ...it causes brain damage in children etc. and that is the tip of the iceberg."
(London, C2DE, Wave 2)

"You don't look at things until it affects us...my little boy, orange juice, it used to make him go mad, couldn't sleep or anything, and there's something in Smarties that done that as well." (London, C2DE, Wave 1)

"When you start to look into all of these additives it makes you wonder if some of these are responsible for all of these allergies etc. that seem to be so much more prevalent these days." (Swansea, C2DE, Wave 2)

4.2.2 Information accessibility

Participants, particularly parents, were commonly worried about a perceived lack of understanding of the chemicals in their food and low accessibility of the information that is currently available to consumers about additives and enzymes. Participants reported not knowing what chemicals were, exactly which ones were present, where they came from, their purpose or the risks associated with them. This was particularly apparent in some responses in wave 2 when participants were asked to look for chemicals in food items, and reported not understanding terms listed on food packets. The lack of understanding of chemicals, their source and purpose raised anxiety for some participants.

"Sometimes you can pick up a packet and you think it's relatively healthy or simple and you look at the back of it and you've got a list that long you don't understand....you just don't know, unless you know exactly what all those things are, what you're putting in your body." (Swansea, C2DE, Wave 1)

Participants reported commonly finding food labels and packets confusing, overwhelming and unhelpful. This was particularly apparent in wave 2 when they were prompted to look at these in more detail. Some participants reported generally avoiding looking at packets due to time pressure when they are shopping, and due to their complexity. E-numbers and scientific language were seen as inaccessible and acted as a barrier to engagement. However, initial engagement prompted by the research highlighted an interest among participants for more accessible information to be available.

“A lot of long words that nobody knows.” (Newcastle, ABC1, Wave 1)

“This is chocolate sponge mix containing palm oil which apparently causes cancer. What is calcium carbonate? Potassium bicarbonate? And all the rest of them?” (London, C2DE, Wave 2)

“We go shopping, we do look at some ingredients but I think it’s just habit, we buy what we want, what we like. I don’t spend time looking at what’s in them.” (Leicester, C2DE, Wave 1)

4.2.3 Animal welfare and dietary requirements

Participants were concerned that the lack of transparent and accessible information available to participants about the use of additives and enzymes in food production processes, and particularly the source of enzymes, meant that consumers were unable to make choices in accordance with their values, priorities and dietary requirements.

Concern was present about potential implications of chemical use for animal welfare. In wave 1, participants were presented with stimulus information which explained that enzymes could be ‘extracted’ from animals, plants or micro-organisms (see appendix C). The idea that enzymes could be obtained from animal sources was an emotive issue for participants across the locations and social grades. Participants were concerned about how enzymes are obtained from animals and what the animal welfare implications might be. Their primary concern was about whether the animals are harmed in any way or experienced pain and this was not an issue which participants had previously considered. However, as above, this appears to be based on a misconception that enzymes are ‘extracted’ from animals, whereas they are obtained and derived from by-products of meat production after animals have been slaughtered (e.g. rennet obtained from animal stomachs).

“I don’t like the words ‘extracted from animals’. The fact that they’re just used for those enzymes...And how is it extracted from those animals? Are they suffering?” (Bangor, ABC1, Wave 1)

“That’s a really scary thing to say, extracted from animals, it seems daunting.” (Exeter, ABC1, Wave 1)

In addition, participants were worried that enzymes obtained from animal sources may have implications for certain consumer groups. They felt that this may mean some foods could be unsuitable for vegetarians and vegans, and were concerned that some vegetarians and vegans may not be aware of this. Participants were also concerned that obtaining enzymes from animal sources, such as cows and pigs, would mean that food items are unsuitable for people whose faiths place restrictions on food from animals. Participants were similarly concerned about the use of additives obtained from animal sources (e.g. pork gelatine). Participants wanted greater information to be available about the source of additives and enzymes to enable consumers to make informed choices aligned with their faiths, personal preferences and values.

“This is the ingredients for chicken breasts ... it contains pork shoulder & pork belly ... You would not know this unless you read the ingredients ... suppose pork is against your religion? E.g. Jewish people & Muslims.” (London, C2DE, Wave 2)

“I do believe that chymosin can come from mammals stomachs. This is a concern for me for the Islamic people as the chymosin may not come from an animal that has been killed in a halal way. If plant based rennet was used in shelved cheeses then it would be very beneficial for this community.” (London, C2DE, Wave 2)

4.2.4 Manufacturers profiteering at the expense of consumers

Participants were concerned about the use of food additives and enzymes, when this was seen to be to the financial benefit of manufacturers at the expense of consumers. Participants were aware that chemicals could offer cost savings, particularly the use of enzymes which created efficiencies in production processes. Where there were cost savings to be made, participants wanted to see these passed on to consumers. Some participants, particularly in Bangor and London, were suspicious and cynical about manufacturers and thought they prioritised consumer profit over consumer health. In Bangor, participants specifically referred to food manufacturers as ‘profiteering’ from food chemical use. This suspicion could shape their perceptions of the purposes of use of food chemicals, illustrated in the quote below.

“[Additives are unacceptable] when things are to benefit the manufacturer only. So for example, apricots. The only reason they put sulphites into that kind of thing is to keep the colour. It’s not to make it taste better. It’s to make it more appealing so you will buy it.” (Bangor, ABC1, Wave 1)

*“The companies that make these things it’s about profit, ultimately the top priority isn’t consumer health....”
(Newcastle, ABC1, Wave 1).*

5. Response to the approvals process

The chapter reports on participant response to the approvals process for additives and presents key issues of importance to consumers in this process. It then briefly discusses the nature of consumers' outstanding concerns.

Before new food additives go to market they must be approved via a process which is conducted at the EU level. Information about the nature of the approvals process initially provided reassurance to participants about the use of food chemicals. The process was perceived to be thorough and robust and participants were reassured by the duration of the process (two years), involvement of scientists, and opportunity to review decisions. Issues of importance to participants surrounding the approvals process were: the independence and impartiality of the process, the process taking place before additives go to market, the opportunity for constant review, assessment of the case and need for use, and the opportunity for direct involvement of consumers in the process. Participants commonly remained concerned about the role of manufacturers and whether they were directly or indirectly able to exert influence over the process. They felt that greater transparency about the process, highlighting these issues, could help to provide reassurance to consumers about the use of additives. However, this initial reassurance proved short lived and the approvals process was generally unable to address participants' deeper concerns driven by the strong association between synthetic chemicals and potential health risks.

5.1 Response to the approvals process

There was very low awareness among participants of the approvals process for food additives. Some C2DE participants reported being surprised that it exists. Participants responded positively to the nature of the approvals process. Reflection on the information provided (see appendix C) generally proved initially reassuring for participants across locations and social grades. They found the process to be detailed, thorough and robust. Participants responded particularly positively to the:

- Two year length of the process
- The involvement of scientists
- That there are criteria in addition to safety testing
- That the consumer interest is taken into account
- That there is the opportunity for review.

"I was a bit like, 2 years? But when I think about it it's nice to know they're taking their time and making sure that it's OK for everyone to have." (Leicester, C2DE, Wave 1)

"It does make you feel safer, that rigorous testing has been gone through." (Bangor, ABC1, Wave 1)

"This is why I don't really think too much about what I'm eating because I can trust this goes on behind the scenes." (Newcastle, ABC1, Wave 1)

Whilst the process was generally seen to be reassuring, some participants in Exeter were concerned about why chemicals destined for human consumption required such extensive testing; they associated this with the substances being risky. Some participants raised questions about imported food and whether items imported from outside the EU were subject to similar testing and how consumers would know this. Raising awareness of the existence and nature of the approvals process, it was felt, could help to reassure consumers about the use of food additives.

"Now there's all of this science involved in having your day to day food which you never would have considered... I didn't think a tin of beans would involve this much science, that's quite worrying" (Exeter, ABC1, Wave 1)

“Do the FSA have any power in terms of imports, in terms of what additives or enzymes are in the food....probably not...you’d hope there’s be a global [approach], where they’re all singing from the same hymn sheet...” (London, C2DE, Wave 1)

5.2 Key issues of importance to participants

The **independence and impartiality of the process** was the key issue for participants and they wanted to see independent scientists and experts and impartial bodies involved in the process. Participants tended to be suspicious and cynical about food manufacturers and saw them as prioritising profits over consumer health and, particularly in Bangor and London, questioned whether the process is followed precisely by manufacturers in practice and wanted any manufacturers’ influence excluded from the process. Despite the involvement of independent scientists in the process, participants, particularly in Newcastle, were concerned that manufacturers might be able to exert influence either directly (by conducting research or via lobbying) or indirectly, for example by funding scientists and influencing other parts of their careers. It was important to participants that the process was independent and seen to limit manufacturers’ profit based and commercial interests and to prioritise consumer health.

“Quite rigorous. What it should be. Powerful businesses would try to get away with putting certain additives into their products if they could.” (Bangor, ABC1, Wave 1)

“There’s a lot of money at stake for these companies so are they forcing the issue by pressurising whoever’s carrying out the survey to come out with the right conclusion?” (Leicester, C2DE, Wave 1)

“Experts in the field...that have no links to any of the food companies involved in the process, so there’s no bias in any way.” (Bangor, ABC1, Wave 1)

“Manufacturers are seeking permission, going through the process ... but in practise does it actually happen?” (London, C2DE, Wave 1)

Participants wanted to see a robust process take place **before chemicals go to market**, rather than this happen the other way around and participants be exposed to risks before approval is given. Participants then wanted to see the **opportunity for review** to take place, particularly if new concerns were raised about health risks associated with a chemical. However participants were unsure about how this process could be triggered, by whom and how difficult it was to initiate. They questioned whether anyone was routinely responsible for reviewing food chemicals. Participants in Newcastle wanted all chemicals to be reviewed every two years.

“I think that’s a reassuring thing that it is regularly reviewed. Science has changed over time so to know that it has been reviewed is reassuring” (Exeter, ABC1, Wave 1)

Participants commonly reported that they thought it was important that **the case** for use for a new chemical should be considered thoroughly. They were reassured by the need for justification in the process. Participants tended to report that they thought new chemicals should only be approved if they are ‘necessary’ (see section 6.2 for further discussion of this). This was an important way in which participants weighed up the acceptability of additives. Some participants were also keen that natural alternatives to new additives were made available and that accessible information is provided so that consumers can make an informed choice between these options where they perceive a use to be less necessary.

Participants were keen for there to be the opportunity for **direct involvement of the public**, rather than the public interest being represented by others in the approvals process. Participants said that it was particularly important for special interest groups (e.g. vegetarians/vegans, religious groups, and groups representing those with health conditions) to have the opportunity to be involved. Some participants also reported that they wanted the data from scientific testing and decision-making in the approvals process to be made publicly available for scrutiny by interested parties. There was a sense that participants expected this to be done by others rather than themselves directly.

“Is it right that they don’t even invite a customer to even have their opinion on it? It says ‘consumer interests’ are considered but like whose perspective is that from?” (Leicester, C2DE, Wave 1)

“I think it’s a good idea that the consumer itself should have a panel that they could, before the actual product is approved, have their input on what they felt about maybe the labelling or of the additive or whatever is being considered, instead of someone deciding what the consumer may think or may want because that’s all open to interpretation of that person thinking for the consumer.” (London, C2DE, Wave 1)

“Everyone should be involved especially when they are incorporating animals such as pig in our food... This goes against people’s religious beliefs and they could be a vegan or vegetarian.” (London, C2DE, Wave 2)

Three further issues were of some importance to participants. Some participants wanted the **public to be alerted when a new additive is approved** and information communicated so that they could be made aware of its presence in their food. Some participants were concerned that the approvals process may not take account of **high consumption levels** in that additives could be assessed according to normal or average consumption whereas in reality, some individuals may regularly exceed this (for example fizzy drinks). Participants in Bangor wanted the approvals process to be **accessible to smaller companies** as well as large corporations and were concerned this might present a barrier to new, small, local food businesses starting up.

"Independent small people, making things then selling them direct to the public, how regulated are they?" (Bangor, ABC1, Wave 1)

"[Test] that its unsafe at a certain level, too. Say if someone drinks ten cans of Coke a day, it's unsafe at that level." (Bangor, ABC1, Wave 1)

Overall, participants wanted the approvals process to be independent, robust, and transparent, to allow direct involvement of the public, and to assess whether a new additive is 'necessary'. Greater transparency about the process, highlighting these issues, could help to reassure consumers about use of additives and enzymes.

"Why don't they make a point of telling everybody that they've tested it, that's the whole point, the whole point of doing it is to give information to the public after you've tested it. What's the point of testing it and not mentioning it?" (London, C2DE, Wave 1)

5.3 Remaining concerns

While participants were initially reassured by the nature of the approvals process, responses in wave 2 showed that this effect was temporary. The approvals process was generally unable to address consumers' deeply held concerns about the association between synthetic chemicals and health risks. This association therefore continued to drive attitudes towards additives.

Participants seemed to lack confidence in the approvals process' ability to identify long term health risks. Participants reported being reassured by the two year process, perceiving this to be an appropriate length of time to ensure rigour. However, participants were concerned about long term serious health risks which could emerge years in the future. It seemed that participants lacked confidence that the process was able to identify these or provide certainty.

"All it means is its not harmful to you, well not immediately harmful anyway, it doesn't mean it's good for you, or it's not harmful in the long run." (Swansea, C2DE, Wave 1)

"I feel confident that the chemicals used are safe properly regulated however there is always a little doubt and certainly a worry that the processing of food could be detrimental to a person's health." (Leicester, C2DE, W2)

"Just because it isn't having an immediate effect on you doesn't mean it's not doing anything, like who knows, maybe if we didn't eat this stuff maybe we'd live to 150." (London, C2DE, Wave 1)

"Aspartame in diet coke is a worry. I know the additives are tested but how can we be 100% sure there will be no long lasting health issues associated with consuming this in large quantities?" (Exeter, ABC1, Wave 2)

These fears may be supported by the existence of incidences when participants felt the authorities had 'got it wrong'. Participants identified examples when health risks associated with chemicals were identified after products had gone to market and people had experienced adverse health effects as a result. Participants gave examples such as Sunny Delight and colourings and flavourings in sweets and drinks which they believed had caused hyperactivity in children (e.g. orange drinks and Smarties). Participants cited awareness of perceived links between aspartame and health risks. Participants in Bangor were also concerned that food manufacturers had been allowed to add high levels of sugar to pasta sauces and saw this as alarming and unhealthy. These types of issue could undermine consumers' confidence in the approvals process and its ability to identify health risks and protect consumers.

"They called [Sunny D] the sunshine drink, sunshine in a bottle and then it turns out all the colours and the additives was really bad for you, so they did mislead us on that." (Swansea, C2DE, Wave 1)

"It's the Government chucking all the aspartame in our food isn't it." (Swansea, C2DE, Wave 1)

The strong association which continued to be held between synthetic chemicals and potential health risks meant that participants generally wanted to limit and reduce their exposure to unnatural chemicals. They wanted to do this by making trade-offs and avoiding chemicals in what they perceived to be less acceptable circumstances. These consumer principles are detailed in the next chapter.

6. Consumer principles: how participants weigh up the acceptability of additive and enzyme use

This chapter presents the ten consumer principles which emerged from this research which outline how participants weighed up the acceptability of food additive and enzyme use.

The strong association between synthetic chemicals and potential health risks was deeply entrenched among participants and would be hard to shift. Whilst the existence and nature of the approvals process provided initial reassurance, this effect was short lived and unable to alleviate this deeply held concern among participants. However, there was also wide acknowledgement of a range of benefits additives and enzymes provided and acceptance that it was not desirable or practically possible to avoid them entirely. Therefore participants tended to want to limit their intake of synthetic chemicals to reduce their exposure to health risks by avoiding them in what they perceived to be less acceptable circumstances. A strong need therefore emerged for greater and more accessible information about food chemicals to be available (particularly about their source and purpose) to empower consumers to feel more able and confident to make informed choices and trade-offs and avoid chemicals in line with their priorities and values. This chapter presents the ten consumer principles through which participants weighed up the acceptability of additive and enzyme use and the thinking which underpins them.

6.1 Unacceptable circumstances: when there are long term and suspected health risks

Consumer Principle 1: Health risks (including long term and suspected risks) should be assessed by **independent scientists** before a new additive or enzyme goes to market and the information made available that can be **reviewed** by interested parties.

The use of additives and enzymes was seen to be unacceptable by participants when there was a risk, or suspected risk, of long term or serious health implications. This was a red line for participants across the locations and demographic groups. As has been discussed, there was a strong association among participants between synthetic chemicals and potential health risks. Participants linked synthetic additives with health risks, rather than what they perceived to be natural enzymes or other natural chemicals (e.g. vitamins or natural colourings). Participants were concerned about long term and serious health conditions, (notably cancer, chronic poor health conditions, and hyperactivity) and that other conditions may emerge in the future. Whilst participants generally held a balanced view about the use of additives and enzymes, they found their use unacceptable where there are health risks as this is an unacceptable trade-off against the benefits they provide.

“It is quite evenly balanced because it brings more benefits but then we don’t know long term what effects those benefits have in the meantime. As more additives and stuff has been introduced has there been more health problems, more diabetes, more overweight issues, compared to when there were less additives in our diets...I think we all agree we benefit in some sort of way in our shopping and longevity of food because of them so it’s catch 22 I think.” (London, C2DE, Wave 1)

Participants wanted the approvals process to assess long term and suspected health risks, and also to take high consumption levels into account. They wanted new additives and enzymes to be assessed by independent scientists due to concerns about manufacturers being seen to prioritise profit over public health. However, concerns remained among participants about how the approvals process was carried out in practice and whether manufacturers were able to exert influence either directly or indirectly (via lobbying, funding research and cross over in scientists’ careers). Participants were aware that health implications could emerge at a later date after chemicals had gone to market, and therefore wanted to chemicals to be constantly reviewed. Greater transparency about the approvals process and these issues could help to reassure consumers about chemical use and that this is underpinned by the key principle of consumer safety.

"I have no problems with this, as long as the additives are proven not to be detrimental to your health!" (London, CD2E, Wave 2)

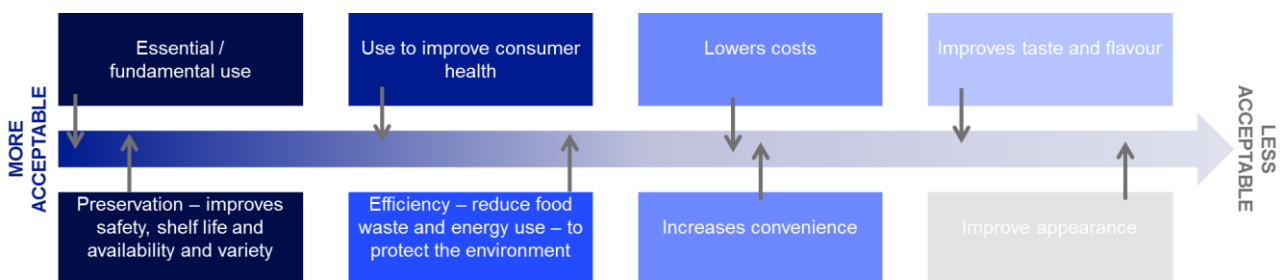
"The main thing that is important to me is that the long term effects are understood and that this is considered more than the cost effectiveness of producing items." (Exeter, ABC1, Wave 2)

6.2 Necessity scale: functional versus aesthetic use

Consumer Principle 2: The use of additives and enzymes is more acceptable when there is a clear case for use— and the use of chemicals is essential to the nature of the product or has a clear functional rather than an aesthetic use

Additive and enzyme use was more acceptable to participants when there was a clear use case and their use was seen to be essential or had a clear functional use rather than an aesthetic use. Participants were more comfortable making trade-offs for items where use was essential or functional, rather than where use was aesthetic where the risks associated with chemicals for this benefit are less worthwhile. This is summarised in figure 6.1 below.

Figure 6.1: Necessity scale



Chemical use was most acceptable where this was seen to be essential or fundamental to the production or character of an item. Participants typically referred here to enzymes which they saw as essential to the production of a product, for example beer, wine, cheese or yoghurt. However, additives could also be seen as essential to the nature of the product, for example red colouring in red velvet cake. Chemicals were more acceptable if their use was essential and could not be substituted with what was perceived to be a more natural alternative (and when the chemical itself was seen to be natural).

"Enzymes seem to serve a more essential purpose in the foods or drinks they used in, and they therefore seem a lot more acceptable than additives." (Exeter, ABC1, Wave 2)

"I think it is acceptable for chymosin to be used in the production of cheese because it is essential in the production of cheese." (Exeter, ABC1, Wave 2)

"A red velvet cake would not be red if it was not for the colouring. A number of cupcake shops would be in uproar if this was banned." (London, C2DE, Wave 2)

The functional use of chemicals to preserve food was widely accepted as necessary and valued across demographic groups. Preservation was seen to make an important and significant contribution to food, increasing safety, shelf life, availability and variety – and therefore consumers' safety, convenience and choice.

"Well maybe not all additives are negative. The antioxidants. Sometimes they're in there to do a specific job. They're not there just to make it taste better..." (Swansea, C2DE, Wave 1)

"Antioxidants is generally very acceptable because they are used to preserve food and prolong their shelf life. For foods that naturally "go off" quickly they are essential." (Exeter, ABC1, Wave 2)

Chemicals were more acceptable where they fulfilled other functional uses such as improving consumer health (notably the use of vitamins and sugar alternatives where this was important to participants) and increasing efficiency. Enzymes in particular were seen to play an important role in increasing the efficiency of production processes and therefore reducing waste and energy use and potentially helping to protect the environment this way (particularly among ABC1s). Increased efficiency was expected to lower costs.

"We have to understand our climate. It is part of affordability and wastage. We are more caring of our environment than we used to be. People don't like to waste, so providing them with something which they can hold onto for a week, saves money, all of these things does make it more acceptable" (Exeter, ABC1, Wave 1)

Chemical use was valued where it could lower costs and increase convenience for consumers. However, tensions emerged around these functions where they were towards the “less acceptable” end of the spectrum (Figure 6.1). Whilst participants valued these functions (particularly for those on lower incomes, families and busy individuals), they were typically keen that chemicals are consumed in moderation and reported greater tensions around making trade-offs for these functions than others placed higher on the scale of acceptability. Some participants were happy to pay more and/or face greater inconvenience (e.g. preparation and shopping time) in order to consume what they perceived to be healthier food more often.

Participants acknowledged that additives and enzymes could improve taste, flavour and appearance. However these aesthetic uses (particularly colouring) were less highly valued than other more functional uses and tended, therefore, to be seen as less acceptable. Participants could look to avoid these items when trying to lower their chemical exposure. Participants acknowledged that additives used for aesthetic purposes can make food more fun (e.g. party, luxury and indulgence foods); improve taste; and make food more appealing for ‘fussy’ eaters (particularly children). However a number of tensions emerged around these uses. Aesthetic use was seen to be a less acceptable trade off. There were also seen to be more natural alternatives to these chemicals, particularly colourings and flavourings, which were preferred. Participants were also concerned that use of these types of chemicals to enhance food, raises expectations of food to look unnatural, and therefore may be reinforcing ‘fussy’ eating. Participants were particularly negative about the use of colourings and typically saw these as less necessary. They were also more aware of more specific examples of links between colourings and health risks (such as hyperactivity) and this awareness may have been driving concern about use of these chemicals for aesthetic purposes.

"Health foods should definitely not have colours added due to perceived negative health issues." (Exeter, ABC1, Wave 2)

"The use of colourings seems pretty unnecessary ... Just that they only change the colour and portray and unnatural picture of food, only needed for fussy eaters but if the colours weren't changed then it would be less of a problem." (Leicester, C2DE, Wave 2)

6.3 Levels and accessibility of information

Consumer Principle 3: The use of additives and enzymes is more acceptable when there is **more accessible** information available about their **source and purpose** – giving participants confidence and enabling them to make informed choices

Participants were more accepting of the use of additives and enzymes when relevant information was available. There was a strong appetite among participants for greater levels of information about them which is readily accessible. In particular, participants wanted to know what chemicals are, their source and purpose and whether there are risks.

"If there's some additives that have been highlighted from research that says it's unsafe, so it might be OK for half the people and the other half not, it should say on the labelling if you take too much of this it could have adverse effects or just some kind of warning cos if it's just a word you just don't pay it any attention unless somebody else educates you about aspartame." (London, C2DE, Wave 1)

Participant responses, particularly in the ‘Go Find the additives and enzymes’ task in wave 2, showed that not knowing what chemicals were and their purpose in food could drive anxiety once participants began engaging with food labels and packets. Greater levels of information about what chemicals were and their purpose provided confidence and reassurance to consumers. However it was important that this information was accessible. Jargon and scientific language on packets was a barrier, drove concern and could be disempowering for participants who were confused by it. Participants were particularly concerned that they did not know what E-numbers were and the purpose of complex chemical compounds. Participant reactions suggested that providing a list of E-numbers was no longer sufficient and that participants wanted a deeper level of engagement.

"Locust bean gum are you telling me that locust are in my Philadelphia cream cheese !!!! Why is it in my Philadelphia cream cheese ... I thought this was made out of cheese!!!!!" (Leicester, C2DE, Wave 2)

"Seemed like a lot of chemicals that I've no clue as to what they are to be in a simple mince pie. Made me feel a little worried about what I was actually eating." (Exeter, ABC1, Wave 2)

"If it's been added artificially, why am I putting something into me that I don't know it's there and don't know what it's purpose is." (Swansea, C2DE, Wave 1)

Participants also wanted more information about the source of additives and enzymes used in their food and its production. This was due to concerns described in section 4.2.3 that the extraction of enzymes from animals could make some food items unsuitable for vegetarians/vegans and religious groups (notably Muslims, Hindus and Jewish people). Participants were concerned that some of these groups may not be aware of this information and were keen that this information should be available on packets to enable consumers to make choices in line with their values.

"It is used in cheeses and other products and is not always advised of which can impact vegetarians unless they are aware of it." (Exeter, ABC1, Wave 2)

There was a strong appetite for greater levels of information about the nature, purpose and source of chemicals from participants to enable and empower them to make informed choices and trade-offs in line with their values and priorities. Use of chemicals should be underpinned by the principle of availability of accessible information.

6.4 Misleading consumers: changing the character of food

Consumer Principle 4: The use of additives and enzymes is more acceptable as long as this **does not mislead consumers** – and does not change fundamental characteristics of, or create unnecessary expectations in relation to, food

Use of additives and enzymes was less acceptable when it was seen to mislead participants by changing the fundamental nature or characteristics of or create unnecessary expectations in relation to food. Participants were less accepting of circumstances where additives and enzymes were seen to change the essential nature of an item, particularly when this was through use of additives for cosmetic purposes. They could react particularly negatively when discovering this after previously having been unaware this was the case. For example, a participant in London was angry when they discovered that custard is yellow due to the use of a colouring (which they perceived not to be natural) and did not see why this needed to be the case. They did not understand why custard needed to be yellow (but had believed it to be naturally so) but now saw this as part of the fundamental character of the product.

"Another Birds custard I found with Annatto ... which is colouring, so without this colouring what would custard look like... I thought custard was naturally yellow?" (London, C2DE, Wave 2)

"We thought it was less acceptable for like fruit, veg and meat to have additives in it preferably to come as natural as it is supposed to be intended really....that's what we're buying into." (London, C2DE, Wave 1)

"Something to make it look more realistic, more colourful. More enjoyable to the human eye than it actually is. More orange than orange." (Bangor, ABC1, Wave 1)

Participants were also less accepting of additives when their use for aesthetic purposes was seen to mislead consumers about what food looks and feels like - this was seen to distort people's expectations of food. Some participants were concerned that this was contributing to food waste in our society and 'fussy' eating particularly among children. The quotes below illustrate how expectations of food using chemicals have become normalised.

"The thing about the apricots surprised me, basically they've got preservatives just to make them an appealing colour cos otherwise they'd be brown. It's the way we've been conditioned isn't it? If apricots had always been brown we wouldn't care but because we expect them to be a lovely orange colour, that's what they have to be." (Swansea, C2DE, Wave 1)

"If the sauce in spaghetti wasn't orange I doubt we would buy or eat it. Or if the gravy on your Sunday roast was clear instead of brown colour. Your orange juice at breakfast wasn't orange enough." (Bangor, ABC1, Wave 2)

Participants were concerned that the use of chemicals to enhance food has created expectations among consumers which will now be hard to shift.

6.5 Misleading consumers: use of terms on food labels

Consumer Principle 5: The use of additives and enzymes is more acceptable when **labels do not mislead consumers** – the terms 'fresh', 'natural' and 'healthy' on labels must be consistent with the food in the pack.

Use of these additives and enzymes was less acceptable where labels and packets were seen to be inconsistent with their contents and therefore were understood to mislead consumers. As discussed in chapter 3, participants tended to associate synthetic chemicals with unhealthy food, and particularly convenience food. They tended to perceive fresh and

natural food without these chemicals to be healthier. Therefore, participants said that they found it misleading when items labelled as 'fresh', 'natural' or 'healthy' contained chemicals. This was particularly the case where ingredients lists on food labels showed a significant number of additives in the product.

"Why on commercials do they always reinforce "our food is fresh" & the huge signs which say "fresh bread" "fresh fish" etc. ... well it's not really fresh is it when you think about it... they have to add additives & enzymes because our food is imported." (London, C2DE, Wave 2)

"Why has this yogurt got rice starch and flavouring in it & maltodextrin ... once again hoodwinked by a product which is marketed as healthy." (London, C2DE, Wave 2)

"I think the fact that they have put rich in vitamin c on the packaging is quite misleading. There are people who see this and naively think that this drink is good for you. Maybe you could argue that this is the consumers fault for being uneducated but you have to stop and think why there is nothing saying rich in sugar and concentrate." (London, C2DE, Wave 2)

Participants expected fresh, natural and healthy products to contain no or few synthetic chemicals. Some participants were angered when they discovered these chemicals in these products after scrutinising the labels and packets. Participants perceived there to be a disjuncture between synthetic chemical use and this terminology. Participants may have been angered by discovering these perceived inconsistencies because this disjuncture disrupts important categories and valued frames of reference which some consumers use to simplify and navigate the food space. These terms may be particularly important to consumers who value healthy eating highly and see this as part of their identity, and to those who are time poor and use these tools to quickly navigate and make decisions in the marketplace. Participants wanted terms used on food labels to be consistent with the contents of the product and those with additives not to be labelled as fresh, natural or healthy.

"This is a healthy drink so I cannot see why they are antioxidant in this drink. As you can see on the label it is made out of spring water and pressed juice so why does it contain antioxidant and they are marketing it as a healthy drink?" (Leicester, C2DE, Wave 2)

"I think the responsibility lies with the FSA really to ensure that the standards are met and certain, all kinds of brands including the supermarkets, go under a committee based investigation in like doing things like this, this has got live bacteria and stuff, it says nothing else added, low fat natural yoghurt, it's natural yoghurt but the expectations of natural yoghurt, the point I'm trying to make is the relationship between the label and the advertising, the branding, it's definitely up to the FSA to come up with legal framework." (London, C2DE, W1)

6.6 Vulnerable groups

Consumer Principle 6: The use of additives and enzymes is more acceptable in food consumed by **people other than vulnerable consumers** (e.g. children, babies, the sick and the elderly) whose consumption of such food should be minimised.

Use of additives and enzymes was seen to be more acceptable when these food products were consumed by people who were not perceived to be vulnerable consumers. Chemicals were perceived as risky substances which participants needed to be able to withstand and were therefore seen as inappropriate for more vulnerable members of society, such as the young, the elderly, the sick or others with weakened immune systems. These groups, it was felt, would benefit from limiting their exposure and reducing their consumption. The references by participants to people with a weak, poorly functioning or under developed immune system may also be linked to a perception that these chemicals posed a health risk or were 'toxic'.

"It is tolerable when you are not too young and not too old, because those ages you are too vulnerable ... the elderly and young should not be digesting this type of food in their diet." (London, C2DE, Wave 2)

"Elderly people who are sick ... Because their immune system is weak and they are more vulnerable." (London, C2DE, Wave 2)

Across the locations and social groups, participants commonly reported thinking that babies and children should reduce their consumption of chemicals. Some participants linked this to the idea of babies and children being 'pure', again seeming to understand chemicals to be toxic and having the potential to pollute this purity. Participants were concerned that consumption of chemicals could negatively impact on children's growth and development and long term health.

"Children's bodies growing up are probably more susceptible to damage and more side effects from chemicals so a cap of usage needs to be in place." (Bangor, ABC1, Wave 2)

"My baby, she's pure, she's not tainted by [chemicals] so obviously if she's going to eat additives she's going to be harmed, her body in some way and I'll be giving that to her..." (Leicester, C2DE, Wave 1)

"I do not want to feed my children harmful chemicals which may affect their health their health in future years." (Bangor, ABC1, Wave 2)

"I feel that children's food should be as clean as possible with nothing extra added." (Swansea, C2DE, Wave 2)

6.7 Additional issues

In addition to the consumer principles outlined above, participants were also keen that the following issues were also observed.

6.7.1 Consuming chemicals in moderation and as part of a balanced diet

Consumer Principle 7: The use of additives and enzymes is more acceptable when they are consumed in moderation and as part of a balanced diet

Consumption of food items which contain these chemicals or have had them used in their production was understood to be more acceptable if they are consumed in moderation and as part of a balanced diet. Participants generally found the use of additives and enzymes to be more acceptable in:

- Convenience foods
- Take away / fast food / eating out
- Indulgent / luxury food
- Cheap food

Given the strong association held by participants between synthetic chemicals and potential health risks, participants generally thought that these foods should be consumed in moderation to limit their exposure to these risks. Participants seemed to believe that consuming higher volumes of foods containing these chemicals and over longer periods of time would increase their risk of long term health risks (seeing risk as cumulative rather than associated with a single event). However these types of food were typically also understood to be 'junk' foods and unhealthy more generally which further reinforced participants' view that these foods (commonly understood to be sweet treats, microwave meals and processed food) should only be consumed as part of a balanced diet.

"It's more acceptable if you have more of a balanced diet because you can accept the fact 'oh I don't have that very often so it won't hurt me' ... it's more acceptable than sitting there every day living off crisps and chocolate bars." (Leicester, C2DE, Wave 1)

"This is a fruit trifle... this can be an indulgence so I will give this one a pass but still it has products in it you think where does this come from." (London, C2DE, Wave 2)

6.7.2 Access the natural alternatives to synthetic chemicals

Consumer Principle 8: The use of additives and enzymes is more acceptable when consumers have access to items with **natural alternatives to synthetic food chemicals**

In order to help consumers achieve a healthier diet, participants wanted items using natural alternatives to synthetic food chemicals to be available on the market. They believed that these should be placed in close proximity and labelled clearly, so that consumers can easily make an informed choice to switch more easily to avoid synthetic chemicals as part of their habits and routines.

"In regards to colouring our food why don't they extract the same colour from one of these products e.g. If you want a food which is green in colour take the colour from one of these vegetables which is green like broccoli, lettuce, kiwi, or avocado." (London, C2DE, Wave 2)

"There are good sugars available; you don't always have to use sweeteners. Why are you using a chemical when there are natural alternatives?" (Swansea, C2DE, Wave 1)

6.7.3 Reducing costs

Consumer Principle 9: The use of additives and enzymes is more acceptable when their use **lowers costs** to benefit consumers rather than manufacturers

Use of additives and enzymes was seen to be more acceptable where this reduced costs and these savings were passed on to and benefitted participants rather than just manufacturers. Participants saw cost reduction as a benefit to themselves and particularly families and those on low incomes.

Participants understood that additives and enzymes could reduce food production costs. They particularly saw increased efficiency as a benefit of enzyme use and were positive about the use of enzymes to speed up food production processes and reduce waste. However participants only saw reduced costs as an acceptable trade-off where these savings were passed on to consumers. There was a high degree of cynicism about food manufacturers and low levels of trust in these organisations which were believed to prioritise profit over public health.

"[Chemicals are less acceptable] If they're just being put in for the purpose of making more money for the fat cats." (Swansea, C2DE, Wave 1)

"The companies that make these things - it's about profit; ultimately the top priority isn't consumer health...." (Newcastle, ABC1, Wave 1)

Participants were cynical about instances where synthetic chemicals were used to replace natural ingredients and alter products and this was presented as an 'improved recipe'. They were particularly negative when they believed the manufacturer's primary motivation was actually cost reduction rather than for example improving flavour. This was perceived to be even less acceptable when they believed that taste had been affected in order to create savings and presented as improved taste or quality. Again participants were negative when the use of chemicals was seen to mislead consumers in some way.

"When it is used to benefit manufacturers in order to use less ingredients" (Exeter, ABC1, Wave 2)

6.7.4 Animal welfare

Consumer Principle 10: The use of additives and enzymes is more acceptable when their use does not affect **animal welfare**.

Participants found the use of food additives and enzymes less acceptable if this compromised animal welfare.

As has been discussed, participants were concerned about how enzymes from animal sources are obtained and that animal welfare is not compromised. This concern was driven by the misconception that enzymes are 'extracted' from live animals rather than derived from by-products. Across the locations and social grades, participants felt strongly that compromising animal welfare was an unacceptable trade-off for the use of additives and enzymes.

There was also concern about whether the use of enzymes derived from animal sources would make items unsuitable for vegetarians, vegans and religious groups and whether these consumer groups were aware of this, Therefore participants wanted to see greater transparency where enzymes are from animal sources to help these consumers make informed choices in line with their religious beliefs and personal preferences and values.

"Stay clear from using animals in the production unless it's of no harm to the animal." (Swansea, C2DE, Wave 2)

"Enzymes are extracted from animals. It's not that I think it's not acceptable but just for the fact it's not often disclosed they come from animals ... that would be a big deal to a lot of people." (London, C2DE, Wave 2)

"Many young calves have to die in order to retrieve this enzyme. This is not acceptable in my eyes. Some home Googling shows that the cheese industry has expanded beyond its supply of calve stomachs. This is a horrifying thought." (Bangor, ABC1, Wave 2)

6.7.5 Impact on local farming industries

Consumer Principle 11: The use of additives and enzymes is less acceptable when their use is seen to have a negative impact on local farming industries

Participants found the use of additives and enzymes less acceptable if this was understood to negatively affect the viability of local farming industries. There was a low level of concern among participants that use of food additives could harm local farming industries. Some participants in Bangor and London expressed concern that use of preservatives might be preventing the survival and growth of local farming industries, because use of preservatives meant that food which can be produced more cheaply abroad can be imported from abroad. In this context, local farming industries were seen to be under pressure from imports, but also large scale farming within the UK, both of which jeopardised more localised supply of food to consumers.

*"Nothing is grown in England so it takes a longer time for our food to reach our plates than other countries."
(London, C2DE, Wave 2)*

7. Conclusions

7.1 Key findings

Throughout the research there was a strong association between 'unnatural' synthetic chemicals and the potential for them to cause serious long-term health risks. Participants feared that synthetic chemicals were not safe and felt that they therefore should limit their intake of these substances to reduce their exposure to health risks. This association was deeply embedded and would be difficult to shift.

There is a need for greater transparency about the nature of the approvals process for additives and a strong appetite for more information about the use of additives and enzymes (particularly their source and purpose) among consumers. More information about the robust nature of the approvals process, and reassurances about its independence and impartiality could help to build confidence among consumers to address concerns about the influence and motivations of manufacturers which are seen as driven by profit rather than public health. Participants wanted to see the public directly involved in the process and data from it to be publically available for scrutiny by interested parties. Participants also wanted more accessible information about additives and enzymes to give them greater confidence to be able to make more informed choices about their chemical intake so that they can make trade-offs in line with their priorities and values. Throughout the research, participants felt that use of these chemicals was more acceptable when they knew the content and source of chemicals and understood the use case and saw this to be 'necessary'. Participants often found current food labels and packets confusing and scientific language and jargon a barrier. It therefore seems that supplying a list of ingredients consisting of E-numbers and chemical compounds is no longer sufficient and that there is an appetite for greater information which consumers can more easily engage with. There is therefore a key role for the FSA to ensure that the consumer voice is listened to by ensuring that food chemical use is underpinned by the core principles of:

- (1) Approval when there is a clear use case
- (2) Greater awareness of and transparency about the nature of the approvals process
- (3) Availability of more accessible jargon-free information about additives and enzymes (particularly regarding their source and purpose) for consumers.

7.2 Consumer Principles

The desire among participants to reduce their intake of synthetic chemicals must be understood within the context of their associations with these chemicals. Association between the concepts of 'naturalness', 'healthiness' and 'safety' was present throughout the research. There was an assumption that natural food was healthier and safer whilst chemicals tended to be associated with unhealthy foods. Additives were understood to be new and synthetic and therefore unnatural, unhealthy and less safe. Meanwhile enzymes tended to be viewed as older and more natural and therefore as healthier and safer. This meant that overall enzymes were generally perceived to be more acceptable than additives. These associations were central to understanding participant attitudes to these chemicals and the ways in which participants weighed up the acceptability of their use.

Unalleviated concern about long term health risks associated with synthetic chemicals and a perceived lack of reliable information about food chemicals meant that participants generally wanted to reduce their current intake of synthetic food chemicals whilst still consuming them when this was deemed to be sufficiently beneficial. Participants tended to want to do this by being able to make informed choices and weighing up when chemicals are more and less acceptable in order to make trade-offs in line with their priorities and values. This included religious views and dietary requirements as well as the level of need for cost savings and convenience and conceptions of quality. Use of additives and enzymes was more acceptable when it was in accordance with the following principles which were developed and underpinned by evidence from the research:

- (1) **Health risks** (including long term and suspected risks) have been assessed before the chemical goes to market by **independent scientists** and are able to be **reviewed** by scientists

- (2) There is a **clear use case** – their use is essential to the nature of the product or has a clear functional rather than an aesthetic use
- (3) There is **more accessible** information available about their **source and purpose** – to give consumers confidence and enable them to make informed choices
- (4) Their use **does not mislead consumers** – it does not change fundamental characteristics or create unnecessary expectations of food
- (5) **Labels do not mislead consumers** – fresh, natural and healthy labels are consistent with contents
- (6) They are consumed by **strong rather than vulnerable** people (particularly less by children, babies, the sick and elderly)

Participants were also keen that the following issues were observed in relation to the use of food additives and enzymes:

- (1) They are consumed in moderation and as part of a balanced diet
- (2) Consumers have access to products using **natural alternatives to synthetic chemicals**
- (3) Their use **lowers costs** which benefits consumers rather than manufacturers
- (4) Their derivation and use does not have implications for **animal welfare**.

7.3 Communicating with consumers about additives and enzymes

Participants did not generally expect the use of these food chemicals by manufacturers and the food industry to change substantially. There was also acknowledgement that it would be difficult and impractical for consumers to exclude these chemicals from their diets entirely and participants therefore wanted to limit their intake rather than eliminate it entirely. Whilst the strong and difficult to shift association between synthetic chemicals and potential health risks persists, despite information about safety testing in the approvals process, consumers may respond better to information and messages which help them feel confident to make informed choices about their chemical intake may be more effective, rather than binary messages about whether chemicals are safe or not.

There was greater awareness of and familiarity with additives than enzymes and more information was reported to be available about additives from a wider range of sources. However, participants were commonly confused by and anxious about the information which is available about additives and commonly perceived this to be confusing, sensationalist and inconsistent. There was particular concern about information from media sources (print, online and social) and information from manufacturers about whom participants were cynical and suspicious. Participants were unsure who to trust about this topic and overwhelmed by volumes of inconsistent information. There is a need for clear, reliable, accurate and independent information to be made available about these additives and enzymes, their use, and risks associated with them from sources which consumers trust. The research suggested that consumers trust independent scientists, healthcare professionals, teachers, celebrity chefs and the Government (when it is not perceived to have a close relationship with industry) on this issue. There is therefore an important role for the independent FSA to play to ensure these consumer needs are met in line with the principles outlined above.

“It's important that I can trust the information provided about the chemicals. If I can't trust then information provided then the whole credibility of the item is taken away and I'm less likely to eat it.” (London, C2DE, Wave 2)

“Transparency, allow me as the consumer to make the choice on what I want to eat, if I am aware of the chemicals then the onus sits on me.” (Exeter, ABC1, Wave 2)

Appendix A: Achieved sample

Achieved sample: wave 1

	TARGET (48 in Total)	TOTAL	London	Bangor, NI	Swansea	Newcastle	Leicester	Exeter
	(Per Group)	(Overall)						
TOTAL								
	8	47	8	8	7	8	8	8
Gender								
Male	4	23	4	4	3	4	4	4
Female	4	24	4	4	4	4	4	4
Age	MIX							
18-24	-	5	1		1	1	1	1
25-34	-	9	1	2	2			4
35-44	-	11	2	2	1	2	3	1
45-54	-	11	2	2	2	3	1	1
55-64	-	7		2	1	2	2	
65+	-	4	2				1	1
SEG	Group Dependant							
ABC1	-	24		8		8		8
C2DE	-	23	8		7		8	
Interest in Science	MIX							
2	-	0						
3	-	3	1				1	1
4	-	6			1	2	1	2
5	-	9	3		1	2	1	2
6	-	9	2	1	1	1	2	2
7	-	7	2	2		1	2	
8	-	8		4	2	1	1	
9	-	5		1	2	1		1

Achieved sample: wave 2

	TOTAL	London	Bangor	Swansea	Leicester	Exeter
TOTAL						
	25	4	6	6	3	6
Gender						
Male	13	3	3	3	1	3
Female	12	1	3	3	2	3
SEG						
ABC1	12		6			6
C2DE	13	4		6	3	

Appendix B: Topic guides

Topic guide: wave 1

FSA Consumer attitudes to chemicals in food

Additives and Enzymes Citizens' Forums – Topic Guide

Background information for researchers

The Food Standards Agency (FSA) is an independent Government department set up to protect the public's health and consumer interests in relation to food. In line with the Agency's strategic plan there is a need to ensure that the consumer can make informed choices about what they eat, and have rights and responsibilities with regard to the food that they eat. This remit extends to assessing and mitigating the risks of human exposure to chemicals in food.

Chemicals may be present in food for different reasons. They can be used in the production and preservation of food, can occur naturally in food, can be present as a result of contamination or can arise from the processing of food. The presence of such chemicals in food is regulated at the EU level to minimise risks and to ensure that food safety is not compromised. Currently, the FSA is seeking to gain a greater understanding of consumer perspectives on chemical contaminants, food additives, and enzymes.

EU legislation on food additives and enzymes aims to ensure the effective functioning of the EU single market whilst delivering a high level of protection of human health and a high level of consumer protection, including the protection of consumer interests. The legislation requires that additives and enzymes must be safe when used, there must be a technological need for their use, and their use must not mislead the consumer. Whilst these substances are currently regulated at a European level these principles and issues will remain relevant whichever regulatory approach is taken around the UK leaving the European Union. We would like the participants to concentrate on the process and not on who is undertaking the work (i.e. EU or UK)

TNS BMRB conducted a small-scale study in June 2015 to explore general consumer awareness and understanding of chemicals in food. The research showed there was general low awareness and understanding of risks presented by certain chemicals in food, apart from food additives and pesticides. This research also highlighted some of the challenges in communicating with consumers about chemicals in food, as participants felt information could be overwhelming, particularly in relation to chemicals they felt they were unable to do anything about. However, research highlighted that consumers welcomed messaging that they saw as empowering and practical: where the risks were particularly high, or where there were clear actions the public could take to avoid or mitigate the risk.

In order to effectively reach consumers with advice regarding chemicals in food, there is a need for more extensive research to better understand public attitudes to chemicals in food, their perception of risks, as well as their information needs to develop appropriate messaging.

Research objectives

- A. Establish 'consumer principles' on the use of additives and enzymes that can be applied by the FSA when helping shape policy, to ensure that consumer interests are taken into account in line with the regulatory framework. More specifically, research needs to:
- a. Understand how consumers weigh up the acceptability of additives and enzymes used in food
 - b. Determine whether there are particular areas where the use of additives and enzymes is less acceptable or unacceptable to consumers (and where it might be more acceptable)
 - c. Gauge which issues around food additives and enzymes are of greatest importance and of lesser importance to consumers around the approval of food additives and enzymes, including any that are not explicitly covered by the current approval systems.
 - d. Identify any circumstances in which consumers would not want a food additive or enzyme to be approved despite successfully passing the safety assessment process

List of stimulus materials

STIMULUS 1	X4 A4 copies per group (1x per pair)
STIMULUS 2	X1 set per group 1. Tin of baked beans 2. Bread 3. Cheese strings / cheese squares 4. Low fat salad dressing 5. Natural yoghurt 6. Dried apricots / fruit 7. Tube of sweeteners (e.g. Canderel) 8. Jelly / chewie sweets (e.g. Haribo/ Chewits) 9. Can of diet/low/no sugar fizzy drink 10. Carton of orange juice 11. Chocolate
STIMULUS 3	X8 A4 sets per group (1 each)
STIMULUS 4	X4 A4 sets per group (1 per pair)

- B. Observers sign consent form

1. Introduction and background (10 mins)

	Stimulus / tasks	Approx timing
<p>1.1 Moderator introduction</p> <ul style="list-style-type: none"> ○ Introduce yourself and Kantar Public – an independent social research agency ○ We are conducting research on behalf of the FSA (Food Standards Agency) ○ Introduce FSA attendees and explain their role as an observer ○ This research will explore your views on additives and chemicals in food and the information you would like about these issues ○ The research will be used in the FSA’s work ensuring consumers can make informed choices about what they eat ○ No right or wrong answer – interested in your views ○ Length – 90 minutes ○ Research is voluntary - participation will not affect your current or future relationship with FSA or food industry ○ Research is confidential and anonymous – your personal details will not be shared with the FSA ○ Information provided will be used for research purposes only ○ Gain permission for audio recording – shared only with the Kantar Public research team 		2 mins
<p>1.2 Group introductions</p> <ul style="list-style-type: none"> ○ Participants introduce themselves to the group <ul style="list-style-type: none"> ○ Name ○ Who they live with – partner; number / age of children, friends ○ What they do – work or hobbies ○ Their favourite food 		8 mins

2. Existing awareness and spontaneous perceptions of food additives and enzymes (30mins)

The purpose of this section will be to explore awareness and spontaneous perceptions of both additives and enzymes in food, before introducing more information about the reasons and circumstances under which these chemicals are used in food.

	Stimulus / materials	Approx timing
<p>2.1 General awareness and spontaneous perceptions</p> <p>Additives</p> <ul style="list-style-type: none"> ○ What they associate this term with – i.e. when they hear this word, what first comes to mind ○ What they understand by the term ‘food additives’ ○ Explore spontaneous perceptions of additives in food <ul style="list-style-type: none"> ○ Explore their understanding of the role and purpose of additives in food and why they are used ○ Views on the benefits of additives in food (or – what would be lost/more difficult if additives were not used) ○ Any concerns ○ Spontaneous views on acceptability of use – when is use more/less acceptable? ● Where they hear about additives in food ● How much they trust sources 	Moderator flipchart	10 mins
<p>Enzymes</p> <ul style="list-style-type: none"> ○ What they associate this term with – i.e. when they hear this word, what first comes to mind ○ Briefly - Regarding food, what they understand by the term enzymes <p>Where it is possible to do so, explore the following questions:</p> <ul style="list-style-type: none"> ○ Explore participants’ awareness of enzymes in food <ul style="list-style-type: none"> ○ Collect any examples they are aware of ○ Main sources of information and level of trust ○ Briefly - Explore their understanding of the role and purpose of enzymes in food and why they are used 	Moderator flipchart	8 mins

<ul style="list-style-type: none"> ○ Where possible - explore spontaneous perceptions of enzymes in food <ul style="list-style-type: none"> ○ Views on the benefits of enzymes in food – or what would be lost if they were not used ○ Any concerns ○ Spontaneous views on acceptability of use – when/why is use more/less acceptable? 		
<p>2.2 Response to definitions</p> <p>MODERATOR TO PROVIDE DEFINITIONS OF ADDITIVES AND ENZYMES TO PARTICIPANTS (HAND OUT OR PROJECT)</p> <p>Additives</p> <ul style="list-style-type: none"> ○ Briefly explore responses to the definition and whether this changes or adds to their views so far ○ Thoughts on benefits of additives ○ Briefly - Any concerns raised <p>Enzymes</p> <ul style="list-style-type: none"> ○ Briefly explore responses to the definition and whether this changes or adds to their views so far ○ Thoughts on benefits of enzymes ○ Briefly - Any concerns raised ○ 	<p>STIMULUS 1</p>	<p>8 mins</p>
<p>2.3 Introductory game</p> <p>MODERATOR TO ASK THE GROUP TO WORK TOGETHER</p> <p>MODERATOR TO ASK PARTICIPANTS TO QUICKLY RANK THE FOODS FROM HIGHEST TO LOWEST IN TERMS OF:</p> <ul style="list-style-type: none"> • Number of ADDITIVES (PARTICIPANTS TO PUT THE FOODS IN A ROW) <p>BRING THE GROUP BACK TOGETHER TO DISCUSS THE ORDER OF THEIR FOODS</p> <ul style="list-style-type: none"> ○ Explore why they ranked their foods in the way they did <ul style="list-style-type: none"> ○ Explore any disagreement amongst the group ○ Explore whether the ranking correlates with the foods they are more/less likely to eat (why/why not) ○ Explore whether the ranking correlates with the foods they think they should be eating more/less of (why/why not) <p>When/why are they more likely to eat foods where more additives have been used in production</p>	<p>STIMULUS 2</p> <p>Moderator to provide x1 set of the foods listed to content</p>	<p>5mins</p>

3. Response to the application process (20 mins)

This section will explore which issues around food additives and enzymes are of greatest importance and of lesser importance to consumers around the approval of food additives and enzymes. It will identify any circumstances in which consumers would not want a food additive or enzyme to be approved despite successfully passing the safety assessment process.

<p>4.1 Introduce the application process</p> <p><i>Moderator to explain that additives and enzymes used in our food must be approved via a safety assessment process.</i></p> <p><i>Moderator hand out stimulus 3, which provides more information about the application process, and ask participants to read through it.</i></p> <p>Stimulus explains the risk assessment and risk management approval process for additives. A similar situation applied for enzymes.</p> <p><i>[Moderator note: The default position for this research is that measures are in place to ensure that additives and enzymes and their uses are safe. Allow participants to raise any concerns and discuss what is driving concerns about safety, but then “park” this issue to enable the research to focus on exploring other issues of interest to consumers.]</i></p>	<p>STIMULUS 3</p>	<p>5 mins</p>
<ul style="list-style-type: none"> ○ Explore spontaneous response to the application for authorization process <ul style="list-style-type: none"> ○ How this makes them feel about the use of additives and enzymes ○ Whether any of this is surprising ○ Any questions / concerns raised – why? <p><i>Probes:</i></p> <ul style="list-style-type: none"> ○ Briefly explore: [stim 3 slide 1] <ul style="list-style-type: none"> ○ Briefly - What participants want to see included in the application process – why? ○ Briefly - What participants want to see included in the package of safety data – why? ○ Briefly - Who participants think should be involved in the process – why? ○ Ask participants to assess which issues they think are most important in the approval process ○ Explore what types of conditions are important to participants (if any) <ul style="list-style-type: none"> ○ e.g. levels of use, types of products / versions of products, types of consumers etc. ○ Briefly explore: [stim 3 slide 2] 	<p>FLIPCHART</p>	<p>15 mins</p>

<ul style="list-style-type: none"> ○ Responses to the information about the review of additives ○ Whether there are any other circumstances under which they think additives should be reviewed ○ Who they think should be involved in the review process ○ Explore whether and how information about the process impacts on their views about the acceptability of additives use in food <ul style="list-style-type: none"> ○ How/why? ○ Explore whether and how information about the process impacts on their views about the acceptability of enzymes use in food <ul style="list-style-type: none"> ○ How/why? ○ Discuss whether there are any circumstances in which participants would not want an additive/enzyme approved – despite passing the safety assessment process <ul style="list-style-type: none"> ○ Any food categories? ○ For any audiences? 		
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4. Understand how participants weigh up the benefits and acceptability of additives and enzymes in food (25 mins)

The purpose of this section is to explore and understand the ways in which participants categorise additives and enzymes and weigh up the benefits and acceptability of their use in food. It will explore whether there are particular areas where the use of additives and enzymes is less acceptable or unacceptable to consumers.

	Stimulus / tasks	Approx timing
<p>3.1 Acceptability consideration exercise</p> <ul style="list-style-type: none"> • MODERATOR TO ASK PARTICIPANTS TO WORK IN PAIRS AND HAND OUT STIMULUS 4 TO EACH PAIR (1X SET OF CARDS PER PAIR). • MODERATOR TO ASK PARTICIPANTS TO SPREAD OUT AROUND THE ROOM TO DO THIS EXERCISE. <p>MODERATOR TO ASK PARTICIPANTS TO READ AND ASSESS THE INFORMATION AND THEN COMPLETE THE STIMULUS 4 WORKSHEET: CONSIDER CIRCUMSTANCES AND EXAMPLES OF WHEN THEY FIND IT MORE AND LESS ACCEPTABLE TO USE ADDITIVES AND ENZYMES IN FOOD – ASK PARTICIPANTS TO THINK ABOUT THEIR REASONS WHY</p>	<p>STIMULUS 4</p>	<p>12 mins</p>
<p>MODERATOR TO BRING PARTICIPANTS BACK TOGETHER TO DISCUSS THEIR DECISION MAKING</p> <ul style="list-style-type: none"> ○ Explore response to the information <ul style="list-style-type: none"> ○ E.g. whether any of the information was surprising, concerning, interesting <p>Enzymes</p> <ul style="list-style-type: none"> ○ Ask each pair to report back on which uses they found more appropriate / reasonable / beneficial, and which they found less acceptable / concerning <ul style="list-style-type: none"> ○ <i>Moderator to probe as to which information in the stimulus materials drove their decisions</i> ○ Explore the benefits of use ○ Explore concerns – and what is driving these ○ Any questions people have 		<p>13 mins</p>

Additives

- Ask each pair to report back on which uses they found more appropriate / reasonable / beneficial, and which they found less acceptable / concerning
 - *Moderator to probe as to which information in the stimulus materials drove their decisions*
- Explore circumstances in which the use of additives would be more/less acceptable than where they have initially placed them

Probes:

- type of food
- food category (e.g. convenience / fast food, healthy/natural foods)
- audience (e.g. children or elderly)
- place of consumption (e.g. home, eating 'on the go', school)
- Explore the benefits of use of additives/enzymes – prompt participants to consider the stimulus materials
- Explore concerns – and what is driving these

5. Summary (5 mins)

5.1 Consumer principles <ul style="list-style-type: none">○ Ask participants to reflect on the session and information they have been provided with:<ul style="list-style-type: none">○ Overall, when is it more and less acceptable for additives to be used in food○ Overall, when is it more and less acceptable for enzymes to be used in food	FLIPCHART	5 mins
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6. THANK AND CLOSE

- Any final comments for FSA?
- HAND OUT HOMEWORK TASK TO THOSE WHO ARE INTERESTED IN TAKING PART IN WAVE 2 – EXPLAIN THAT THE TEAM WILL BE IN TOUCH WITH THOSE WHO AGREED TO BE RECONTACTED
- Check they understand how incentive cards work
- THANK AND CLOSE

7. Additional briefing material and FAQ for researchers:

Under the current legal framework there is a “positive list” of food additives which have been safety assessed and subject to specified conditions of use in specific food categories, and only additives on this list are permitted for use. If an additives manufacturer wishes to place a new additive, or extend the use of an already permitted additive, on the EU market, they must supply a comprehensive package of safety data to the European Commission. After ensuring that this data package is complete, the Commission passes it on to the European Food Safety Authority (EFSA) for them to carry out a scientific assessment. EFSA produces a scientific opinion and, based on this, the Commission and Member States will decide whether the additive should be permitted for use, including any appropriate use conditions. A similar legal framework is being developed for food enzymes in the meantime, food enzymes may be used subject to EU general food law which requires that they must be safe.

- *How many food additives are on the positive list?*

There are around 350 additives on the positive list.

- *Can you provide some examples of conditions for use which are set?*

Conditions of use can be set in terms of levels of an additive that can be used and the foods in which it can be used. The can also state that the additive can only be used in specified versions of products (e.g. an additive which can be used in Ultra-Heat Treated (UHT) milk but not normal pasteurized milk). Work towards establishing the first positive list of food enzymes is ongoing. In the meantime, as with all food/food ingredients, general food law requires that enzymes and the way they are used must be safe and food businesses are have a legal responsibility to ensure that all food they produce is safe.

- *An indication of how long the approval process can take?*

From the point an application is submitted, the approval process takes around 2 years for new food additives.

Sometimes EFSA/the Commission may request additional data from the applicant which will extend this timeframe.

- *What sorts of things are included in the comprehensive package of safety data? (a few examples would help to bring this to life)*

The data package contains the information necessary for EFSA to assess the safety on an additive or enzyme. It is broken down into four sections (1) chemistry (production process, reactivity with components of food, breakdown into other substances) and specifications (chemical purity of the food additive/enzyme and other substances present) (2) references to existing authorizations and evaluations (e.g. where it is permitted in another country around the world) (3) proposed uses (foods and use levels) and exposure assessment (how much of the food additive/enzyme consumers are likely to eat in their diet) and (4) toxicological studies (to demonstrate no adverse effects on living organisms).

- *An indication of how many enzymes are being used currently?*

There are many different enzymes currently used in the production of food but can be broadly grouped by the function they undertake in a food system (e.g. lipase enzymes break down fats, amylase breaks down starch). With individual enzyme manufacturers make different varieties of these functional groups to work most efficiently in different products,

- *What ‘safe’ means in this context?*

'Safe' in this context means that food additives permitted under the legislation and used in accordance with it, have been evaluated for safety by independent bodies providing expert scientific advice before they are authorised. More specifically, that consumers' exposure from the normal diet to additives permitted under, and used in accordance with, the legislation does not give rise to any safety concerns. In terms of food enzymes, 'safe' means that food businesses can demonstrate to the satisfaction of enforcement bodies that the use of enzymes in particular foods at the levels use present no safety concerns.

8. Task 1 – Introduce yourself!

8.1.1 Subtitle: Introduce yourself!

1. Hello and welcome to the forum! [INSTRUCTION]
2. This research is being conducted by Kantar Public – an independent research agency– on behalf of the Food Standards Agency, an independent Government department. The aim of this project is to learn more about your views on the use of additives and enzymes in your food and its production. This app will **close at 23:59pm on Sunday 22nd January 2017**. It would be great if you could **log in a few times** and complete the activities and chat to us and the other participants! There are 15 activities in total. New activities will unlock during the research for you to complete – including a competition with a prize on Sunday 15th January! Our team will be in touch after the research finishes to arrange the £40 payment to everyone who has logged in and **responded to all of the activities**. [INSTRUCTION]
3. Please be reassured that this is not a test and there are no right or wrong answers – it's all about your views! If you have any questions about the research please contact Emily O'Neill on Emily.ONeill@KantarPublic.com or +44 (0)20 7656 5593.

If you experience any technical issues, please contact support@crowdlab.com, or tap the 'Support' button in the app. We're really looking forward to your posts! The Kantar Public Team. ☺ [INSTRUCTION]

4. Firstly, it would be great for us to get to know you better so please could you tell us a little bit about yourself? For example about your family, job and any hobbies. [OPEN TEXT]
5. Thanks for that! We hope you really enjoy meeting everyone and the rest of the forum! If there is anything you want to tell us about how you are feeling about additives and enzymes in your food, please feel free to send us a photo, video, audio message or text anytime on the 'Anytime activities' tab. [INSTRUCTION]

Task 2 – Welcome back from the Christmas Holidays!

8.1.2 Subtitle: Your Christmas Task

1. We hope you had a great holiday break! At the focus group we gave you a task to take away and complete over Christmas. [INSTRUCTION]
2. What additives and enzymes did you find used in your food and it's production over the festive period? [TEXT]
3. How did this make you feel about the use of additives and enzymes in your food and why? [TEXT]

Task 3 – Watch a video with us!

8.1.3 Subtitle: Assessing additives and enzymes

1. The BBC and European Food Safety Authority (EFSA) have made some informative shows and videos about additives and enzymes and their use in food and food production. Please could you take a moment to click on the links below and watch the videos and then answer the questions below:

Additives: https://www.youtube.com/watch?v=1MyK_ATJH_0

Enzymes: <https://www.youtube.com/watch?v=Qn4dgyM1tag&list=PL77B6F5984D1D92AE>

2. How do you now feel about the use of additives and enzymes in your food and its production – and why? [TEXT]
3. These are some of the principles about when it would be acceptable to use chemicals in your food and its production that you and other participants mentioned when we met at the focus groups
 - a. Food labels are clear
 - b. I can trust the information provided about chemicals
 - c. Use of chemicals in food benefits consumers, not manufacturers
 - d. Chemicals are used to do more than just improve the appearance of food
 - e. Less chemicals are used in children's food

- f. Use of chemicals in food does not compromise animal welfare
- g. Evidence provided in the chemicals approval process is produced by independent scientists
- h. Long term health impacts of chemicals are investigated

Which three of these principles are most important to you and why? [TEXT]

4. Are there any other issues about use of chemicals in food you can think of, that are not listed here? If so, please let us know what they are and why they are important to you. [TEXT]

Task 4 – Meet additive use #1

8.1.4 Subtitle: You've found Additive #1: Colours

1. Stimulus
2. On a scale of 1-5, (where 1 is unacceptable and 5 is acceptable) how acceptable or unacceptable do you find the use of colours in your food? [SLIDER]
3. Can you name some examples of when you think it is more acceptable to use colours in your food? Why? [TEXT]
4. What do you think are the key benefits of using colours, for you in your life? [TEXT]
5. When do you think it is less acceptable to use colours in your food? Why? What are your concerns, if any? [TEXT]

Task 5 – Meet enzyme use #1

8.1.5 Subtitle: You've found Enzyme #1: cheese production

1. Stimulus
2. On a scale of 1-5, (where 1 is unacceptable and 5 is acceptable) how acceptable or unacceptable do you find the use of chymosin in the production of your food? [SLIDER]
3. Can you name some examples of when you think it is more acceptable to use chymosin in the production of your food? Why?
4. What do you think are the key benefits of using chymosin, for you in your life?
5. When do you think it is less acceptable to use chymosin in the production of your food? Why? What are your concerns, if any? [TEXT]

Task 6 – Meet additive use #2

8.1.6 Subtitle: You've found Additive #2: Thickeners

1. Stimulus
2. On a scale of 1-5, (where 1 is unacceptable and 5 is acceptable) how acceptable or unacceptable do you find the use of thickeners in your food? [SLIDER]
3. Can you name some examples of when you think it is more acceptable to use thickeners in your food? Why?
4. What do you think are the key benefits of using thickeners, for you in your life?
5. When do you think it is less acceptable to use thickeners in your food? Why? What are your concerns, if any? [TEXT]

Task 7 – Meet enzyme use #2

8.1.7 Subtitle: You've found Enzyme #2: syrup production

1. Stimulus
2. On a scale of 1-5, (where 1 is unacceptable and 5 is acceptable) how acceptable or unacceptable do you find the use of these enzymes in the production of your food? [SLIDER]
3. Can you name some examples of when you think it is more acceptable to use these enzymes in the production of your food? Why?
4. What do you think are the key benefits of using these enzymes, for you in your life?
5. When do you think it is less acceptable to use these enzymes in the production of your food? Why? What are your concerns, if any? [TEXT]

Task 8 – Meet additive use #3

8.1.8 Subtitle: You've found Additive #3: antioxidants

1. Stimulus
2. On a scale of 1-5, (where 1 is unacceptable and 5 is acceptable) how acceptable or unacceptable do you find the use of antioxidants in your food? [SLIDER]
3. Can you name some examples of when you think it is more acceptable to use antioxidants in your food? Why?
4. What do you think are the key benefits of using antioxidants, for you in your life?
5. When do you think it is less acceptable to use antioxidants in your food? Why? What are your concerns, if any? [TEXT]

Task 9 – Meet enzyme use #3

8.1.9 Subtitle: You've found Enzyme #3: brewing

1. Stimulus
2. On a scale of 1-5, (where 1 is unacceptable and 5 is acceptable) how acceptable or unacceptable do you find the use of these enzymes in brewing? [SLIDER]
3. Can you name some examples of when you think it is more acceptable to use these enzymes? Why?
4. What do you think are the key benefits of using these enzymes for you in your life?
5. When do you think it is less acceptable to use these enzymes in the production of your food? Why? What are your concerns, if any? [TEXT]

Task 10 – Go find the additives and enzymes competition!

8.1.10 Subtitle: The contest begins!

1. Congratulations! You have now completed the first week of the forum, and we hope you have enjoyed it so far. This week we will all be taking part in a game together - and the competition starts NOW!
2. We would like you to try to find **as many different items of food as possible** containing additives (e.g. antioxidants, thickeners or colourings) and /or which may have used enzymes in their production (e.g. for brewing, preserving and food production). Each time you find **a different item of food** which contains one or more additive and/or may have had enzymes used in its production, please send us a photo or video of the food item and answer the question below in the text box. [COMBINED MEDIA]
3. **How acceptable do you find the use of the additives in this food or enzymes in this food's production, and why? How does the use of the additives or enzymes in this food item make you feel and why?** [TEXT]
4. [Stim (photo of Monty)] We will update the leader board daily to show who has submitted the most entries! At the end of the week, the person who has submitted the most entries will win Monty the cuddly Microbe! Good luck!

Please note: Each video or photo submitted should contain one item of food and each will be counted as one entry to the competition regardless of the number of items in the photo/video. Please ensure you have also answered the follow up question. *Please note: the game will close at 23:59 on Sunday 22nd January 2017. Entries submitted after this will not be counted. The winner will be contacted on Wednesday 25th January 2017. In the event of a draw, Kantar Public will choose a winner at random from those with the highest number of entries submitted.*



Task 11 – When is it more acceptable and less acceptable to use additives in your food?

8.1.11 Subtitle: Lets discuss additives

1. Thank you for taking part in our competition. Good luck! We would also like you to reflect on the experiences and information you found out this week about additives in your food and discuss these with your fellow participants. [INSTRUCTIONS]
2. How do you decide whether it is acceptable to use additives in your food? [OPEN TEXT]
3. Once you've posted your first response to this task, you'll be able to see what other people have written and they will see your posts Please take a moment to review and comment on other people's posts - is there anything you particularly agree / disagree with?

Task 12 – When is it more and less acceptable to use enzymes in the production of your food?

8.1.12 Subtitle: Lets discuss enzymes

1. We would also like you to consider enzymes. [INSTRUCTIONS]
2. How do you decide whether it is acceptable to use enzymes in the production of your food? [OPEN TEXT]
3. Please take a moment to review and comment on other people's posts - is there anything you particularly agree / disagree with?

Task 13 – Additives, enzymes and consumers

8.1.13 Subtitle: Who should be involved?

1. Who do you think should be involved in the approval of additives and enzymes, and why? Is there anyone who should not be involved? [OPEN]
2. Imagine you have met someone whose job it is to represent the views of the consumer as part of the approvals process for additives and enzymes. They will review the evidence put forward about a new additive or enzyme and - where it has been shown to be safe - go on to decide whether it is in the interest of consumers to approve it. If you could tell them 3 things to bear in mind as they make decisions on behalf of the consumer, what would they be?
3. 1. [OPEN TEXT]
4. 2. [OPEN TEXT]
5. 3. [OPEN TEXT]
6. Please take a moment to review and comment on other people's posts - is there anything you particularly agree / disagree with?

Task 14 – Principles of additive and enzyme use

8.1.14 Subtitle: Rank the principles

1. In the focus groups, you told us some of the circumstances where you think it is more and less acceptable to use additives and enzymes in your food and its production. Thinking about the information about additives and enzymes you saw last week, can you now rank the principles below according to how important they are to you? 1 being the most important and 6 being the least important. [INSTRUCTION]
 1. **Information should be provided about what chemicals are and what they do**
 2. **Information should be provided about the health risks associated with chemicals**
 3. **Chemical use should make food cheaper for consumers rather than manufacturers**
 4. **Chemicals which are used to improve the appearance of food should not mislead consumers about what food looks like**
 5. **Chemicals should be allowed to be used to increase availability and choice of food and encourage innovation**
 6. **Chemicals should not be used in children's and baby food**

2. Can you tell us why you ranked the statements in that order? [text]
3. Have your views about additives and enzymes changed at all during this research? If so, how and why? [TEXT]

Task 15 – Thank you!

8.1.15 Subtitle: Rate us!

1. Thank you again for taking part in this research. We hope you have enjoyed taking part. [INSTRUCTION]
2. On a scale of 1 -5 (where 1 is not at all and 5 is a lot), how enjoyable have you found taking part in this forum? [SLIDER]
3. **Next steps:** Our team will be in touch to arrange the £40 payment to everyone who has logged in and responded to all of the activities. Thanks and enjoy the rest of your week! [INSTRUCTION]

Appendix C: Stimulus materials

Stimulus materials: wave 1

Stimulus 1: Definitions

DEFINITION: FOOD ADDITIVES

Additives are substances which are added to food to perform a technological function (e.g. to prolong the shelf-life of a food or to prevent separation of ingredients.)



There are many different types of food additives including:

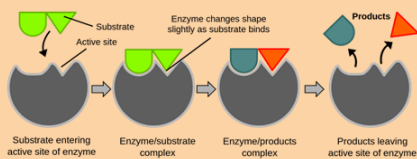
- Sweeteners
- Emulsifiers
- Preservatives
- Antioxidants
- Thickeners



DEFINITION: FOOD ENZYMES [1]

Enzymes are substances produced by animals, plants or micro-organisms which speed up (catalyse) specific chemical reactions.

In humans, enzymes catalyse digestion reactions which break down food molecules into smaller molecules that can be absorbed.

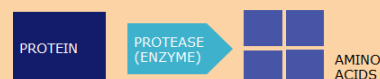


EXAMPLES

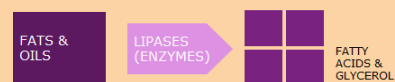
In the mouth & small intestine:



In stomach & small intestine:



In the small intestine:



Source of diagram: <https://simple.wikipedia.org/wiki/Enzyme>

DEFINITION: FOOD ENZYMES [2]

1. Enzymes can be extracted from animals, plants or micro-organisms and have been used for centuries to help produce foods such as bread, cheese, beer and wine.

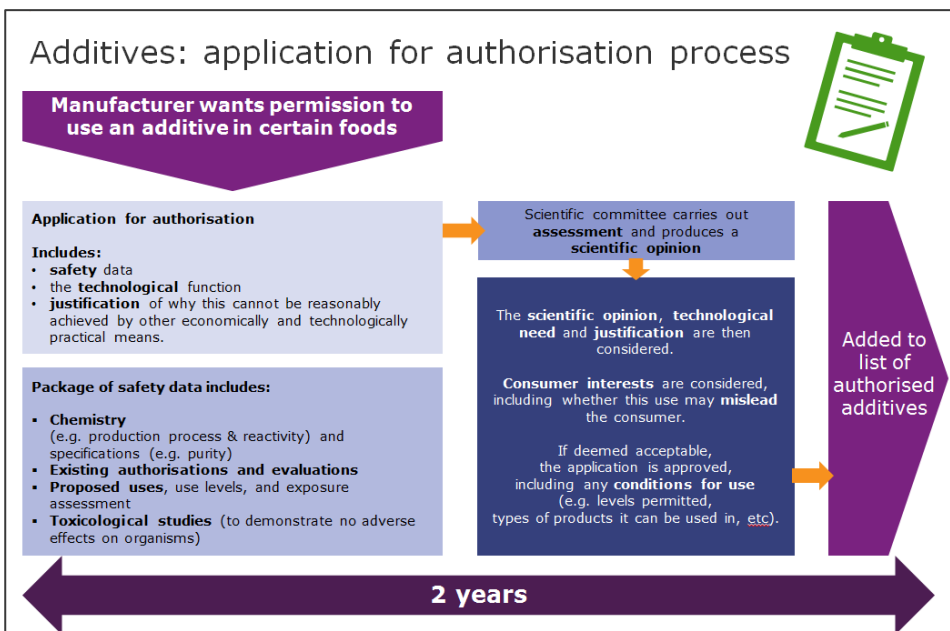
2. Different types of enzymes breakdown different types of food (e.g. fats, starches, or protein). Therefore a range of different enzymes are used in food production.

3. Enzymes help produce food products that meet consumers' expectations around choice, consistency and price. Helping make production processes more efficient can also reduce energy consumption and waste.

4. Enzymes are not considered to present any safety concerns since they are naturally present in many foods.

Stimulus 2: Products

Stimulus 3



Review of additives

After additives have been fully assessed for safety and approved for use they are kept under review.

This could be for a number of reasons such as new research being published, consumer pressure or advances in scientific understanding.

Examples

Aspartame

- Sweetener (E951)
- Following concern that some studies had shown aspartame may not be safe, and consumer pressure, the scientific committee re-evaluated over 600 studies looking at aspartame
- They re-confirmed the original advice that it is safe at current levels of use.

Red 2G



- Food colouring
- Following advances in certain aspects of science, the colour Red 2G was removed from the positive list
- There were concerns that a breakdown product from it could potentially be unsafe.



All additives are currently going through a re-evaluation process to ensure that the original safety assessment still stands, and that no new evidence or changes in science would change the conclusion.

Stimulus 4

When is it more and less acceptable to use additives and enzymes in food?

	MORE ACCEPTABLE 	LESS ACCEPTABLE 
Additives		
Enzymes		

Enzyme use #1: Bread

Bread making



Enzymes can be used to:

- make the dough easier to handle
- improve its structure and behaviour during baking
- improve the final product's characteristics.



Food enzymes which can be used in bread production include:

- **Lipases** – give bread consistent volume and crumbs
- **Alpha-Amylases** - help the dough rise and intensify bread flavour and crust colour
- **Proteases** - improve the consistency of the dough to reduce mixing times
- **Xylanases** – improve dough stability which results in bread with improved structure, shape and volume
- **Oxidases** - improve dough strength and dry the dough's surface which makes it easier to handle.

Enzyme use #2: Fruit juices



Producing fruit juices



Enzymes can:

- Increase yields (make more juice from the same amount of fruit)
- Improve quality
- Improve stability
- Create energy savings due to shorter processing times



Food enzymes that are typically used in fruit juices:

Cellulases

Breakdown the structure of the fruit to:

- Increase the amount of juice produced
- Minimise waste

Pectinases

Break down fruit cell walls to:

- Help produce clear (rather than cloudy) juices
- Reduce viscosity
- Prevent or reduce clogging of equipment
- Improve the overall efficiency of the process leading to energy savings and environmental benefits.

Enzyme use #3: Starch processing



Starch processing to create sugars



Enzymes can be used to separate out the starches (fibre and gluten) found in cereals or grains. The starch can be further processed using enzymes to produce sugar syrups (e.g. glucose).

Benefits of enzyme use:

- Improve starch purity
- Improve yield from the starches
- Provide energy savings and environmental benefits due to reduced use of water, lower processing temperatures, and decreased production time
- These efficiencies lead to cheaper prices for food manufacturers and consumers.

Food enzymes which can be used in starch processing include:

- Amylases
- Xylanases
- Cellulases

These enzymes can all improve the separation of starch, gluten and fibre from the raw materials and can improve the production conditions (e.g. reduce viscosity).

This results in energy savings.

Additive #1: Preservatives

What are preservatives?



Preservatives kill the microorganisms or prevent them from growing.

Preservatives:

- help prolong shelf-life by protecting food against deterioration caused by microorganisms (e.g. growth of moulds)
- protect against the growth of harmful bacteria (e.g. botulism) that can lead to food poisoning.

Preservatives allow foods to be kept safely for longer, therefore reducing food waste.

Example 1: Preservatives in meat products



Nitrates and nitrites are used in bacon and ham to prevent the growth of bacteria which can lead to botulism food poisoning which can be fatal.

Using them in the curing process also leads to the characteristic colour and flavour of these meats.

Example 2: Preservatives in dried fruit



Sulphur dioxide and sulphites are used in the production of dried fruit to prevent the growth of mould and extend shelf-life.

Sulphites are used in dried apricots, which would otherwise be brown in colour and so not meet consumers' expectations.

Additive #2: Emulsifiers

What are emulsifiers and their benefits?



Certain ingredients don't mix well (e.g. oil and water) and can lead to foods separating into different layers (e.g. salad dressings).

Emulsifiers help ingredients mix together and so have a better consistency and can lead to products with better texture and taste, such as low fat products.

Emulsifiers are used in salad dressings, ice-cream, chocolate and bread.



Example: Emulsifiers in bread

Emulsifiers provide a longer shelf-life and improve the texture of bread (e.g. greater volume, softer crumbs and easier to cut).

They are often found in sliced bread which consumers may find more convenient and cheaper.

In the production process, emulsifiers strengthen the dough which cuts down production time and strengthen and soften dough for faster mixing. This increased efficiency could lead to cheaper products.



Stimulus materials: Homework task

Consumer attitudes to additives and enzymes in food

Name:

Location:

Thank you very much for your time so far! We hope you enjoyed the evening and found it interesting.

Before the mobile project starts in January, there are a couple of short activities would like you to participate in over the Christmas period. This is a chance for you to think about what you've heard in the focus group this evening and how it fits in with your everyday life. Each of these activities will only take a short time to do.

1. Answer the three questions on the next page



2. Keep a 'log' of anything you hear about additives and enzymes in food - including any government advice.



1. Additives and enzymes

1. Over the festive period, what types of additives can you find in the food you eat? (e.g. preservatives, emulsifiers, sweeteners, colourings, thickeners, antioxidants etc.)
2. Over the festive period, which types of food you eat may have had enzymes used in their production? (e.g. baking; brewing; starch processing; juice, syrup and cheese production etc.)
3. How do you feel about these chemicals being in and being used in the production of your food?

2. Keep a 'log' of anything you hear about additives and enzymes over the festive period- including any government advice.



Note down anything you see or hear about additives and enzymes in food. This could be on the news or in other media, or from your own research. For each, note down:

- Where did you see / hear about it?
- What was it saying?
- How did you feel about it? What were your thoughts?

You can jot these down below!

Thank you!

We look forward to speaking with you in the mobile project.

Starting 09/01/2016

Kantar Public will contact you in the week starting 19th December to ask if you want to take part, give you more information and instructions for using the mobile forum.

Stimulus materials: wave 2

Additive use #1
Colours




What are they?	A colour additive is any dye, pigment or substance that imparts colour when it is added to food or drink. They come in many forms including liquids, powders, gels and pastes. All permitted colours are given an 'E number' in Europe.
Purpose:	Certain colours are associated with certain flavours. Colours may be used to offset natural colour loss; correct natural variations; enhance colours; provide colour to colourless food; make food more fun, attractive and appetizing; and to allow people to identify products on sight.
Used in:	Sweets, cakes, icing, drinks, sauces.
Examples	Carotenoids, chlorophyllin, anthocyanins, beetroot red, caramel, quinoline Yellow , Carmoisine, Ponceau 4R, Patent Blue, Green S.

Additive use #2
Thickeners




What are they?	Thickeners increase the viscosity of liquids. They form 'viscous dispersions' (or gels) when they are put into water and therefore 'thicken' mixtures.
Purpose:	They are used to change the texture of food to improve its quality. For example they can increase 'stickiness'.
Used in:	Soups, stews, gravies, salad dressings, ketchup, sauces and toppings, and puddings.
Examples	Modified starches, agar, xanthan gum, guar gum, acacia gum, karaya gum, tragacanth and carboxymethyl cellulose (CMC) .

Additive use #3
"Antioxidants"




What are they?	Antioxidants are molecules which stop the oxidation of other molecules.
Purpose:	Exposure to oxygen and sunlight can lead to 'oxidation' in food which can cause food to become rancid and spoil. Antioxidants are used as food additives to stop oxidation and help preserve food by guarding against deterioration.
Used in:	Frozen and refrigerated foods, dried fruit, fat rich foods (e.g. olive oil and butter)
Examples	Ascorbic acid and tocopherols, propyl gallate, tertiary butylhydroquinone , and butylated hydroxyanisole .

Enzyme use #1
Cheese production



Types	Chymosin is a protease enzyme found in rennet. Rennet is an enzyme complex found in the stomach of some mammals. Plants or microorganism sources of rennet can be used as an alternative to animal sources.
Purpose:	Rennet is used to separate milk into solid curds and liquid whey in most cheese making.
Benefits:	Cheese production involves the controlled spoiling and preserving of milk into cheese. Cheese production is a food preservation process which allows the nutritional and economic value of milk to be preserved. It creates a higher value product.
Used in:	Cheese, yoghurt, curds and whey.

Enzyme use #2
Syrup production



Types	α -amylase, glucoamylase, D-xylose isomerase
Purpose:	Glucose syrup is mainly produced by adding the enzyme α -amylase to corn starch and water to break down the starch into oligosaccharides. These are then broken into glucose molecules by the enzyme glucoamylase . Glucose can then be transformed into sweeter fructose by the enzyme D-xylose isomerase. The enzymes may be from bacteria or fungi.
Benefits:	Glucose syrup is used as a sweetener, softener, thickener and retains moisture and freshness. It can be cheaper than other sugar products.
Used in:	Sweets and cakes.

Enzyme use #3
Brewing



Types	β -glucanase, α -amylases, xylanases
Purpose:	Enzymes such as β -glucanase and xylanases are added during the mashing stage of brewing to hydrolyse the polysaccharides in the grain. α -amylase is added during the fermentation stage to increase sugar levels.
Benefits:	Enzymes increase the production of fermentable sugars, reduce viscosity to improve filtration, enhance chill proofing and speed up maturation.
Used in:	Beer, ale and wine production