

Chapter 5

Consumer choice and food quality

- 5.1 The part played by food in human life is much larger than its role as fuel for physical activity. Food features prominently in religious rituals and in the small rituals of everyday life; we welcome friends with food; and our credentials as good parents rest partly on what we feed our children and under what circumstances. Although the overriding interests of consumers in the developed world are, first, safety and, second, informed choice, we are very conscious that the cultural meanings of food are more elaborate. Any parent will remember teaching children to 'eat properly', and recall their children's adamant refusal to eat even the most nutritious food if it was declared to be 'yucky'. Powerful adult emotions are aroused when age and infirmity makes it harder for us to 'eat properly'. The public's concerns about the introduction of genetically modified (GM) foods into their diet is therefore not surprising, even to those who think GM foods pose little risk to health.
- 5.2 The majority of concerns about the possible consequences of GM crops are of two kinds: the effects of such crops on human health, and environmental effects. This chapter discusses consumer attitudes to food containing ingredients made from GM crops. The majority of our evidence to date comes from the developed world, but consumer attitudes in the developing world are also important. The environmental effects of GM crops are discussed in Chapter 6.
- 5.3 There is much greater public concern about GM foods in the United Kingdom (UK) and some other European countries than in the United States (US). Most Americans appear to accept the Food and Drug Agency's (FDA) positive stance on GM soya and maize without concern. On the face of it this is surprising, since North American society is a highly litigious one. It may be, however, that the high regard in which the FDA is held by the US public, and their more entrepreneurial, innovative and less risk-averse culture may in part account for the more relaxed acceptance of genetic modification and the comparative lack of debate on the subject in the US.¹ Alternatively, as GM ingredients do not have to be labelled in the US, perhaps the public is unaware of the extent to which GM ingredients have entered their food chain and the question of GM crops may not appear as pressing as it does to Europeans.
- 5.4 Consumers in the UK and much of Europe appear to be increasingly concerned about the safety and impact of GM food. This is almost certainly linked to two major factors: first, the high-profile campaigns of environmental and other pressure groups and secondly, the development of intensive farming, which, although it has delivered high quality food at ever decreasing prices, has been accompanied by:
- well-publicised food scares, particularly BSE (bovine spongiform encephalitis);
 - a rise in food-poisoning statistics;
 - overcrowding of animals and a concomitant need for antibiotics to ward off disease.
- 5.5 These have combined to make the public suspicious of what the food they buy might contain. It is not surprising, therefore, that the idea of genetic modification has not been widely welcomed. This attitude may be caused in part by natural conservatism, a resistance to the new and a feeling that the old ways were the best ways, particularly if the new ways do not appear to offer many direct benefits. It is also possible that genetic modification is a 'lightning-rod' upon which the public's general uneasiness about the modern world is focused.
- 5.6 Consumers have expressed fears and anxieties about the impact of GM foods on human health. However, it should be remembered that eating *any* food carries some dangers, such as the risk of food poisoning or an allergic reaction. This chapter considers the consumer's perception of

1 A study for the National Science Foundation concluded that North Americans' confidence in science was based the country's 'string of successes in science'. The strong support for science found in the US study is also present in Canada and European countries. However, far greater reservations about science are expressed in Europe than in the US (Macilwain C (1998) US public puts faith in science, but still lacks understanding, *Nature*, 394:107).

additional risks that GM foods might carry, over and above those carried by their non-GM equivalents.

- 5.7 There is often a conflict between the consumers' desire for attractive, nutritious and affordable food and food that has been grown in a conventional or environmentally-friendly manner. This conflict makes it difficult to predict the attitude consumers would have to any GM food that offers demonstrable benefits, for instance by being cheaper, better-tasting or more nutritious than its conventional alternative.
- 5.8 An example is the general acceptance of the addition of preservatives to food to make it safer or to prolong its shelf-life. Would GM food which eliminates the need to add these chemicals also be acceptable, or even preferable? Rather, it seems that public unease is focused on the stage at which the plant breeder intervenes. It seems to be considered acceptable to add vitamins to bread flour but not, one suspects, to modify the wheat plant genes to enable the plant to produce the vitamins itself. Why might it be acceptable to 'put back' nutrients lost in processing, but not to modify the plant?
- 5.9 What, for example, would the public regard as the right response, if any, to the dramatic decline in household intake of vitamins among the poorest fifth of families in the UK? Since 1980, beta carotene (a vitamin A precursor) intake has dropped by 47% and vitamin C intake by 23%.² Nutritionists in the UK would understandably argue that it would be better for children if they ate fresh carrots (a source of beta carotene) but this ignores the fact that exhorting young people to do what is good for them seldom appeals. In these circumstances, is ensuring beta carotene intake from the foods that they are determined to eat, such as chips, justifiable? In the developing world, millions of children could be saved from eye defects if they had more vitamin A in their diet. One way to achieve this would be by introducing the genes coding for beta carotene (which the body uses to make vitamin A) into their rice (see paragraph 4.18). Should such GM developments be encouraged? Will developments such as this result in one set of ethics for children from the developing world and another set for our own?

UK consumer attitudes

- 5.10 In examining existing patterns of public attitudes towards GM food, there is not a large body of evidence to go on. Table 5.1 provides a list of five important surveys to date. The sources fall into two main groups. On the one side there are large-scale statistically representative surveys, like the European-wide Eurobarometer³ poll, or Iceland Frozen Foods' poll as conducted in a nationally representative telephone survey by the Gallup organisation (paragraphs 1.35–1.37). The second group comprises the small-scale qualitative studies, which take a small group of people and create a context in which they receive evidence on a question, can deliberate about it and come to a group conclusion. These latter sorts of studies cover a variety of methods, including focus groups and more experimental procedures, like citizen panels, which resemble a more formalised procedure.
- 5.11 Each method has its strengths and its weaknesses in judging public opinion. The small-scale qualitative studies enable evidence to be presented to participants and discussed by them, thus allowing a more subtle appreciation of underlying reasoning and ambivalence of feeling, but they suffer from the obvious disadvantage of being statistically unrepresentative and therefore forming a poor basis for generalisation. Statistically representative polls, by contrast, are prone to 'off the

2 Leather S and Dowler E (1997) Intake of micronutrients in Britain's poorest fifth has declined, *British Medical Journal*, 314: 1412 and Government data, Ministry of Agriculture, Fisheries and Food (MAFF) National Food Survey 1980 and 1996.

3 European Commission (1997) *The Europeans and Modern Biotechnology: Eurobarometer 46.1*, European Commission Directorate General XII. Science, Research and Development, Brussels.

Table 5.1
Summary of Main Surveys of Public Opinion

Name	Date	Type	Commissioner	Main Results
UK National Consensus Conference ¹	1994	Consensus Conference	Science Museum	There were benefits and risks. Product labelling and freedom of choice were very important.
Eurobarometer ²	1997	Representative Sample (EU)	European Commission	Genetic modification less well endorsed than other new technologies. Variation in support by country. Moderate level of objective knowledge of genetics. Increased support correlated mildly with knowledge. Stronger support for genetic techniques for medicines than for foods. Importance of clear labels.
Consumer Attitudes ³	1997	Focus Group	IDG	Low awareness and understanding. Importance of clear information.
Uncertain World ⁴	1997	Focus Group	Unilever <i>et al.</i>	Doubts about GM as proxy for more general uncertainties.
Genetically Modified Food ⁵	1998	Representative Sample (UK)	Iceland	High levels of concern about GM. Considerable uncertainty about what it involved. High level of concern about labelling.

¹Anon (1994) Final Report of the **UK National Consensus Conference on Plant Biotechnology**, The Science Museum, London.

²European Commission, **Eurobarometer 46.1**.

³Policy Issues Council, Institute of Grocery Distribution (1997) **Consumer attitudes to genetically modified crops: results of qualitative research**, Institute of Grocery Distribution, Watford.

⁴Grove-White R, Macnaghten P, Mayer S and Wynne B (1997) **Uncertain World: Genetically Modified Organisms, Food and Public Attitudes in Britain**, Lancaster University, Lancaster.

⁵The Gallup Organisation (1998) **Genetically Modified Food: Executive Summary Report** (prepared for Iceland) (unpublished). The research was carried out by the Gallup Organisation 3–9 March 1998. Adults 16+ were interviewed randomly by telephone. There is a margin of error of $\pm 3\%$.

top of the head' answers and a sensitivity to question wording that can make estimates of opinion problematic.⁴

5.12 Despite these drawbacks, the surveys of public opinion are thought-provoking. In all forms of sampling, a desire for clear and informative labelling is a strong theme. This was a feature of the earliest study, the 1994 UK National Consensus Conference (paragraph 2.67) and also came through very markedly in the Iceland Frozen Foods survey of 1998, where 81% of respondents favoured clear labelling. A similar proportion of respondents to the Working Party's consultation attached great importance to labelling. Another common theme in all the surveys is a sense of uncertainty in the face of complex issues and a desire for caution when dealing with potentially important technical innovations. This may be interpreted as a proxy for a wider unease about the

⁴ Some scepticism about the validity of survey findings is understandable: if asked whether we would like 'strawberries that could, on account of being genetically modified, be frozen without becoming mushy when thawed', the answer is more likely to be positive than if the question is phrased as 'Would you like fish genes in your strawberries?'.

'unnatural' implications of innovative technology,⁵ or it may be more specific worries about GM techniques compared to other technologies. This was implied by the Eurobarometer results, in which GM techniques were thought to have less promise of human benefit than, say, telecommunications or solar energy.

- 5.13 Even so, it is possible for members of the public to make important distinctions. For example, the UK National Consensus Conference panel drew attention to the potential for medicines and vaccines to be derived from GM crops, and Eurobarometer respondents also showed a clear preference for genetic modification for medical purposes over that of plants or organ transplants, even though there was a net balance of opinion that was favourable to all applications.⁶
- 5.14 One interesting aspect of public opinion is the relationship between levels of information and attitude towards GM applications. The Eurobarometer poll⁷ shows a positive link between knowledge of genetics, as measured objectively by a ten-question test, and optimism regarding biotechnology. Yet we cannot infer from this that as people become more knowledgeable so they will readily accept biotechnology. In Iceland Frozen Foods' poll, the proportion of respondents with reservations about GM technology increased as it was explained to them. The focus group results also showed a pattern in which increased awareness and discussion inclined respondents to be more cautious. There is no reason to think that we can predict attitudinal developments as public knowledge increases. Consumer knowledge about GM crops is discussed in more detail in paragraphs 5.29–33.
- 5.15 It is, in any case, difficult to infer behaviour from opinions. An example of the difference between expressed opinions and actual purchases is provided by comparing the sales of GM tomato purée at two UK supermarkets and the answers given in a survey by a third. Tomato purée produced from GM plants developed by Zeneca can be processed at lower temperatures than conventionally bred alternatives. The lower temperature of processing ensures that no caramelisation takes place, which provides an apparently 'fresher' flavour. The tomato purée has been sold under the 'own brand' label at selected Safeway and Sainsbury's⁸ supermarkets and clearly labelled as genetically modified. It has also been cheaper than the traditional 'own brand' purée.⁹ Between February 1996 and November 1998, approximately 1.7 million cans of the GM purée were sold. In Safeway supermarkets, GM purée outsold traditional purée by 60:40 where they were sold side by side, and in Sainsbury's supermarkets sales of GM purée were only 30% less than the traditional purée.¹⁰ In contrast, in the Iceland Frozen Foods' poll examining consumer attitudes towards GM foods,¹¹ 8% of respondents reported that they were likely or 'very likely' to buy GM food, 15% might purchase it and 77% reported that they were unlikely or 'not at all likely' to buy GM food.
- 5.16 The silent majority may well buy GM food without qualm, and accept the growth of genetic modification without question, or they may feel a deep latent unease about the technology but feel powerless to influence its development.¹² And, as implied above, they may state an objection and buy the product anyway. The *Uncertain World* study¹³ suggests that purchasing GM foods does not necessarily indicate approval of them. The focus groups showed an 'apparent paradox that

5 This was the interpretation of the Lancaster Group that conducted a study commissioned by Unilever (Grove-White R *et al.*, **Uncertain World**).

6 European Commission, **Eurobarometer 46.1**, p 32–37.

7 *Ibid.* p 28.

8 Following Sainsbury's decision on 16 March 1999 to remove GM products from their 'own brand' labels, stocks of the tomato purée will not be renewed and are expected to run out by June 1999.

9 In November 1998 Zeneca GM tomato purée was priced at 29p for 170g as opposed to 29p for 142g of the conventional product. Sainsbury's and Safeway determined the price at which they would sell the GM purée.

10 GM tomato purée is hit with consumers, **Financial Times Food Business**, September 1998 Issue 2 page 22; Gittus K (1999) personal communication, Zeneca.

11 The Gallup Organisation, **Genetically Modified Food: Executive Summary Report**.

12 One study, based on nine focus group discussions, noted a 'sense of "inevitability" and fatalism, reflecting perceptions of the possible future persuasiveness of GMOs in foods'. Grove-White R, *et al.*, **Uncertain World**.

13 *Ibid.* p 1.

people may purchase particular GMO products, whilst also harbouring significant unease about the technology as a whole, and about potential implications of its trajectories’.

- 5.17 Respondents to the Working Party’s Consultation expressed concerns that GM food would be introduced against their wishes. It was thought that GM crops would provide benefits to growers and producers rather than consumers, and that for this reason the crops would be grown, irrespective of consumers’ wishes. Consequently, consumers would have to buy GM food and face any attendant risks, without receiving any benefit. Particular frustration was expressed at the proposition that GM foods might not have to be labelled, so that consumers would not be able to avoid them if they wished. The question of labelling is discussed in more detail later in this chapter and in Chapter 7.
- 5.18 When consumers who have stated that they do not wish to buy food are asked why, a range of reasons are offered. In Iceland Frozen Foods’ poll, of those who were unlikely or very unlikely to purchase GM foods, reasons included that they ‘just didn’t like the idea’, ‘didn’t know enough and were unsure’, ‘didn’t know enough about the long term effects’ or ‘didn’t like the fact that GM foods were produced by ‘interfering with nature’’. Two Consumer Association surveys¹⁴ have reported that reasons for a reluctance to buy GM food include: a lack of awareness/interest; caution; insufficient information; a dislike of tampering with nature/food; a preference for fresh/natural food; concerns about long term consequences to the food chain and environment; and that GM food is wrong.
- 5.19 In addition to these views, respondents to the Working Party’s public consultation have expressed the following specific concerns about GM food:
- some consumers, including vegans, vegetarians and some religious groups are concerned about the possible introduction of genes of animal origin into other animals or crops;
 - there is concern that farmers, manufacturers and retailers will not pass on savings gained through genetic modification to the consumer;
 - the suspicion exists that research is more likely to be focused on genetic modifications that help the farmer, manufacturer or retailer, such as herbicide tolerance or longer shelf-life, than on those that might benefit the consumer, such as improvements in nutrition or a reduction in allergens;
 - some people believe that humans might absorb and be affected by DNA transferred to them through the cell walls during digestion (see paragraph 2.50);¹⁵
 - the risk that allergenicity could be transferred from one food plant to another with the transfer of genes has concerned some scientists and others;¹⁶
 - there is also a more general unease that there may be long-term risks to human health from this technology. Because the nature of such risks is unknown, questions were raised about whether they would necessarily be picked up by the safety tests that GM foods undergo (see paragraph 2.55).

14 1994 Consumers’ Association Survey. The Consumers’ Association held face-to-face interviews with a nationally representative sample of 176 adults. In April 1996, the Consumer Association carried out face-to-face interviews with a representative sample of 506 UK men and women.

15 In the Eurobarometer survey 29% of respondents thought that their genes could become genetically modified as a result of eating GM fruit.

16 Only one example of this has been reported: experiments on the introduction of a Brazil nut gene into soya beans were halted by the company when they found that people allergic to nuts could have an allergic reaction to the GM soya, the allergenicity having been transferred with the transferred gene (see paragraphs 2.53–2.54). The production of allergenic GM soya is of particular concern because GM soya is used in a wide variety of processed foods. Nordlee J A, Taylor S L, Townsend J A, Thomas L A and Bush R K (1996) Identification of a Brazil nut allergen in transgenic soybeans, **New England Journal of Medicine**, 334: 688–692.

5.20 So there is a wide range of public concerns in the UK about the merits and risks of GM food. It is possible that some concerns about the consequences of genetic modification may be alleviated if more information becomes available to the public and as further research is carried out, but the evidence is conflicting. The next section considers to what extent consumer concerns in Britain are present throughout the European Union.

European attitudes

5.21 The Eurobarometer survey published in 1997 examined the attitudes of 16,246 Europeans¹⁷ to six applications of biotechnology. Respondents were asked to consider whether the applications were morally acceptable, would benefit society, would involve risks for society, and whether or not they should be encouraged. There was a strong correlation between applications of biotechnology expected to benefit society and those that were considered to be morally acceptable.¹⁸ When asked about the use of biotechnology to genetically modify crops to make them more resistant to insects,¹⁹ 62% of European Union (EU) respondents and a similar number of UK respondents considered this morally acceptable. When asked about changing food characteristics such as taste and nutritional content about half of EU and UK respondents thought this was morally acceptable.

5.22 When asked whether these biotechnological applications would benefit society, about three-quarters of UK and EU respondents thought that creating GM insect-resistant crops would be beneficial and close to half thought that changing food characteristics would benefit society. UK respondents were slightly more optimistic than the EU as a whole. Of EU respondents, nearly two-thirds thought that GM food posed a risk to society while just under half thought that GM insect-resistant crops posed such a risk. A higher number of respondents answered 'don't know' to the question about risk compared to previous questions about benefits, suggesting that respondents found it easier to assess the benefits than the risks offered by biotechnology. Figures for the UK were slightly higher than the EU average. However, of EU respondents, 28% (rising to 40% of respondents in the UK) agreed with the statement 'We should accept some degree of risk from modern biotechnology if it enhances economic competitiveness in Europe'.

5.23 The Eurobarometer survey demonstrates the public is aware of the benefits offered by GM foods and crops as well as its perceived dangers. Where forms of genetic modification are seen to be useful, they tend to be perceived as acceptable, even if they are also thought to carry risk. The European public appears to be ambivalent about the role of GM, both in food and crops.

Potential benefits of genetic modification

5.24 Interviews with supermarket shoppers and focus group discussions present a picture of suspicion and nervousness about GM technology. When asked to what extent they supported the development and introduction of GM food, a quarter of respondents to the 1998 MORI poll for GeneWatch supported GM food to a slight or great extent while over half opposed it.²⁰ When asked if they

17 In each EU country, a number of sampling points were drawn in relation to population size and density. The figures for the EU as a whole are a weighted mean of national figures. Results for each country are weighted according to the country's population aged fifteen and over within the total Community population of the same age.

18 Pearson correlation coefficient=0.71.

19 The phrase used in the survey was 'Taking genes from plant species and transferring them into plants, to make them more resistant to insect pests'. Much current research into insect resistance involves the transfer of genes originating from bacteria (*Bacillus thuringiensis*) into plants, which some consumers find less acceptable than the transfer of genes between plant species.

20 The MORI poll for GeneWatch involved the face-to-face interviewing of 950 adults aged 15 and over. Data have been weighted to reflect the national profile.

would be 'happy to eat GM food', approximately a quarter of respondents were willing to and about two-thirds were slightly or greatly unwilling to eat such food. Much of the public debate has centred on the safety or otherwise of genetic modification, without as much consideration being given to any potential benefits. Quite apart from the question of improved global food security discussed in Chapter 4, and the environmental benefits discussed in Chapter 6, it is theoretically possible that genetic modification could improve the flavour, texture, appearance, price, and nutritional content of a number of plant foods (see paragraphs 2.39–2.41, 4.18). It is likely that if the public could see, smell, feel and taste improvement to their food, their attitudes would become less hostile. At this early stage of GM crop development, current field trials in the UK focus on herbicide tolerance and insect resistance, matters of no direct benefit to the ultimate consumer.

- 5.25 *Price*: Zeneca's tomato purée is cheaper, has sold well and is rated more highly in blind taste tests than conventional tomato purée. This suggests that the purchaser's confidence in the safety of GM foods, or his or her ethical stance about such foods, can be swayed by price. A similar phenomenon was observed during the BSE crisis. Beef sales fell until desperate retailers halved prices, whereupon supermarkets rapidly sold out of beef. There would appear to be a balance reached between price and the amount of perceived risk or ethical discomfort that consumers are prepared to tolerate. However, in the 1996 Consumers' Association Survey there was not a significant increase in the number of respondents who said they would buy GM food if it was cheaper. But, if GM foods are substantially cheaper than non-GM foods, and taste and look better, it is reasonable to suppose that some people may not feel that they can justify, to themselves or others, the higher price of non-GM foods, even if they would prefer to purchase such a product.
- 5.26 *Flavour*: There is little evidence about how consumers would respond to food with an 'improved' flavour. In the *Eurobarometer* survey, 29% of EU respondents (37% of UK respondents) agreed that they would 'buy GM fruit if it tasted better'. Of the respondents to the Iceland Frozen Foods' poll who were likely or very likely to purchase GM foods, a better flavour was the second most popular reason for doing so (cited by 15% of respondents). In contrast, in the *Uncertain World* study and responses to the Working Party's Consultation, concerns were raised that changing the flavour of foods was a trivial reason for 'meddling'. Some respondents mentioned that they would not wish flavours of their favourite foods to be altered. It was also proposed that flavours only need to be 'improved' because foods had lost flavour as a result of modern agricultural practices.
- 5.27 *Nutrition*: The use of genetic modification to improve the nutritional values of developing world crops is discussed in Chapter 4. Some respondents to the Working Party's Consultation questioned whether there was a similar need to alter the nutritional profiles of foods in the developed world, given that such consumers have access to a more varied and complete diet. It has been pointed out that conventional plant breeding has reduced the levels of such protective substances as sinigrin and sulphoraphane in sprouts and broccoli, and it has been claimed that increasing the levels of these substances would improve protection against cancer of the gut.²¹ However, foods modified to have high levels of particular nutrients such as high-lycopene tomatoes may not be as beneficial as expected.²² Some forms of genetic modification of nutrient values, such as altering fatty acid profiles of particular oil seeds, might even have a deleterious effect on a nutritional profile, in addition to the positive effects. On a larger scale, it was proposed that public health messages about nutritious values of certain foods will become increasingly complicated and confusing as the nutrient profile of foods are modified.
- 5.28 As discussed above, the *Eurobarometer* results suggest that consumers are more prepared to tolerate risks if some benefit is offered. Apart from the cheaper price of Zeneca's tomato purée,

21 Institute of Food Research (IFR) (1997) **Why your best friend could be a Brassica**, IFR, Norwich.

22 **The British Dietetic Association's** response to the Working Party's Consultation.

consumers in the UK have experienced no direct benefit from the introduction of GM foods. At this stage it is uncertain whether or not consumers will welcome GM foods offering them direct benefits, and, as discussed in Chapter 3, it will be some time before such products appear in UK supermarkets.

Public awareness of GM technology

- 5.29 In a 1994 Consumers' Association Survey following the release of Co-op's 'vegetarian cheese'²³ about one-fifth of respondents had heard of gene technology and only 17% had some comprehension of what it meant. In their April 1996 survey, following the release of Zeneca's tomato purée,²⁴ approximately two-fifths of consumers had some understanding of the terms 'biotechnology', 'gene technology' or 'genetic modification'. The term 'genetically modified tomatoes' was most widely understood. A similar number of respondents realised that 'made using genetic modification' and 'produced using gene technology' meant the same thing.
- 5.30 In the 1998 Iceland Frozen Foods' survey, around two-thirds of the population had heard of the terms 'genetically modified foods' or 'genetically engineered foods'. When asked what these terms meant, the seven most common responses were 'changing the nature of food', 'changing genes', 'something to do with science', 'human involvement in changing food', 'playing around with genes', 'playing around with nature' and 'something to do with longer lasting qualities'.
- 5.31 In the Eurobarometer survey,²⁵ respondents were asked whether statements were true or false to test their 'objective' knowledge of biotechnology:
- 'ordinary tomatoes do not contain genes, whereas genetically engineered tomatoes do' (approximately equal numbers of respondents correctly thought this statement was false, incorrectly thought it was true, or did not know);
 - 'if people eat genetically modified fruit, their genes could also become modified' (half the respondents correctly thought this was false, but about a quarter thought it was true and a similar number did not know);
 - 'it is impossible to transfer animal genes to plants' (one quarter of respondents correctly stated this statement was false, another quarter answered incorrectly and about half did not know).
- 5.32 Levels of knowledge about aspects of genetic engineering will often affect opinions about GM food. This survey suggests that one-third of the EU population believe that eating genetically modified fruit could alter their genes. Information about such fundamental misapprehensions from trusted sources may alleviate much consumer concern about the effects of GM foods on the food chain.
- 5.33 When considering the necessity of using genetic modification in plants and animals, 56% of EU respondents agreed that 'only traditional breeding methods should be used, rather than changing the hereditary characteristics of plants and animals through modern biotechnology'. However, 43% of EU respondents also agreed that 'traditional breeding methods can be as effective as modern biotechnology in changing the hereditary characteristics of plants and animals'. Consumers may increase their support of GM foods as they realise that genetic modification has the potential to make changes to food that are not possible through conventional plant breeding.

23 Co-op's vegetarian cheese carried the label 'produced using gene technology'.

24 The Sainsbury's GM tomato purée is labelled as 'made with genetically modified tomatoes' and Safeway's produce carries the label 'produced from genetically modified tomatoes'.

25 European Commission, **Eurobarometer 46.1**.

Public information

- 5.34 As discussed above, whether or not further information about the process of developing GM crops and their consequences will be reassuring is uncertain. Increased anxiety as a result of more information may have more to do with how people get information, than the quality of that information. In the first months of 1999, the UK media had what one journalist called a 'feeding frenzy' regarding risks associated with GM foods. Stories were published with eye-catching headlines such as 'MP links genetic food to 37 deaths' and were later contradicted in articles with titles like 'Gene foods scare rooted in confusion'. Inaccurate assertions, an example being the claim that GM foods were not tested to see if they cause allergic reactions, were made and rebutted within days. One of the most prominent stories over this time regarded Dr Arpad Pusztai's research (see paragraphs 2.57–2.58 and Appendix 1). Numerous newspaper articles appeared supporting his research into the effects of GM potatoes on rats, and alleged a cover-up of unfavourable results. Later newspaper reports presented a contrary view to earlier articles and a wide variety of contradictory 'expert' opinions were aired. It is extremely difficult to see how this abundance of partisan or confused reporting could aid the public understanding of GM crops. The problem of prejudicial reporting is not restricted to arguments about genetic modification, and cannot, in a society with a free press, be avoided. There is no way of ensuring that either side in a debate must present information in an ethical and fair way, however regrettable this may be.
- 5.35 Press coverage aside, most people lack the opportunity to gain an understanding about the science involved in the creation of GM crops and the differences between GM and non-GM crops. However, public information is needed: people should know, if they are interested, what their food is made of. Carefully written leaflets from official or semi-official bodies such as the Science Museum, or interested parties such as the Food and Drink Federation (FDF) or the National Farmers' Union or even official government public information documents are not widely read by the general public. Often such documents are intended primarily for professionals and opinion formers and are frequently much more detailed than the general public wants. The question therefore becomes how to make this information available to consumers to answer the questions that they have and in a form that they are able to access. It is also important to understand whether calls for 'more information' are in fact calls for something else, for instance, reassurance about the efficacy of regulation.²⁶
- 5.36 Consumers also lack a way of explaining their fears and concerns to those responsible for the development, production and sale of GM crops. Some respondents to our public consultation expressed frustration that information about decision making regarding GM crops was difficult for them to access and that they could see no way to express their concerns and influence decisions. We suggest below some institutional arrangements that could improve the dissemination of information and allow people's concerns to be taken into account.
- 5.37 In the Eurobarometer survey, respondents were asked which organisation they would trust most to tell them the truth with regard to modern biotechnology in general and, in particular, about GM food crops grown in fields. With regard to GM crops, environmental organisations commanded the support of around one-quarter of respondents, followed by consumer organisations and farmers' organisations. Industry, religious organisations and political parties received the least amount of support (0–1% of respondents). In February 1999, a poll for the Cabinet Office suggested that the public trusts independent scientists and pressure groups more than politicians for advice on scientific matters.²⁷

26 This view was echoed by some respondents to the Working Party's Consultation, including **BTG plc** which stated 'People expect official bodies and NGOs to deal with [GM crops] on their behalf, objectively and free from ideological opposition to biotechnology in industry'.

27 Public scorns advice over food safety, **The Times**, 8 February 1999.

- 5.38 Furthermore, incidents such as the BSE crisis, have led to some public mistrust of scientists. An additional reason for such mistrust may be because of the difference in the perception of risk between scientists and the public. Scientists and technologists often see novel applications of new discoveries as logical and reasonable, and may characterise opposition as unreasonable. They are more used to an uncertain world, where knowledge is always flawed, can handle risk judgements more easily, and can be impatient with those who differ from them. The public's reaction can be quite different, and could be described as 'outrage' – how dare they do this to us, 'dread' – the way we all would regard a nuclear power station explosion, or 'stigma' – the way the public regards food irradiation.²⁸
- 5.39 We acknowledge that the credibility of the government information on food safety has been so badly impaired in recent years that it may be more fruitful for non-governmental entities, supermarkets and food manufacturers to take on some of the task of informing their customers. All of these organisations have, however, vested interests of some kind. The public's distrust of information from such organisations suggests that advice from companies marketing GM crops would also carry little weight with the public. In fact their efforts to persuade people of the benefits of GM crops are probably counter-productive. Consequently, information about GM plants needs to come from an impeccable source. This disinterested and authoritative information can then be disseminated by supermarkets, libraries, the media and others.
- 5.40 Independent information from a trusted source will not allay all fears, but such information will at least allow the public to make a better informed choice about what food they will buy, and what risks they are prepared to take. **We recommend that the proposed Food Standards Agency (FSA) should be the main source of independent information.** But perhaps the onus on communicating this information in an accessible form for consumers should fall on organisations that they are more likely to trust. The major retailers such as Marks & Spencer, Sainsbury's and Tesco, have a far higher 'trust' rating than the Government, and should be encouraged to disseminate impartial information in a readable and user-friendly form from the FSA, as long as the agency is constructed in such a way that it is able to command widespread confidence.

Consumer choice

- 5.41 Many people fear that genetic modification will lead to less choice for the consumer.²⁹ Even if choice does exist, there is the risk that it will not be a 'real' choice for everyone. Someone at the bottom of the income table, struggling to feed a family, cannot be said to have much choice if he or she has to pay a premium for the 'natural' product. The same argument has been made about organic produce which, because of its expense, is more readily affordable by the middle classes.
- 5.42 In addition, there is the practical problem of whether or not a choice of GM and non-GM foods will be achievable as more foods become genetically modified. The questions of provenance or traceability of foodstuffs, the feasibility of guaranteeing that plants have not inherited modified DNA from a GM parent and the practicalities of a dual path from farm to table of segregated GM and non-GM foods raises concerns that non-GM food at a realistic price may be unattainable in a few years' time. If, however, there is enough demand for non-GM food, it is more likely that the market will segregate GM and non-GM crops, and choice will be preserved. Retailer responses to consumer demand for non-GM foods are discussed below.

²⁸ Burke D (1999) Making British food safe, *Food Science and Technology Today*, 13:12–18.

²⁹ In the 1996 *Eurobarometer* survey over a quarter of British respondents thought that over the next 10 years genetic modification would lead to a reduction in the varieties of fruit and vegetables available. Some respondents to the Working Party's consultation expressed similar concerns.

5.43 Labelling is meaningless unless the public know what genetic modification is. If foods are to be labelled, readily available information about genetic modification should be available at the point of sale in all shops carrying GM products. The situation has been unsatisfactory, with most supermarkets relying on their telephone help-lines to answer customers' questions, but with the employees on the help lines ill-equipped to give accurate information. The current position on labelling is that while some GM products in the UK are clearly labelled, such as GM tomato purée and Co-op 'vegetarian' cheese,³⁰ not all are. One well-known example results from the non-segregation of GM and non-GM soya grown in the US. In 1998, GM soya accounted for about 40% of the US soya harvest and US soya is used in approximately 60% of processed food in the UK. While some soya products need to be labelled, not all do. In addition, ingredients such as hydrogenated vegetable oil do not contain material which allows a test to prove whether it has come from a GM plant or not (see paragraph 2.37). Consequently, manufacturers and retailers wanting to label these substances accurately will have to trace the non-GM plants from the farm gate, and label products which are indistinguishable by any known test differently. This is difficult to do, especially across national boundaries, and the problem of potential fraud, such as representing a product as GM-free when there is no test available to distinguish products, is a serious one.

Responses to consumer concerns

- 5.44 For the reasons discussed above, it is difficult to determine with any precision what the attitude of UK consumers would be to a gradual introduction of GM foods, especially if such foods provided some benefit to the consumer, such as being cheaper or nutritionally superior to a non-GM equivalent. In contrast, consumer's opinions about the labelling of GM products appear to be more unified (paragraph 5.12) and appropriate labelling of GM ingredients is sought, in some cases, even when the ingredient from a GM plant is chemically identical to the same ingredient from a non-GM plant.
- 5.45 Retailers and food manufacturers must build suitable relationships with both consumers and suppliers to remain profitable. GM crops thus provide a dilemma. On the one hand, GM crops appear to be cheaper to grow and the crop of choice for many farmers (especially in the US), and such savings could ultimately benefit the consumer. In future, GM crops could offer the additional benefits to consumers such as 'improved' flavours or nutritional profiles (paragraphs 2.39–41). On the other hand, many consumers would like accurate labelling of GM ingredients (despite research showing that on average in the UK only 10% of consumers read labels) and may wish to avoid food containing GM ingredients altogether. Manufacturers may end up supplying what they consider to be a superior product, containing GM ingredients, for which there will be little demand. A similar situation happened in the early 1990s when food irradiation was proposed. In the 1980s factories were built to carry out irradiation but, because of public disapproval, such foods were never marketed widely in the UK.
- 5.46 Current regulations for the labelling of GM ingredients have been criticised as having too many loopholes, so that additives, processing aids and products from which DNA or protein are removed during processing, need not be labelled as genetically modified, despite coming from GM crops³¹ (see paragraphs 2.37, 7.54, 8.22). In response to these perceived concerns, many manufacturers have agreed to label their GM produce beyond the level currently required by regulation. Such labelling can be unreliable because of the difficulty of testing for some GM ingredients (see paragraph 5.43). Indeed, many manufacturers have recently received adverse publicity for failing to label their products

30 The vast majority of hard cheeses in the UK are made by using chymosin produced using genetic modification.

31 An example of recent criticism is in Anon (1999) *Gene cuisine* **Which?** March: 8–11.

as containing GM ingredients. In some of these cases manufacturers were unaware that their foods contained GM material or had specifically sought to make their products GM-free.³²

- 5.47 As a result of the level of public concern and the difficulty with labelling some forms of GM ingredients, many supermarkets have decided to remove any GM ingredients from their 'own brand' products.³³ As discussed above, to enable supermarkets to ensure that ingredients such as hydrogenated vegetable oil have not come from GM sources, such supplies will need to be segregated and traced from the farm gate. Consequently, a consortium of European supermarkets has formed, including Sainsbury's and Marks & Spencer in the UK, to provide enough buying power to guarantee the provision of non-GM crops, particularly soya. Growers are beginning to recognise the European demand for non-GM plants and countries such as Brazil and Canada are considering the prospect of providing soya that has not been genetically modified, possibly at a premium price. However, the soya component of many processed foods is so small that the increase in cost to the consumer will be minimal. Fast-food chains such as Pizza Express and Burger King have followed the trend and announced that their food is, or is in the process of becoming, GM-free. Large food manufacturers, such as Nestlé and Unilever have made similar statements.³⁴
- 5.48 The Government has also recognised consumer concerns about labelling GM foods to the extent that it announced regulations in February 1999 requiring restaurants to label GM food. In March the controversial regulations were extended so that restaurants, fast-food outlets and waiters were required to inform customers if meals contained GM ingredients. Fines of up to £5000 would be imposed on organisations failing to comply with the regulations³⁵.
- 5.49 Just 20% of Eurobarometer respondents thought that the regulation of modern biotechnology could be left mainly to industry. However, over half of EU respondents agreed with the statement 'irrespective of the regulations, biotechnologists will do whatever they like'. When considering current regulation, about a quarter of EU respondents agreed that 'current regulations are sufficient to protect people from any risks linked to modern biotechnology'. Of organisations administering regulation of modern biotechnology, international organisations such as the United Nations or World Health Organization were most popular, followed by scientific organisations. The remaining organisations in order of popularity were: public authorities, ethics committees, the EU and parliament. The question of regulation of GM crops is considered in detail in Chapter 7.

Implications for public policy

- 5.50 It is clear that the public wants choice as to whether to eat these new foods or not, and choice requires labelling, and labelling requires segregation of supplies. So to quote a recent editorial in the journal *Nature*:

Finally, broad public concerns, however 'irrational' they may appear to some, must be taken into account in food safety regulations if they are to maintain their credibility. Industry complains that the public has lost trust in its scientific experts, but it will only make matters worse by declaring its own loss of trust in the judgement of the consumer. If labelling all foods

32 The reverse situation has occurred in the US where 'BST-free milk' was sold at a premium price but was, in fact, regular milk.

33 Iceland was the first supermarket to take this step in 1998 and has been followed in 1999 by Safeway, Sainsbury's, Co-op, Asda and others, most recently Tesco. For some supermarkets this was a gradual decision: Sainsbury's first announced that they would label all GM ingredients in their own products and then announced that all GM products would be removed from their 'own brand' labels.

34 Nestlé remains committed however, to using GM ingredients in food products to be sold outside the UK. The decision to stop using GM ingredients in UK foodstuffs is in response to public concerns but Nestlé hopes that this halt will be temporary. Nestlé remains confident that GM ingredients offer benefits. **Nestlé UK Ltd Position on Gene Technology**, 28 April 1999

35 **GM labelling - Rooker puts new powers on the menu**. MAFF News Release, 18 March 1999.

produced by GM techniques, as many argue, turns out to be a necessary step in regaining trust on both sides, it could be a small price to pay.³⁶

Conclusions

- 5.51 Consumer opinion about GM foods in the UK and much of Europe is complex and appears to be primarily focused on ecological issues and health concerns. It is difficult to gauge the concerns of the silent majority of the public. However, focus groups and surveys suggest that there is considerable unease about GM products entering the food chain. Although sales of some clearly labelled GM products have been robust, focus groups suggest that people may purchase particular products while 'harbouring significant unease about the technology as a whole'. A large amount of public concern is focused on the issue of choice and there is widespread demand for the labelling of GM foodstuffs. We return to the issue of labelling in Chapter 7. It is unclear how consumer opinion will change if, as predicted, the benefits of GM foods become more established over the next few years.
- 5.52 The public has now become even more sensitised to GM foods following extensive public debate in the media, but, because of the misleading and inaccurate information, are unlikely to be much better informed. More research is required to learn what information the public want to know about GM food. Although some may want information about risks and benefits from a reliable and trusted source, others may prefer more information about regulatory processes so that they know a trusted group is making the decisions for them. People have mixed feelings about whether government regulation is adequate and impartial. Many official sources of information are mistrusted, particularly concerning science and the limits of current scientific knowledge. **We recommend that further research is undertaken to determine what information the public would like about GM food and how best to provide such information.** Such research could build on the public consultation exercise being undertaken by the Office of Science and Technology, due to report in May 1999. In addition, there is a need for public concerns to be integrated into regulatory regimes. Means for doing this are discussed in Chapter 7.

36 Anon (1999) *Nature*, 398: 639.