Consumer Acceptance of Genetically Engineered Food

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Abstract

Consumer acceptance of the products of genetic engineering will be the ultimate test of the success of the technology. Whilst ge modification of food offers great advantages in terms of both economic benefit, and improvements in food for the consumer, the str development of the technology is likely to be market-lead, rather than science-driven. It is essential that the issues relevant to public perce and consumer acceptance be understood during product development.

In Europe, attitudes tend to be most negative towards those applications involving animals and human genetic material. The technolo not viewed as unitary, but different applications should be considered on a case-by-case basis.Negative perceptions may be mediate understanding of need or benefit. It is also important to note that the views of experts and public perceptions of risk are often very differen development of effective risk-benefit communication strategies is essential, and should take due account of the relevant social psycholo theory, whilst it should be remembered that the goal of such communication is to create an informed consumer, rather than attempt to pers or educate the public to accept the technology.

Introduction

The strategic development of genetic engineering in food production is likely to be market-led, rather than science-driven, as ultimately it consumer who will decide whether to purchase food products in the supermarket. In addition, there is a growing public resistance development and application of genetic engineering, particularly within Europe. Existing environmental groups are beginning to raise which argue against future development of the technology, and new groups are beginning to form which directly oppose the unstructured development of genetic engineering, particularly within the context of food production.

Public resistance to technology has many historical precedents. The "Luddite" movement associated with the British industrial revo has been linked to the perceived contemporary social transformation in terms of the displacement of key labour groups, the families of displaced, and competition between other work groups and newly displaced workers for remaining jobs (Randall, 1995). Parallel social ch were predicted to occur in the 20th Century with the advancement of information technology. Despite a change in the skills base of the force, widespread public resistance never really occurred. Against this, the 20th century has seen much greater public resistance to nu energy, in part attributable to the relatively high risk and low benefit the public associate with this technology (Frewer, Howard, and Shep accepted). Public perception is likely to be important in the strategic development of any emerging technology. In the case of ge engineering, the wider social issues in which the technology is embedded cannot be ignored. It is essential that public concerns about wider issues are adequately addressed, and information about all public concerns (not just risk and benefit) be provided to the public (H Woodrum and Czaja, 1992). The goal of such communication is not simply to "educate" the public to accept the technology, but to pr individuals with the scientific information enabling them to make an informed choice about consuming food products and to make a contri to the wider public debate surrounding the technology. The research reported here attempts to address questions relating to consumer perce of the technology, and effective communication about the technology.

Public perceptions and application specificity

Objections to genetic engineering of animals, or the use of human genetic material, are likely to be greater than for manipulations inv plants or microorganisms (for example, see Hoban and Kendall, 1992; Sparks, Shepherd and Frewer, 1995). Moreover, medical applic are more acceptable (on the grounds of either reduced risk perceptions, or because of fewer ethical objections) than applications to food (F and Shepherd, 1995). Typically, surveys and questionnaire studies have utilised questions generated by the investigators themselves to public perceptions of both the technology and its applications. Semi-structured interviewing was used in two experiments to elic terminology that respondents used to distinguish their concerns between different applications of genetic engineering drawn from food-re agricultural and medical applications, where genetic transfers involved either microorganisms, plants, animals or human DNA. In the first respondents (n=25) were asked to respond to fifteen very specific applications with direct tangible benefits. In the second study, a se group of respondents was asked to respond to fifteen applications phrased in very general terms (n=25). Both sets of data were submi generalised Procrustes analysis. Applications associated with animals or human genetic material were described as causing ethical concern, unnatural, harmful and dangerous. Those involving plants or microorganisms were described as being beneficial, progressive and nece Medical applications were seen as being more natural when presented in general terms, although this was not the case when some sp applications were presented. The results were validated in survey research (n=400) where factor analysis indicated that general applicati genetic engineering were perceived as either positive or negative, whereas the specific applications tended to be more highly differentia perceptual terms. Applications involving animals and Human DNA were perceived as high in risk, unnatural and unethical relative to the applications, but this effect was greater if the science was being applied for the purposes of food production (Frewer, Howard, and Shep 1997)

One single item (the extent to which people express objections to genetic engineering) was further analyzed using preference m procedures (Hedderley and Wakeling, 1995). Analysis of variance was used to identify individual differences in the samples. For g applications, the results indicated that most respondents objected less to applications involving plants and microorganisms than to involving animals or human genetic material. Individual differences in objection focused on applications involving animals or human g material, with women and those who are very concerned with the environment having greatest objections to these applications. How individual differences tended to be reduced when specific applications were assessed. The focus of concern was still on applications inv

animals and human genetic material, but gender differences were not statistically significant, and those respondents who had high levels of environmental concern were differentiated by increased objections to large-scale agricultural applications (Frewer, Hedderley, Howard, and Shepherd, in press).

The Importance of Consumer Benefit

Research has indicated that individuals are more likely to purchase genetically modified products if there are tangible benefits to the consumer. Benefits to the manufacturer or the producer are unlikely to facilitate acceptance (Frewer, Howard and Shepherd, 1996). Even for non-controversial examples of the technology, however, decisions appear to made on the basis of process considerations as well as product characteristics. Conjoint analysis was used to assess the relative importance of both process considerations and potential benefits of novel cheeses in terms of purchase likelihood decisions. The example of genetic engineering used was relatively non-controversial in terms of public perceptions of risk, unnaturalness and benefit. 120 consumers were asked to rate purchase likelihood, perceived safety, unnaturalness, ethical concern and need for development for novel cheeses. Genetic engineering (defined as transfer of genetic material between species), protein engineering (altering the characteristics of microorganisms without transferring genetic material), and traditional selective breeding of microorganisms were compared in terms of "production process". Benefits were directed towards the health of the consumer, product quality, the environment, animal welfare or the manufacturer. Conjoint analysis indicated that 79% of the sample made decisions based on process considerations, although tangible benefit was a more important factor in their decisions. For respondents in this group, genetic engineering was the least acceptable production process, and accounted for 30% of their decision making. A further 19% did not consider process important, but tended to make decisions based on consumer benefits alone. Benefits to industry reduced acceptance of the new product. Positive correlations between perceived benefit and need, and purchase likelihood were observed for those respondents who considered process important, but there was no relationship between purchase likelihood and perceptions safety or unnaturalness (Frewer, Howard, Hedderley, and Shepherd, in press, a).

Thus, even for a non-controversial application of the technology, process considerations are clearly an important consideration in consumer decision making. It is likely that this effect will be amplified for more controversial applications, such as meat production. Further research during product development is clearly needed if consumer concerns are to be adequately addressed. For example, perceptions of risk, harm and unnaturalness are more likely to be salient to consumers for more controversial technologies, although these perceptions might be offset by perceptions of need or benefit.

Trust, social context and effective communication

Effective risk benefit communication about technology in general and genetic engineering in particular is unlikely to be effective unless care is taken to address the wider social context in which the technology is embedded. Trust, both in those responsible for regulating the risks associated with genetic engineering, and in the information provided to the public about the technology, is likely to be an important determinant of perceptions about genetic engineering.

At least in the UK, the underlying causes of trust and distrust in different information sources appear to be complex. Trust in information sources appeared to be associated with "truthfulness, "having a good track record", "being trustworthy", "individuals being in favour of using the source,""accuracy", "being factual", "being concerned about public welfare", "being responsible", and "being knowledgable". Such constructs are linked with consumer organisations, medical doctors and the quality media, and to a lesser extent university scientists. Distrust was associated with perceptions of "distortion of information", "being proven wrong in the past" and "being biased". In the UK, such perceptions were linked with government and political sources. Beliefs about source "independence". "accountability", "protecting themselves and their own interests", and "vested interest" (industry) were opposed by "sensationalization" (the tabloid press and friends). Other psychological perceptions associated with trust were "freedom" and "expertise", whereas distrust was associated with "withholding information" (Frewer, Howard, Hedderley and Shepherd, 1996).

Respondents agreed about whom they trust, but tend to disagree about whom they distrust. Female respondents trusted members of parliament and the food industry more than their male counterparts, but trusted newspapers (whether quality or tabloid) less. There was no gender effect for the consumer organization. Younger respondents tended to distrust elected government representatives more than older respondents. Respondents in the intermediate age group had least trust in the food industry, and younger respondents had greatest trust in television documentaries. Trust in government departments and members of parliament increased with education, but trust in the food industry, friends and the "sensationalist" sources decreased with education (Frewer, Howard, Hedderley, and Shepherd, in press b).

The question arises as to whether trust in the information source is important in determining reactions to information about genetic engineering. For general information about genetic engineering, it has been shown that highly persuasive information from a distrusted source may result in attitudes which are very negative towards the technology, this effect being greatest for more controversial applications of genetic engineering involving animals for food production processes (Frewer, Howard, Hedderley, and Shepherd, submitted). However, the effect may be less important in cases where the information is about a concrete application.

Application Specificity : A case study using a realistic example of the technology.

The import of the genetically modified soya (developed by Monsanto) into the United Kingdom from the United States provided the opportunity to test the impact of trust in a "natural" experiment. Media attention about the new genetically modified soya was predicted to occur in late October 1996. Public attitudes towards the risks and benefits of genetically modified soya could then be assessed before and after the predicted media attention, and interactions with source effects assessed. It was hypothesized that the effects of source credibility (if any) would be amplified following any controversial media debate about risks and benefits of the new food technology, as public views would be polarised and the potential hazard become more salient to members of the public in general.

The experimental design was as follows. In July of 1996, 105 quota sampled consumers were allocated to one of three experimental groups. Respondents in group one received neutral to positive information about genetically engineered soya attributed to a high credibility source, a consumer organization. The second group received information from a low credibility source, the government. The third group were allocated to a control condition and received no information. All respondents completed attitudinal scales to assess their attitudes to the new product and to genetic engineering in general (derived from Frewer *et al*, 1997). Those respondents who received information were also asked to rate their perceptions of the qualities of the information in terms of whether they trusted the information, whether it was relevant to the respondent and to other people, the extent to which they perceived it was positive towards the introduction of genetic engineering in food production, and whether it was biased. The same respondents were approached in late October of 1996, and asked to fill in the same attitudinal measures, without the inclusion of information. A second group of 105 respondents were also recruited in October. They were allocated to one of three experimental groups as was done in July. The conditions under which attitudinal data was collected from these respondents was identical to those recruited in July. This permitted direct comparisons between the July group (before the predicted media attention) and the new respondents assessed in October, where the only difference was the media attention directed towards genetically modified soya.

No differences between the different groups were observed with respect to their concern with technology applied to food production, their level of environmental concern, or their interest in food issues. No differences were observed between the two experimental groups in July,

in terms of their attitudes towards genetic engineering, or their perceptions of the attributed source or informational qualities.Furthermore, were no differences between the two experimental groups and the control group in terms of attitudes towards genetic engineering, nor were any changes in attitudes for the respondents assessed repeatedly in July and October. However, comparisons between the respondents recr in July and the new respondents in October indicated several differences.If the information was attributed to the consumer organiza respondents rated it as being more personally relevant if they received the information in October. If the information was attributed t government, respondents reported that they were less likely to actively purchase foods made using genetically modified soya. Fin perceptions of personal relevance increased between the July and October if the information was attributed to a consumer group, but decreas it was attributed to the government. This could be because the issue has become more salient to respondents through the slight increase in m attention in October. The information from the highly trusted source appears to be more personally relevant because respondents had incre recognition of being exposed to both the risks and benefits of the new genetically modified soya.

One problem with "natural" experiments investigating the impact of media attention is that it is not always possible to predict when height of media reporting will occur for a particular news issue. In the case of genetically modified soya, greatest impact occurred du November and early December of 1996.

However, these results appear to indicate that information about very specific products of genetic engineering is likely to reduce impact of trust in the information source. Other experimental work has indicated that inclusion of statements of risk uncertainty in information provided increases trust in the information source and acceptance of more controversial applications of genetic engineering, such that involving animals (Frewer, Howard and Shepherd, submitted). This is probably because public understanding of scientific process is m sophisticated than previously believed. If people recognize that scientific uncertainty is inherent in the risk assessment process, to categorically that a particular potential hazard represents a "zero-risk" option may signal that the real risks are being hidden from the public.

Conclusions

The consumer perception issue is becoming more important as the products of genetic engineering begin to reach the market place. Ge modification of animals is likely to be one of the most controversial applications of the technology, and the one likely to be associated with consumer objection, at least in the UK. It is essential that effective communication about the risks and benefits of applying the technolog addressed early in product development. Some products are likely to be acceptable to the public, although concerns other than those relati simply risk and benefit must be addressed. Failing to label products (particularly at the present time, as products are beginning to enter market) may signal to the consumer that the technology is being hidden. For other more controversial applications, it cannot be assumed that placing products on the supermarket shelves will result in acceptance. Some products may not be accepted, despite commercial benefits accr to industry and the producer. Parallels with food irradiation can be made - consumer acceptance of the technologies used in food productio not automatic, and selective development is more likely to result in product success in the marketplace.

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