

# Genes on the Menu

## A public debate on biotechnology and food

Report by the Temporary Committee on Biotechnology and Food, chaired by Dr. J.C. Terlouw

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## 1. Introduction

Last year, a public debate was held in the Netherlands which was called *Eten en Genen*, loosely translated as Genes on the Menu. The debate is a very special event in the more general, long-standing discussion taking place in society about biotechnology and food. What has made this public debate special is the concerted effort that was made to recruit a broader public in discussion of the subject. This was, in fact, the crux of the Government's assignment to the Committee. The Committee's task was to bypass the usual group of outspoken supporters and opponents, and to make a special effort to seek out the 'common man', the 'average consumer' and ask them about their views on the rapid advances in biotechnology and how they feel about the sometimes uncertain consequences of this technology. The Minister of Agriculture, Nature Management and Fisheries, speaking on behalf of the entire Cabinet, asked the Committee in particular to find out which aspects are important to the public with respect to themes such as food safety, food and health, environment and ecology, citizenship and consumerism, and the global food supply.

The Committee has always been aware of the difficulty of this assignment. The application of biotechnology may have dramatic consequences in many areas and the stakes are high. In addition, the Committee had to work within practical constraints, such as a relatively small budget and a tight schedule for organising and holding the debate and reporting on the results. All in all, this made for a truly challenging task.

The Committee was forced to accommodate its aims within the limiting conditions, above, without affecting the essence of its task: to organise a meaningful exchange of views in the community, and to encourage the public to voice their arguments and opinions as well as their questions. Anyone wanting to make himself heard would be given the opportunity to do so. The Committee also tried to get as many people as possible to attend public meetings where they could talk about food and biotechnology. Every voice counted. A debate is not about how many are for or against, but about people's own thoughts and convictions as well as the validity of their arguments. All the debate activities together have contributed to our report to the Government and Parliament about the public's views on biotechnology and food.

The debate was designed with express consideration for the perceptions and lives of real people. Nine realistic, though sometimes hypothetical cases were drawn up which were used as the basis for the information campaign and to distil people's views<sup>1</sup>. People were asked to consider the nine cases and to

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<sup>1</sup> The nine examples were: (1) a tomato containing a new gene which significantly extends its keeping quality (exists); (2) silage maize containing a gene extracted from a soil bacterium which decomposes a herbicide making the maize more resistant to this weedkiller (exists); (3) yeast cells containing a gene from calves to enable the production of synthetic rennet, so that this no longer needs to be extracted from calves' stomachs (exists); (4) rice containing a gene which increases the vitamin A content of the grains (in development); (5) a potato variety which is resistant to phytophthora (in development); (6) non-germinating seed, made by inserting a genetic switch in the plant activating a gene to prevent the germination of its seeds (in development); (7) salmon containing a gene from another fish species, so that it can be farmed in colder water (at other locations) (hypothetical); (8) a cow containing a gene which makes it immune to prion infections so that it cannot develop BSE (hypothetical); (9) a cow in

form an opinion on the pros and cons of using biotechnology in food production, and to discuss this with others in an organised debate. The Committee also actively sought out citizens and consumers at locations where a good response was likely: at schools, at gatherings of clubs or interest groups, and at supermarkets. It also advertised in various media, including the Internet. The methods used by the Committee are described in more detail in Appendix A.

The subject of the debate was hardly new. In order to understand the context in which the debate took place, it is important to realise that genetic engineering has played a significant role in life sciences research since the 1970s. Genetic scientists met with little resistance as they developed practical tools now widely accepted in forensic medicine (in the fight against crime) and medical diagnostics. The pharmaceutical industry is enthusiastic about the possibilities of biotechnology in the development of new vaccines and drugs in the future. Around the world, many see biotechnology and molecular biology as the second modern innovative revolution, after information and communication technology. In our own country, the Government has spent about 275 million euros on genomics research.

In agriculture, gene technology is being applied on a large scale around the world. In particular, genetically engineered maize and soybean are processed in many food products. In 2001, about 50 million hectares of arable land, worldwide, was under transgenic crops: maize and soybean in North America and Argentina, and cotton in China. In 2000, in the United States alone, transgenic crops were grown on more than 30 million hectares. In that year, transgenic crops were grown in thirteen countries around the world (eight industrialised countries, five developing countries). Of the global soybean crop in 2000, 36 per cent comprised transgenic varieties. In comparison, seven per cent of the global cereal crop consisted of genetically engineered varieties. According to the United Nations, about 150 to 200 transgenic crops are currently in development.

In Europe, many products on the supermarket shelves may contain small amounts of genetically modified (GM) ingredients, primarily from maize and soybean. Genetic modification is also a common application during the processing of food products. Experts in the fodder sector estimate that 75% of the compound feed used in the Netherlands may contain GM ingredients. According to industry experts, nearly all consumers in developed countries have been exposed to GM enzymes. For example, fifty per cent of the enzymes produced for bread-baking are said to be genetically modified. In the case of sugar syrup, this is estimated to be as much as 80%, compared to 25% for cheese. Unlike genetic engineering in the medical sector, however, the application of this technology in food production is highly controversial.

The debate was organised to enable participation at different levels by people from different target groups in the population. The Committee's debate design is described in detail elsewhere in this report. A large group of people were canvassed just once for their opinion, others were brought together in an organised debate. A small group participated intensively, taking part in several debates. It is clear that the way in which people are approached is reflected in their response. Factors that influence response include whether or not people have been informed about the subject beforehand, or whether they are

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which the gene responsible for the production of saturated fats has been repressed, so that its milk is better for human health (hypothetical).

part of a representative cohort. People who were asked ad hoc to give their opinion were usually very critical and negative about the application of biotechnology and food.

*The Committee observed that the better people were informed and the more they had thought about the issue, the stricter their conditions for the use of biotechnology in food.* Clearly, being well-informed did not lead to a more positive view of biotechnology in relation to food. This group of people was more aware of what they find important. The most important precondition is that the public must be able to rely on the authorities which monitor biotechnology applications in food production: the government, science, trade and industry. At the moment, this precondition is not being met to the public's satisfaction. People will become more tolerant towards the use of biotechnology in food production when the government, science and trade and industry succeed in fulfilling the necessary preconditions. Finally, as regards information, there is a fairly large gap between what the experts know and the public's knowledge on this subject. This naturally affects the nature of the debate.

The Committee observed that the public's confidence in government has declined.<sup>2</sup> This decline does not only pertain to the government's role in food quality and food safety. People have become more emancipated, they are better informed, better educated, more independent and generally better equipped to form their own opinion. The government does not yet fully realise this. Many people thought that the public debate on biotechnology and food had come much too late. They appreciated being asked for their opinion, but also pointed out that developments – nationally and internationally – had already gone too far to be stopped.

The Committee does not believe that the public mistrusts science as such. Scientists have achieved impressive results. But scientists also publicly admit that they do not know everything, that some consequences of the applications of their work cannot be foreseen. Their assessments may differ and indeed sometimes conflict. This adds to the public's uncertainty.

In the Netherlands, the public's views on farming and the food industry must be considered in the light of the recent food crises. Dioxins in animal feed and animal products, BSE, classical swine fever, foot-and-mouth disease, hormones and antibiotics, and salmonella contamination... these have all been heavy blows to consumers' belief in the safety of their food.

*Genetic modification is an impressive new technology, but its application in practice depends on public support. This is only now being recognised. The government and political parties must learn to act according to this principle. The most important thing is to restore citizens' confidence in their government, because it is the government that lays down the preconditions for research and enterprise. This is dealt with in the Committee's recommendations, elsewhere in this report. Briefly, the Committee recommends:*

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<sup>2</sup> Compared to other European countries, however, Dutch citizens still have a fairly high degree of confidence in their government: in 1998, Eurobarometer recorded that 50% of Dutch citizens believed that their government is entirely truthful in its statements on food safety, compared to 40% in Finland, 37% in Austria, Sweden and Denmark, 35% in Spain, 31% in Ireland, 26% in the UK, 21% in Italy, 18% in Greece and 14% in Belgium.

- *The establishment of a national or European Food Safety Authority. This should be an independent body charged with the authorisation of foodstuffs and funded by the government. There must be no government influence, however, in the body's execution of its tasks.*
- *The development of new and better methods to enable the government to start an early dialogue on the possible application of life sciences research with a broader public. This is necessary because public support is vital for the application of a new technology. Citizens must have access to objective, balanced, easy-to-follow information in order to form their opinion on new technological applications and the conditions under which it would be acceptable. The Committee suggests that the government commissions a study in the near future, culminating in an official position on the most appropriate way of communicating with the public about biotechnological applications.*
- *Giving the best possible guarantee that consumers' freedom of choice will be maintained, by laying down legislation on accessible, detailed production information.*

## 2 Methods

An important question is whether there is greater awareness of biotechnology and food as a result of the public debate. Was the public successfully informed about the issue, and did they speak up? In its approach, the Committee on Biotechnology and Food distinguished between different 'debate levels'. Target groups were involved in the debate in various ways. The first, and most intense debate level, involved a selection of about 150 Dutch people, which was then divided into smaller subgroups of 25 people each. Each subgroup spent two evenings in intense discussion led by an expert in the field in which they exchanged arguments for and against the applications of genetic engineering in food production and the preconditions people would want to set on the development of such applications. This first debate level shall be referred to as the 'group debaters' throughout the rest of the report. The second debate level consisted of schools and public organisations that were invited to discuss biotechnology and food within their own groups; about 320 organisations (including umbrella organisations) and 2400 schools were asked to participate. And finally, the third debate level was the general public who were informed about biotechnology through the media, including our web site ([www.etenengenen.nl](http://www.etenengenen.nl)), at the public debates, and through *Allerhande*, the Albert Heijn supermarket newsletter.

The Committee chose this tiered approach in order to reach its quantitative as well as qualitative goals. On the one hand, the Committee wanted to inform Dutch consumers as much as possible about food and genetic engineering, while giving as many people as possible the chance to share their opinions. On the other hand, a debate is more than an opinion poll: in order to make a substantiated statement about the social support for applications of biotechnology in food, we needed insight into the arguments on which people base their opinions and the conditions which they impose on particular technological developments. Each level provided the Committee with a piece of the information it felt it needed to be able to report in a responsible way to the Government and parliament. Thus, every level provided more value in relation to the other; together, they provided the most complete picture possible of how applications of biotechnology in food production are viewed in society.

Public opinion research<sup>3</sup> established that between June (before the debates) and November 2001, public awareness of genetic engineering and food increased. Millions of people were directly confronted with biotechnology and food a number of times over the past year. Newspapers, radio and television reported on the Committee's initial meeting, on the vote against this Committee by fifteen environmental and development organisations, and on the hearings that were held on 8 October 2001 by the Committee. In addition, a number of national newspapers highlighted biotechnology and food in a series of articles which appeared in the first half of the year. More than two million copies of the brochure 'Let's talk together about the future of our food' were distributed through supermarkets nationwide. And the Committee placed a total of six different advertisements containing information about the various aspects of biotechnology and food in practically all the national and regional newspapers. Furthermore, the Committee invited the public to share their opinions on certain issues. In

total, we received around 26,000 reactions. The Internet debate held on the student web site *www.metofzonder.nl* received about 1500 reactions. Also, several hundred reactions were received via letters, the web site *www.etengen.nl* and e-mail. More than 500 people from all over the world participated in the Internet debate on biotechnology and food hosted by Southern Voices. Almost 200 schools and approximately 80 organisations held debate activities – either with the help of our toolbox containing information and discussion material, or based on the performance *Met of Zonder* ('With or Without') by the theatre company Pandemonia. In total, an estimated 2000 citizens and at least 10,000 secondary school students (15–18 years old) participated.

The researchers concluded that the public debate *Eten en Genen* provided sufficient opportunity for discussion and the formation of opinions and viewpoints about the use of modern biotechnology in food and the preconditions and limits that, according to stakeholders, must be set.

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<sup>3</sup> A consortium of researchers from different institutions, led by the Twente Institute for Communication Research (University of Twente) and advised by professors from various universities, conducted research on the public debate *Eten en Genen* and on two occasions, polled the Dutch public for their opinion. The results of these research projects is available on request.

### 3 Debate results

#### 3.1 General

Based on the general impression of responses from the three discussion levels, the public is very sceptical about the use of biotechnology in food. People are doubtful about the purpose, they want to be informed about the alternatives, and they fear the risks. For example, in many letters and also in the debates with 150 Dutch people, the purpose of biotechnology in food production came up as a question almost continually. Health-enhancing uses generated the most support, but even here questions were immediately raised about alternatives. For instance, the majority of debate participants could not see the need for a transgenic BSE-free cow because there is already a simple and effective alternative: ban meat and bonemeal in animal feed. Reasonable alternatives to cows that produce low-cholesterol milk include a healthy lifestyle, a healthier diet and the use of medications for patients with high cholesterol. Many people considered the genetic engineering of animals to increase food production more unethical than such applications with plants. Only in cases where there is an urgent need, such as a medical application that actually tackles a major illness (and not just the symptoms), does the public deviate from this moral position.

A frequently recurring theme in the debate was the question whether genetic engineering is fundamentally different from conventional breeding. For example, some suggested that genetic engineering should only be permitted in situations involving lower organisms or isolated parts of higher organisms “taking into consideration all of the ethical preconditions in completely closed reactors or production lines”. In the debates with 150 Dutch people, opinions were split over whether there is a fundamental difference between genetic engineering and breeding. Both groups were approximately equal in number, but for a majority, the objective of the application was eventually the deciding factor. If the objective is judged to be sufficiently useful, most debaters felt this justified genetic modification, regardless of their fundamental view on genetic engineering in relation to conventional breeding.

Many feel that economic benefits alone offer insufficient reason to develop and commercialise certain applications. Many people are concerned about the increasing concentration of knowledge and power in multinational corporations, particularly at the expense of the independence of developing countries. A lot of attention was also paid to this issue on the Internet debate Southern Voices, in which many people from developing countries participated.

Although the group discussions generally began with people’s observations or fears about the problems and risks, approximately three quarters of the group debaters responded affirmatively on the written response forms to the question ‘Should we continue developing biotechnology in food?’ However, it is important to note that the ‘no objection’ opinion expressed by the majority of group debaters depended on the following stringent conditions:

- the objective and need must be demonstrated,
- adequate guarantees for food safety must be provided (strict rules, adequate enforcement),
- risks to the environment and nature must be minimised (for example, the risk of extinction of native species),
- the effects of genetic modification must be further researched in general, and

- consumers must be able to choose between genetically and non-genetically modified foods.

Researchers at the University of Twente analysed the response forms from citizens and students who led debates within their own groups. Here as well, the large majority thought that, 'in general', the use of biotechnology in food should continue (about 80 per cent of the students, and about 66 per cent of the participants in debates run by interest groups or public organisations). The nine examples of applications that the Committee introduced into the debate on the whole received less support. An average of 16 per cent of the respondents from schools and organisations thought that this research should be allowed to continue 'absolutely', about 48 per cent proposed continuing under certain conditions and an average of 36 per cent were absolutely against it.<sup>4</sup> Reservations (and with that the conditions that people set for continuing) arise from the uncertainty that people experience with respect to long-term health risks, the lack of sufficient scientific knowledge, and ethical considerations. But participants in the debates at schools and organisations also viewed the health benefits as the most important possible benefit.

The Dutch public's critical attitude toward the applications of biotechnology in food was confirmed by representative public opinion polls of almost 1300 people that took place in June and November 2001. In both polls, the majority of those interviewed reported to be more or less concerned about the current developments in this field (68 per cent and 62 per cent in June and November, respectively). Forty-three per cent of those interviewed were more against than for further development of genetic engineering in food, while 26 per cent were in favour. The respondents were also asked about what they saw as the pros and cons of using genetic engineering in food production. Almost a fifth of the respondents reported that they could not name any benefits (19.3 per cent). The other respondents named benefits for healthcare (13.4 per cent), for food safety (11.1 per cent) and for developing countries (10.4 per cent). Furthermore, the public considered 'uncertainty' to be the biggest disadvantage (17.7 per cent). For example, respondents asked questions such as 'where does it stop?' and 'what are the consequences?' Another frequently named disadvantage was, strangely enough, also a frequently named benefit: the consequences for human health. Respondents also raised objections that the technology is 'unnatural' and harmful to the environment.

The public's critical attitude revealed itself again in the reactions received by the Committee to the advertisement campaigns. In response to a question in one of the ads, an overwhelming majority (69 per cent) reported that they thought, in general, applications of biotechnology in food were 'undesirable'. Respondents also seemed to be concerned about food safety, health issues, and above all the uncertainty about long-term health effects (and the reversibility of these effects).

### **3.2 Food safety and health**

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<sup>4</sup> Rennet made with the help of GMOs met the least resistance: 17 per cent of the participants believed that this application should not be allowed to continue, 58 per cent thought this should be allowed to continue under certain conditions, and 25 per cent thought this should be allowed to continue 'without restrictions'. Transgenic salmon and the 'terminator gene' met the most resistance: 44 per cent and 46 per cent, respectively, thought that this should not be allowed, while 18 per cent and 4 per cent, respectively, believed this application should be allowed to continue 'without restrictions'.

In June, the Committee asked the public via newspaper advertisements which issues should absolutely be included in the public debate. The number one issue was safety for human health and the environment, closely followed by how safety would be monitored and guaranteed. In November, responses to an advertisement with a question about food safety received a closely split response: 43 per cent of the respondents declared they would not tolerate genetically modified foods; 44 per cent voted to permit genetically modified foods only if, as with medicines, 'extensive, longitudinal research has been conducted to determine the potential long-term effects'.

According to public opinion polls conducted by researchers at the University of Twente, it appears, as mentioned already, that the majority of respondents viewed health and food safety as the most important potential benefits of the applications of biotechnology in food, but also as the most important disadvantages. 'Health benefits' were named as the most important advantage by 13 per cent of respondents, 'health risks' as the most notable disadvantage by 17 per cent of respondents. Risks are mainly understood to include potential long-term effects of biotechnologically produced food on human health, for both current and future generations. In this respect, many people are concerned about 'irreversible consequences'.

In any case, as discussed in the group debates, people realise that safety cannot be 100 per cent guaranteed. Consumers are demanding the government pass laws and issue rules that provide a high level of protection and monitor enforcement. In the public opinion poll, 94 per cent of respondents thought that it was the government's responsibility to guarantee food safety. In addition, several debaters expressed the hope that the government will keep the public better informed about biotechnology in food, so that consumers are more aware of what they are eating. This desire is widespread across society: 70 per cent of those interviewed in the public opinion polls felt that currently the information available about biotechnology and food is inadequate.

For the average citizen and consumer, food safety remains a top priority in the debate about genetic engineering. Interestingly enough, this issue plays a much less prominent role with most social organisations. Critics generally say that there is still not much known about the long-term effects of genetic engineering and point – just as many people do – to available alternatives for almost all biotechnological applications. All stakeholders – producers, food retailers, environmental and consumer organisations – further emphasise the importance of freedom of choice, so that consumers who do not trust or do not wish to purchase transgenic products are given the chance to avoid them. This issue is discussed further below. Only a few organisations, such as the Alternative Consumers Association, *X min Y* and the *Natuurwetpartij* (Natural Law Party) express clear reservations about the safety of genetically modified foods that are currently approved for use on the market. Supporters argue that food produced using GMOs are subjected to a stricter approval process than foods which do not fall under the novel foods regulation, and are therefore perhaps even safer.

The Committee found no scientific evidence in the medical literature to support concerns over the consumption of foods that were produced with the help of GMOs. In a committee hearing held on 8 October 2001 in the Dutch Senate of the States General, Dr. Kuiper of the National Institute for Quality in Agriculture and Horticulture (*Rijksinstituut voor Kwaliteit in de Land- en Tuinbouw*, RIKILT) stated that detailed test protocols for the current generation of transgenic crops already exist. However, these

testing methods will be useless for the next generation of crops, which will contain multiple genetic alterations. With respect to potential health risks of approved foods which have been produced with the aid of modern biotechnology, Prof. Reijnders of Environmental Studies at the University of Amsterdam, testifying at the hearing, remarked that in the current evaluation procedures, many assumptions are made for example about allergies and other health problems. In the end, according to him, a system of empirical predictive tests should be developed, similar to the system already developed for chemicals.

The 150 debaters went into their second session after the hearing. The assertion that food produced using biotechnological techniques is well tested, and that in fact not everything is known about the health effects of 'normal foods', appeared to have little influence on their opinion. The overwhelming reaction to what was mentioned in the hearing about this issue was that the lack of practical experience with genetically modified foods urges caution. Although conventional foods may not be thoroughly scientifically tested, from long, practical experience we know that consumption of conventional foods does not lead to unexpected health effects.

Thus, we can conclude that in the anxiety over the safety of transgenic food, there exists a divide between the public's concern and the assessment of the risks by medical and non-medical experts.

### **3.3 Freedom of choice and labelling**

According to EU regulations, genetically modified ingredients must be labelled whenever GM proteins or DNA can be detected in the raw materials. Because of unavoidable contamination, a threshold of 1 per cent is permitted. The latest rules introduced by the European Union would require labelling of all ingredients produced using GMOs, even if the protein or DNA from these organisms is no longer detectable. In addition, based on national legislation (*Warenwetbesluit Nieuwe voedingsmiddelen*, or Novel Foods regulations under the Commodities Act), producers can voluntarily state that the product they sell on the Dutch market was produced without the use of genetic engineering if genetic modification is used nowhere in the production line. But because this is so difficult to guarantee in practice, producers have not yet taken advantage of this possibility.

Based on the reactions to the newspaper advertisements on labelling that were placed by this Committee in November, there seems to be little public support for the existing labelling requirements: less than 6 per cent were satisfied with 'labelling according to the current legislation in Europe and the Netherlands (e.g. the 1% rule)', as described further in the advertisement text. More than 80 per cent of the respondents thought that we should go further than the current situation: 18 per cent believed that foods should be labelled whenever 'genetic engineering is applied anywhere in the production process'; 64.5 per cent considered that, in the Netherlands, the most stringent labelling requirements should be applied, so that the consumer "can be absolutely sure they are not buying any products containing genetically modified ingredients".

The desirability of freedom of choice was not disputed in the group debate discussions. Although almost everyone immediately admitted to hardly ever reading food labels, they considered the guarantee of freedom of choice an important precondition. Whether people use the labels is not so much the issue; what is important is that people have the opportunity to inspect the ingredients of the foods they buy.

Small print is out of the question; labels must clearly show at a glance whether or not a product is produced using genetic modification. As the discussion progressed, people became more convinced that complete freedom of choice is an illusion. Thus, people expect that price differences in the free market will arise between products that are produced with and without biotechnology and that certain products that are manufactured without the use of genetic engineering may disappear from the market.

The subject of freedom of choice and labelling likewise plays a distinct role in the attitude of various stakeholders in society. The organic food sector is particularly concerned about 'contamination by wind-blown transport of pollen from transgenic plants'. For producers of organic foods, EU rules require that all ingredients must be 'GMO-free'. Avoiding the use of genetic engineering now demands an unjust, one-sided effort in time and money from farmers, food processors and consumers who did not wish to use this technology. Environmental and consumer organisations are asking for solid guarantees from producers and from the government that the idea of freedom of choice be taken seriously.

The biotech industry endorses the importance of thoroughly educating the public on the use of genetic engineering in foods, but strongly objects to the European Commission's proposal to abandon the principle of analytical detectability of GMOs in the end product for labelling purposes. Besides the competitive disadvantages, the industry fears that this would confuse consumers.

Together with the Consumers' Association, food retailers have declared their support for the source labelling of genetically modified foods. At the committee hearing, Dr. Hertzberger (Albert Heijn supermarkets) reported that all the labels on Albert Heijn-brand items state whether the products derive from genetically modified raw materials, even if GMOs are no longer detectible in the end product. However, the total absence of ingredients from genetically modified organisms can never be 100 per cent guaranteed. In any case, according to food retailers, labelling products that contain GMOs does not lead to a decline in sales of those products. In the end, however, according to experts at the hearing, those who want to eat GMO-free will be spending more money than the consumer who is not so particular.

### **3.4 Nature, the environment and agriculture**

With regards to the effects of the cultivation of transgenic crops on nature and the environment, the situation appears to be the opposite of that concerning food safety. Whereas stakeholders and experts seriously considered the effects on nature and the environment, and in many cases expressed outspoken views, this issue received relatively little attention from the public. The Committee had the impression that many people had difficulty evaluating the potential consequences for the environment and nature. This did not restrain the public sometimes from having firm opinions on this point.

'Environmentally damaging' and 'unnatural' played a relatively minor role in the public opinion polls held in November by researchers at the University of Twente. Nature and environmental considerations were also less frequently mentioned in the group debates. Nevertheless, people claimed to be devoted to preserving native species; on the one hand to uphold freedom of choice, and on the other hand to keep the applications of genetic engineering 'reversible'. If reversibility cannot be guaranteed, then most

would prefer no genetic engineering at all. With some applications, namely salmon, people believed that the benefit is so small that the potential risks for biodiversity make this application unacceptable. It was noted that damage to the environment should be minimised as much as possible and that genetic modification is justifiable only when a 'clear' goal is being achieved. Genetic modification to gain an environmental benefit is only acceptable if this benefit is large and measurable.

On 11 December, the Committee asked newspaper readers if and under what conditions transgenic crops should be allowed, with respect to the environment. More than 2100 people responded. From this naturally random selection of Dutch people, about 37 per cent believed that these crops should not be grown; 31 per cent considered that this should only be allowed once we know more about the effects of a genetically modified plant on nature and the environment through years of scientific research. A minority of less than 9 per cent prefer to let the government and scientists decide, and even fewer respondents (almost 7 per cent) endorsed risk assessment as it is conducted now, that is, based on current scientific knowledge.

Critics of the application of biotechnology in agriculture have raised arguments concerning ecological risks, both in the Netherlands and developing countries. They primarily fear the uncontrolled and irreversible spreading of transgenic plants in the wild, with unknown consequences. Supporters of biotechnology in agriculture often point out that the environment benefits from growing transgenic crops. In particular, the current generation of transgenic varieties on the market require a much lower use of pesticides. But again, critics counter, the same environmental benefit can be gained in other ways, for example by engaging in integrated crop management or by switching over to organic farming methods.

In interviews with experts, the Committee was surprised to find that there is still much that they do not know concerning the ecological effects of cultivating transgenic plants and that in many respects there is still much uncertainty about the potential environmental benefits promised by certain applications of genetic engineering. This was evident both during the hearing and in individual interviews with experts, for example from COGEM (the Committee on Genetic Modification, which advises the Dutch Ministry of Housing, Spatial Planning, and the Environment about permit applications for research on transgenic plants) and from the research institute Plant Research International (part of Wageningen University and Research Centre).

Prof. Koeman, former chair of the Pesticides Approval Committee in the Netherlands, said that he was not convinced that planting herbicide-tolerant crops would actually lead to a reduction in herbicide use. "It could, but it is certainly not the indisputable case." Prof. Koeman did not rule out that the increased use of these pesticides could consequently lead to a decline in the natural biodiversity surrounding the fields. Prof. Ernst, professor of Plant Ecology and Ecotoxicology at the Free University of Amsterdam believed that the spread of herbicide tolerance to weeds could be expected to pose problems for agriculture in the future. Moreover, Prof. Ernst stated that little is known about the behaviour of transgenic species in the environment and about the effects of plants (transgenic or not) on soil processes. These knowledge gaps were confirmed by Plant Research International.

On Bt genes incorporated into plants to make them resistant to predation by insects, Prof. Dicke, professor of Entomology at Wageningen University, responded that opinions differ over how toxic a specific Bt protein is for a specific group of insects. He added that built-in toxins can also harm useful organisms, particularly when they are natural enemies of the insect pests. This view was shared by Plant Research International.

The public and many NGOs remain concerned about the risks posed to nature by the use of transgenic crops, especially by cross-pollination and natural genetic exchange. It was not easy for the Committee to properly assess these potential risks because, as mentioned earlier, experts still lack consensus and reliable knowledge in several subject areas. Nevertheless, discussions with scientists have made a number of issues clear:

- ❑ unlike in North America, farmland and nature areas in the Netherlands are often located in close proximity to each other. Genetic exchange with wild flora and fauna can thus take place faster than in a situation with large, extensive monocultures;
- ❑ in the Netherlands, fully segregated planting of transgenic and GMO-free crops is in practice not feasible for certain crops;
- ❑ the incorporation of herbicide tolerance in crops can, as a consequence of one-sided use of certain herbicides, lead to the development of resistance in field weeds or to the genetic transfer of herbicide tolerance to related wild species;
- ❑ the incorporation of Bt genes will lead to a decreased use of insecticides. But the effect this would have on other insects, which are not pests (including butterflies) and which are associated with certain plant species is not known;
- ❑ scientific knowledge of complex soil life is largely lacking. It is not known what effects the planting of transgenic and non-transgenic crops can have on micro-organisms, on the soil flora and fauna and on the processes in which all these organisms play a role, as well as on the exchange of genetic material;
- ❑ current regulations hinder investigation into the effects of a transgenic crop on nature and the environment during the early stages of development of a transgenic crop in field studies.

### **3.5 *Developing countries***

In so far as North-South issues were raised in the group debates, the questions have been about the power that industry could exercise over poor farmers by means of patents and seeds for sowing. The 150 group debaters found the dependent relationship unacceptable; the relationship between rich and poor nations should not be allowed to grow more lopsided. They stress that developing countries must make this choice themselves. Similarly, it was noted that in the debates among social clubs and organisations and in schools, there was much resistance against the development of seeds with the 'terminator gene'. This seed essentially produces a sterile plant, thus making it impossible for farmers to use part of their own harvest to produce seeds for the following growing season. In the hearing, Prof. Fresco (FAO) remarked that the difference between the current hybrid seeds and seeds with the terminator gene is not so great: neither seed allows you to grow a second harvest. According to her, whether the seed actually poses a problem for the farmer depends on the farmer and the type of production system.

At schools and public organisations, the idea of Vitamin A Rice received the most interest of any example biotech application. The support for the development of Vitamin A Rice appeared to be the same as for the eight other example biotech applications that were presented. None of the participants at public organisations and schools expressed definite opinions over the implications biotechnology could have for the food supply in developing countries. It is noteworthy that few participants at this debate level (less than 4 per cent) expect biotechnology in general to harm developing countries.

The Committee asked the Biotechnology and Development Monitor and the Network University to organise an Internet debate in autumn 2001 in which participants from all over the world could exchange views on the possibilities and impossibilities, and the opportunities and risks of genetic engineering for food production in developing countries. In this debate, the potential contribution of biotechnology towards solving the world food problem was not discussed explicitly, but rather the conditions under which biotechnology could play a role in developing countries and the potential risks that people see here. The participants collectively defined the agenda items for the debates and chose debate subjects, such as patents, risk assessment and the building of research capacity in developing countries. The discussion on biotech patents was not so much focused on ethical issues, but rather on practical questions.

During the debate, there were many suggestions made about passing laws and issuing rules in developing countries and over the making of agreements on an international level, for example, in connection with the World Trade Organisation (WTO). The importance of good safety assessment and regulation was emphasised by many parties. Regulations must clearly determine which products may be allowed on the world market and based on what criteria. Rules for permitting a genetic material must have a multilateral character, so that countries no longer have to negotiate this privately. The goal must be to harmonise national laws and rules on an international level as much as possible. Legislation requiring risk analysis and field tests should be proposed. Special attention must be paid to regulating safety in domestication areas.<sup>5</sup> Because domestication areas of several of the most important food crops are located in developing countries, the world community has expressed interest in supporting these countries in the name of preserving genetic diversity. For example, by preventing the introduction of genetically modified species in such areas and by supporting research centres and gene banks. If efforts to preserve genetic diversity harm competition for growers in developing countries, rules for compensation must be established on an international level.

Many countries suffer from overpopulation, natural disasters, severe climatic conditions, and social and political unrest, resulting in long-term poverty and hunger. Worldwide, 800 million people are underfed. Nationally and internationally there is much debate over the potential contribution that genetic engineering could offer towards solving the world food problem. According to public opinion polls conducted by researchers at the University of Twente, a large fraction (52 per cent) of those interviewed considered that genetic modification techniques should be permitted to solve the food shortage problem in the Third World.

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<sup>5</sup> These areas, called Centres of Diversity, in which certain food crops are domesticated, deserve special attention. Here, next to the domesticated varieties, there also appear wild varieties and hybrids. These varieties are important for breeding food crops and they are

Reactions to the advertisement placed by the Committee on 14 December painted a totally different picture. From about 900 responses to this specific issue, almost 60 per cent thought that the development of genetically modified foods for the benefit of developing countries should be discouraged; other reactions were equally divided between the categories 'I think that developing genetically modified foods for the benefit of developing countries should be promoted', and 'People in developing countries should decide for themselves how they want to apply genetic modification techniques.'

On 29 October, 15 environmental and development organisations held a conference together in The Hague entitled, "The other side of genetic engineering" in which they proposed that genetic engineering is not necessary to feed the world. There is enough food for everyone, but not everyone can obtain it, for example because people lack enough money. According to experts from the South who spoke at the conference, there is a lot of concern in developing countries about the introduction of genetic engineering. This concern arises more or less out of fear that the dependence on multinationals will increase (because purchase of one product also requires purchase of another), and out of fear for the unpredictable consequences for the environment and agricultural biodiversity.

The Human Development Report 2001 published by the United Nations Development Programme (UNDP) argues in contrast that many developing countries could profit from genetically modified agriculture and food production. The UNDP recognises that risks to human health and the environment deserve attention. But it also emphasises the unique potential of biotechnology, namely the possibility to grow crops that are virus resistant, drought resistant and extra nutritious. Such crops would be especially valuable for poor farmers practicing agriculture on marginally productive lands in sub-Saharan Africa. The Human Development Report assumes that the risks to human health and the environment can be managed.

Various experts at the Committee hearing stated that under certain conditions there are indeed possibilities for genetic engineering to contribute to solving the food problem. According to Prof. Fresco, the cause of hunger is complex and not completely attributable to a shortage of global food production capacity. Hunger appears mainly in areas with great civil unrest and poverty. There are, as she states, specific areas where genetic modification could provide some quality and stability in food production. In particular, the issue is about adapting to ecologically marginal conditions. Experts point out that the (hundreds of) applications that are now being developed offer few prospects for developing countries in the coming five years. The new properties are mainly associated with herbicide tolerance. Little research is being done on biotic stress (drought and salt tolerance) and animal diseases – applications which would benefit developing countries. This situation is partly to blame on the present economic structure, in which the industrial sector can receive patents on biological material and thus allow a capital-rich market to dictate the development of applications, instead of the common good and the good of the small farmer.

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very important for the world as a whole. If they came into contact with genetically modified varieties, this can lead to 'genetic contamination'. A recent study in Mexico has shown that such contamination in maize has indeed already taken place.

Participating scientists in the Southern Voices debate stated that the emphasis the scientific world had shifted from *publish or perish* to *patent or perish*. In the past, scientists were rewarded based on their publications; now the priority is to invent something they can patent. This discussion raised an interesting paradox: on one hand, people recognise that patents can throw up barriers to further research and development; on the other hand, patents can also provide financing for future research. There was a lot of criticism aimed at the patent system during the Internet debate. According to many participants, the system is reducing developing countries' access to original plants and genetic source material. This should be taken into consideration in intellectual property regulations. For example, recognition of farmers' rights and compensation for farmers' knowledge are of major importance for maintaining genetic material.

Participants in the Southern Voices debate came up with the interesting idea of an Intellectual Property Clearing House. Such an institution would provide a forum for the exchange of free, accessible knowledge and genetic material, with which scientists in developing countries can carry out experiments. The Netherlands would be willing to support the establishment of such an initiative if enough interest is expressed by researchers, non-governmental organisations and policymakers in poor countries.

Farmers and NGOs who participated in the Southern Voices debate feared genetic exchange from transgenic crops thereby seriously affecting their freedom of choice. There was particular concern about organic farming, which must be kept a viable economic alternative. Most important for farmers in developing countries is the availability of seeds for sowing, which in these countries are traditionally produced in part by farmers themselves. All parties asked about aid for building research capacity and expertise in developing countries. This demands training and exchange programmes for researchers. It is important that local needs in this area remain central and that people manage available resources realistically and efficiently. Urgent attention must also be paid to local social, cultural and economic aspects that are associated with the introduction of new techniques.

Finally, it is noteworthy that differences of opinion shared in the Southern Voices debate were not based on North–South differences, but rather on the "institutional environment" of participants, such as the organisations they are members of and their profession. In general, opinions from members of NGOs, from both North and South, were very similar. The same held for scientists who work within the same field of study.

#### 4 General conclusions

Dutch public opinion is strongly divided about whether the application of genetic engineering in food production is in principle different from conventional breeding. But even as there are objections to using biotechnology in food – and many people had objections which were often very strong – it seems that only a small number of people object to biotechnology in principle or for ethical reasons. The Dutch public generally considered arguments for the technology's usefulness as being more important; participants often began their arguments and reasoning by asking what the goal of a particular potential application was. However, it can be concluded that government policy does not currently assess either the goals or needs in approving biotechnology in food production.

Directly related to the goals and needs discussion is the question of risk for human health and for the natural environment. Whenever applications on animals are mentioned, the public's apprehension noticeably increases; the availability of alternatives is more urgent in the light of ethical motivations. The public attaches the guarantee of personal freedom of choice as a necessary precondition for accepting food that is made using biotechnology.

Because the goal weighs so heavily in the public's attitude, it is surprising that the commercial sector has not yet tried harder to convince the public about the alleged benefits of the applications of biotechnology in food production. Public opinion is sensitive to the loud voice of environmental organisations, which pay a lot of attention to risk. For instance in the public debate, many people were concerned about still unknown (long-term) consequences of applied biotechnology. It is understandable that faced with new technology, people question the potential consequences for human health, nature and agriculture. And certainly with a technology for which there still exists much scientific uncertainty and doubt, people demand strong guarantees from the government, so that no irreversible developments are allowed that we would later regret. The public also expects the government to sufficiently involve them with policy development and inform them about approval policy.

Certainly in the field of environment and ecology there remains much uncertainty concerning the various aspects of transgenic crops and food products. Some see this as a reason to choose for alternatives to genetic modification; others note that every new technology brings risks and that today's farming and food production also have uncertainties and risks. In any case, it is obvious that we must establish more lines of research in fields where there is still much uncertainty. Basic research by definition breaks new ground. But for concrete applications of biotechnology and food, we cannot escape the conclusion that safety measures<sup>6</sup> form the basis for allowing transgenic products and for guaranteeing public support for the actual application of biotechnology in food.

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<sup>6</sup> In the Cartagena Protocol on Biosafety, certain international trade of GMOs is described in this cautionary document: "Lack of scientific certainty due to insufficient relevant scientific information and knowledge regarding the extent of the potential adverse effects of a living modified organism on the conservation and sustainable use of biological diversity in the Party of import, taking also into account risks to human health, shall not prevent that Party from taking a decision, as appropriate, with regard to the import of the living modified organism in

In the Southern Voices debate and the debates in the Netherlands, it came up that developing countries must be able to determine for themselves whether they want to allow genetic modification. On this point, only the newspaper ad respondents expressed a predominantly different opinion. Research capacity in developing countries in general has suffered in previous years under declining priorities for governments and donors. Capacity recovery, or capacity building, is a first requirement. Rich countries like the Netherlands can offer their support in a variety of ways. By advocating generous arrangements for the use of Northern-developed technologies, such as already takes place with the use of patented medicines. By supporting relevant initiatives of poor countries in global forums such as the World Trade Organisation (WTO). And by providing internationally coordinated support to countries that manage domestication centres of important food crops.

Although the organisation of public discussions led to a certain 'natural' selection of interested participants, there was always a large difference in knowledge (and therefore in the arguments used) between the public and experts. The public's trust in applied biotechnology and food depends to a large extent on the trust in these experts and institutions that are responsible for regulation and control. Therefore it is essential that society understands the scientific grounds which regulations are based on: what criteria are the arguments being weighed by, and what conditions must applications meet? Above all, good communication between science, the government and the public is critical.

Thus from the public debate, we can draw a number of important conclusions about government policy on biotechnology and food:

1. developments should be subject to a thorough evaluation of their goals and necessity;
2. current gaps in our knowledge must be resolved in order to increase public confidence;
3. the government must enter into a comprehensive dialogue with the public on policy concerning biotechnology and food if it is to convince the public that the approval of genetically modified foods is carefully considered. In a good dialogue, it is important that the government clearly communicates how they will handle the public's contribution.

In addition to offering more information, the government must also convince the public that agencies will be created to adequately oversee the safety of new products brought on the market. A cautious approval policy and the guarantee of a well-equipped, independent control agency, separate from the government – for example in the form of a national or European Food Authority – would be the most appropriate approach.

Not only does the public have clear expectations of the government, the public also expects:

- industry to have an open and honest attitude, for example by being clear about the concerns and risks that are associated with the applications they are working on,
- consumer organisations to play a critical role, and
- science to take an independent position which serves the common good, and not just industry's interests.

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question as referred to in paragraph 3 above, in order to avoid or minimize such potential adverse effects."

Finally, the Committee would like to remark on whether a public debate, such as the one we have tried to organise here, has been useful. As mentioned earlier, the divide between researchers and the public is generally large. This is not a problem where basic research uncovers patterns in living and non-living natural processes. But this changes when the research concerns the application of those more fundamental results. Not only because the public is directly affected by technological applications, but also because the conditions that must be applied to applications often belong to another science than the discipline of the original research.

The public consists of many individuals: a source of feelings, intuition, knowledge and experience. Especially if it concerns viewpoints that have to do with the quality of life, viewpoints that often have their origins in ideology, in ethics, in a long-term vision, it is quite likely that arguments are formulated about the fundamental acceptability of applications of basic research. These arguments may also suggest that such technical advances should remain undeveloped.

In recent years, public opinion has given policy a direction. A good example is the stronger regulation for the protection of animals. And could we not conclude that the much criticised public discussion over the peaceful application of nuclear energy was held far too late? If the public could have given their opinion 25 years ago, would not the problems of nuclear waste, the danger of theft of fission material and the threat of nuclear proliferation have received the attention of scientists and politicians much earlier? A public debate is never pointless. Many citizens are prepared to listen to arguments and want to learn more about the pros and cons of applications that science makes possible. Even with all its limitations and shortcomings, a public debate is an attempt to give the public what it has a right to: to be treated as responsible citizens, who have a say in developments that concern them.

The Committee thoroughly realises that the public debate about biotechnology and food will continue unabated in the coming years. The public debate that took place this year has strengthened society's involvement in this subject as a whole. By having this debate, the dialogue between stakeholders and other parties involved in biotechnology on the one side, and the consumers and citizens on the other, has been given a more solid foundation. The debate can now move forward on the basis of more knowledge and substantiated opinions.

## 5 The Committee's Recommendations

The Committee on Biotechnology and Food directed a year-long debate titled Genes on the Menu. It listened intently to everything that the public said. The Committee observed that the better informed people were, the clearer their idea of the conditions which would make biotechnology in food acceptable to them. These conditions can be translated into policy recommendations. The Committee also spoke with scientists and other experts, and with people from interest groups. Their knowledge and arguments have also been recorded carefully.

Taking all this into account, the Committee has drawn up its recommendations, below, for government and parliament. It must be stressed that these have an independent status and do not correlate one-on-one with the results of the public debate.

### 5.1 Food safety and health

The Committee found no scientific evidence in the medical literature to back the public's concerns about the safety of foods produced with the aid of gene technology. It is important that the safety of our food, including food which contains GMOs, is assured now and in the future through legislation and enforcement. The authorisation of genetically modified foods should therefore be based on uniform criteria, for example by using a uniform definition of the concept substantial equivalence<sup>7</sup> and by maintaining a minimum list of substances to be tested.

On the basis of these considerations, the Committee has made the following recommendations:

1. At the European level, there must be a uniform set of rules laying down requirements for market access applications, how these should be assessed and what accompanying information should be provided.
2. A much more comprehensive assessment method as well as adequate measuring techniques should be developed in order to accommodate future generations of engineered crops (with more complex genetic constructs or a changed composition).

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<sup>7</sup> The concept substantial equivalence plays a key role in the authorisation of genetically modified foodstuffs, in particular plant products. A GM foodstuff is considered to be substantially equivalent when measurements fail to show a substantial deviation from the composition of its conventional counterpart. Thus, for example, oil made from GM soy bean is compared with oil from conventional soy. Next to the toxicity analysis, the substantial equivalence test is very important to establish that the GM product is just as safe as a comparable conventional product. When the composition of a product has been altered deliberately through genetic engineering, the introduced characteristics are excluded from the assessment of substantial equivalence. Various aspects of this assessment are still under discussion by scientists, for example:

- how much deviation is allowable for a positive assessment of substantial equivalence?
- what is the normal range of the **compositional** substances in a compound product, which naturally occurs in different varieties?
- which **compositional** substances should be measured (knowing that an organism used as food tends to be made up of thousands of different metabolites, proteins and so on)?

3. Monitoring for short and long term health effects should continue after introduction onto the market (post market surveillance) for every new food product which falls under the EU Novel Foods directive. This should happen irrespective of whether the food product was produced with the aid of biotechnology or not.
4. An independent institute must be established, ultimately at the pan-European level, to make a safety assessment of every food product under the Novel Foods Directive and to give its mark of approval before a product is put on the market. In this way, a reliable and high standard of food safety can be assured.

### ***5.2 Freedom to choose, extension and labelling***

A public survey shows that more than 90 per cent of consumers favours mandatory labelling of foods which have been produced with the aid of biotechnology. About five per cent of those polled said they did actually read product labels. The best way to ensure consumers' freedom to choose would be a simple and clear labelling system using symbols or a colour code, in combination with widespread availability of accessible, more detailed product information.

On the basis of these considerations, the Committee has made the following recommendations:

5. Consumers' freedom to choose must be guaranteed.
6. GM labels on food products should be simple, unambiguous and **distinguishable**/have a high recognition level. A labelling system could distinguish four categories of products:
  - a) GM-free with respect to both composition and production;
  - b) GMOs involved in the production process, but end product is GM-free;
  - c) Less than 1% of product ingredients are genetically modified;
  - d) More than 1% of product ingredients are genetically modified.
7. Consumers must be better informed about the safety of food products. Any consumer wanting to know in detail about how a product was made or what it is made of should be able to get this information from the producer or the supermarket.

### **5.3 Nature, the environment and agriculture**

The authorisation of transgenic agricultural crops should proceed on a case by case basis. GM-free cultivation must be possible now and in the future. Measures must therefore be taken to prevent hybridisation and the growth of volunteer plants. Some crops (grasses) are more difficult to contain in this respect than others. We are required under international treaties such as the Bern Convention and the Biodiversity Convention to ensure the conservation and sustainable use of wild flora and fauna. This also applies to the components which make up nature, from genes to species to ecosystems. Elements of nature and agriculture are so closely interconnected in the Netherlands that some transgenic varieties simply cannot be grown here.

During various interviews with parties such as Cogem, the Committee learned that institutions involved in the scientific assessment of transgenic varieties are themselves actually developing these. Ecological aspects are rarely considered and are in any case evaluated by the same institution. This is an unacceptable conflict of interests and responsibilities. In our contacts with Cogem we also learned that research into the ecological effects of large-scale introductions of transgenic crops is carried out with models only. This, too, is unacceptable: these effects must be studied in field trials.

Varieties which are engineered to reduce the use of insecticides could in the long term give the opposite effect, namely, an increased use of these substances. This might be due to the host plant's resistance being broken. In assessing market applications for engineered varieties, we should also consider the type of agricultural production system we are aiming for in the long term and whether the variety would have a role in such a system.

With respect to animal breeding, the Committee has recorded ethical objections against breeding for 'unnatural' characteristics, a situation which in some livestock sectors already prevails. The introduction of a new technology such as gene technology must not strengthen this trend.

On the basis of these considerations, the Committee has made the following recommendations:

8. In many cases, genetically altered crops cannot be grown in the Netherlands because the following conditions cannot be guaranteed:
  - GM-free cultivation must remain possible;
  - Transgenic crops may not affect wild flora and fauna.
9. We need to expand our – currently limited – knowledge of the biological processes taking place in the soil, more particularly of the substances deposited in the soil by transgenic crops. The effects of transgenic crops on soil processes should be permanently monitored after introduction on the market.
10. Independent ecological researchers must be contracted to provide us with more detailed information about the influence of transgenic crops on wild flora and fauna in the Netherlands. Potential ecological effects should also be investigated in small-scale field trials with transgenic crops.
11. Authorisation procedures should include an assessment of the technology's benefits and to what extent its application is necessary. Short-term benefits should not outweigh long-term policy objectives concerning, for example, sustainability.
12. The genetic modification of animals for food production should not be allowed if there are viable alternatives.

#### ***5.4 Developing countries***

In the national debate, supporters as well as opponents of biotechnology brought up the interests of developing nations in their arguments. Sometimes, these arguments are based on a faulty premise. Structural wrongs and chaos on our planet are at the root of regional food shortages. There is little hope

of these wrongs being set right in the foreseeable future. Developing countries will have to decide themselves, on the basis of their own circumstances and needs, whether biotechnology can help resolve problems in food production and distribution. Dutch policy for development cooperation must take this into account.

On the basis of these considerations, the Committee has made the following recommendations:

13. Hunger and food security problems depend strongly on individual circumstances in developing countries. It is therefore up to local authorities to decide whether biotechnology has a role in agriculture and food production, and what this role might be.
14. Dutch policy for developing countries should support efforts to strengthen local research and capacity building for such research as well as research into alternatives for biotechnological solutions.
15. The preservation of genetic diversity is of vital importance to us all. We should therefore support the conservation efforts of developing countries, for example by a strict application of the precautionary principle, by ensuring farmers' involvement in preserving diversity and rewarding their efforts (breeders' rights), and by supporting gene banks in the regions.
16. A measure needs to be developed for the possible future use of patented seeds of GMOs in developing countries, similar to special regulations for the production of patented drugs in poor countries. There are ideas about establishing an international Intellectual Property Clearing House and guaranteeing free access to agrarian knowledge.

### **5.5 General**

The government stimulates research into the development of biotechnology for food production. At the same time, government policy hampers the testing of these research results in field trials. It is important that the government's policy in this respect is consistent.

The issue of biotechnology and food is far removed from the public. This underscores the importance of keeping the social debate alive, even after the Committee has completed its task. The temporary advisory committee on the genomics knowledge infrastructure, headed by Mr Wijffels, advised the government to keep the public well-informed of developments in this field. We support this view. Open lines of communication will enable the government to signal the public mood and use this information as a basis for policy.

The development of gene technology and its acceptance by the public must be seen in an international context. Some of the Committee's recommendations might put the Netherlands or the European Union at a competitive disadvantage. Yet this need not stop us from making certain choices. The government should assess this on a case by case basis.

On the basis of these considerations, the Committee has made the following recommendations:

17. Government policy on stimulating certain areas of research, on issuing licences for field trials and assessing market access for genetically modified crops should be consistent. It is the government's duty to create and maintain favourable conditions for research.
18. New technology cannot be applied on a large scale without sufficient public support. It is therefore important that the public obtains objective, balanced and accessible information at the earliest possible stage, so that people can form their thoughts about the necessary preconditions for such a large-scale introduction. Citizens must have access to objective, balanced, easy-to-follow information in order to form their opinion on new technological applications and the conditions under which it would be acceptable. A good authorisation procedure will ensure that society's preconditions are fulfilled. The Committee suggests that the government commissions a study in the near future, culminating in an official position on the most appropriate way of communicating with the public about biotechnological applications.
19. The government must determine how it can nullify any negative economic effects of ethical decisions. Possibilities may include new financial instruments or agreements with WTO partners.

Public confidence in the government is the most important precondition for support for government policy in general, and for policy on food in particular. The Committee is convinced that the good relationship between government and the public can be restored with the implementation of this package of measures. Key aspects are clear regulations, adequate enforcement and good communication with the public.

## Appendix A

### The approach

In a letter to Parliament dated 12 January 2001, Minister Brinkhorst wrote: “The Government will launch a public debate on biotechnology and food production, because it wants the public’s views about whether a conscientious use of biotechnology is possible, and if so, in which cases.” But the Minister also stressed that this debate was not intended to promote biotechnology in food production to the public.

### *The assignment*

The assignment to the Temporary Committee on Biotechnology and food Production was:

1. To increase and exchange information on biotechnology and food production on a large scale;
2. To offer possibilities for discussion and the forming of views on the use of modern biotechnology in food production, under which conditions and to which limits;
3. To record the results of the public debate before 1 February 2002, and to present its own recommendations if desired.

The Minister has requested the Committee to pay particular attention to the conditions that the public considers important in the area of food safety, food and health, global food security, the environment and ecosystems, and the interests of citizens and consumers. This last aspect includes ethical issues, labelling and freedom of choice, and a review of the role of government and European and international factors.

### Committee members

The Temporary Committee on Biotechnology and Food Production was chaired by Jan Terlouw, Member of the Senate of the States General, former Minister of Economic Affairs and former Queen’s Commissioner for the Province of Gelderland. In addition, the Committee consisted of the following members:

- Rie De Boois, biologist and nature conservationist, former member of the House of Representatives of the States General
- Renate Dorrestein, novelist
- Hans Galjard, former professor of human genetics at the Erasmus University in Rotterdam
- Frans Kok, professor of food and health at Wageningen University
- Monique van der Laan-Veraart, farmer, former chair of the Dutch young farmers’ union, Nederlands Agrarisch Jongeren Kontakt
- Louk de la Rive Box, professor of international cooperation at Maastricht University
- Herman Scheffer, Chair of the Supervisory Board of Imtech, former Chair of the Supervisory Board of Gist-Brocades
- Erwin Seydel, professor of applied communication sciences at the University of Twente

### The problem

A public debate is not a referendum. In a referendum, binding or otherwise, the objective is to obtain clarity on how the majority of the consulted public feels on a certain matter. The question is ‘are you for or against?’ and the most votes count. A public debate not only focuses on the *opinions* people might

have, but mainly on the *arguments*. In a debate, the question is: 'Which arguments do you consider important and how do you weigh those arguments in your discussion with others?' In that sense, *all* votes count in a debate.

Environmental and development organisations in particular have reproached the Committee that they have evaded the fundamental question in the debate; whether or not the public considers the application of gene technology acceptable. These organisations feel that the public should not only be asked under which conditions they would accept the application of genetic technology in food; they should also be able to express, principally, whether they are for or against this technology. It is incorrect to say that this question of principle was not raised in the public debate, as it was posed explicitly in the information and discussion material distributed on the Food and Genes debate. Aside from this, the Committee feels that this criticism disregards a characteristic aspect of the public debate. The most important objective in a public debate is to show the different arguments that are important to people.

The first assignment was to find an appealing, understandable way to present the 'biotechnology and food production' theme, a title that may initially appear boring and difficult. The Committee believed that the interest and attention span of the average citizen in his role as consumer would be difficult to raise, let alone sustain, if the focus would only be on the mechanics of biotechnology. The debate should not predominantly focus on this; people should be asked to give their views on the possible desirable and undesirable social consequences of the application of genetic technology in food. Food is a subject that is important to us all, as we all eat every day. Subsequently, the Committee decided to continue this train of thought and to raise the public's interest by using the title 'Food and Genes'.

### **The implementation**

In the implementation of the public debate, the Committee was assisted by a project or implementation organisation, consisting of the Netherlands Nutrition Centre, the Consumer & Biotechnology Foundation (*Stichting Consument & Biotechnologie*) affiliated with the Consumer Organisation and *Stichting Wetenschap*, a foundation aimed at increasing the dissemination of knowledge to the public. *Stichting Wetenschap* was the 'main contractor': its director acted as coordinator and project manager and it housed the implementation organisation in its offices in Utrecht. The Committee has overall responsibility, and assigned the implementation organisation the task of drawing up and implementing an action plan for the public debate. The development of specific sub-projects was in some cases commissioned to external experts. In public relations, the Chair of the Committee was assisted by an independent spokesperson, appointed by the Ministry of Agriculture, Nature Management and Fisheries. The Committee was provided with a two-man secretariat in order to see to the daily operations and maintain contacts between the Committee and the implementation organisation, the Ministry and the official steering group (see below).

### **Design**

In first meeting of the Committee, which took place on the day that the Cabinet decided to instate the Temporary Biotechnology and Food Committee, the question was weighed carefully how to implement this complex assignment in a responsible manner despite the limited possibilities. The Committee felt that the primary target group of the public debate should be 'ordinary' people shopping at their local

supermarket, a conviction that if anything made the assignment even more ambitious. The Committee felt that one year was not enough time to properly plan this event.

It quickly became apparent that the available maximum budget of ten million guilders would not be enough to actively involve all Dutch people in the debate. Yet the Committee also wanted to reach as many citizens and consumers as possible, so that the debate would truly become a *public* debate. The added value would be that the debate on biotechnology and food, mainly conducted by stakeholding parties (primarily the biotech industry and environmental interest groups) over the past few years, would be broadened. However, the public involvement had to be substantial, as the Cabinet wanted to know about the possibilities of public acceptance of genetic technology applications in food and food production. In other words, to a certain extent people had to gain insight into the considerations that can play a role in evaluating the acceptability of gene technology and, in addition, be able to form its own opinions.

To quickly shift the focus of the debate from the technology of genetic modification or manipulation to its impact on society, the Committee decided to present a series of conceivable, concrete examples of applications of gene technology in food production. Each of these would be accompanied by a brief explanation on the possible benefits, the solution for a particular problem, the pros and cons of the various aspects of a such a product, and finally, whether or not non-transgenic alternatives are available.

Initially, the Committee made a series of seven examples: potatoes resistant to potato blight (*phytophthora*), green maize resistant to weed killer, salmon that can be raised in cold water (and possesses pink colour genes), vitamin A enriched rice, non-perishable tomatoes, cows resistant to BSE, and cows capable of producing cholesterol-reducing milk. Integral, qualitative considerations were drawn up for each example, with a list of the pros and cons for the dilemmas and arguments. The series offered examples of animal and vegetable applications, as well as examples of existing techniques and those that are still in development or purely hypothetical. Thus, the seven examples covered all relevant aspects mentioned by the Cabinet. Each of the examples expressly reflects whether these are fictitious or real.

In the spring of 2001, it appeared from the discussions conducted with interested parties and on behalf of the Committee, that some specific elements in the seven examples were insufficiently highlighted. In the first place, there was no example of a microbic application of gene technology, which is just the type of application that most often occurs in practice. In the second place, there was no example that would focus the question of power and authority: who controls the technology and the market and whose dependence is increased in the application of gene technology? To counteract these criticisms, the Committee developed two additional examples and brought them into the debate in the summer of 2001. These were (1) cheese produced with a coagulant manufactured through genetic modification and (2) seed that produces plants with specific properties that cannot be passed on to seed in a following harvest (this is called 'terminator technology').

### **Debate levels**

In the 'Food and Genes' plan of approach presented at a press conference in the *Nieuwspoort* press centre on 20 March 2001, the Committee opted to use 'debate levels'. Both quantitative as well as

qualitative objectives could be met by including different target groups with different intensities in the debate, with each level producing its share of information. The Committee considered this necessary to reporting responsively to the Cabinet and House of Representatives. Each level provides added value compared to the other levels; together, they provide a complete picture on how society feels about the application of biotechnology and food production.

The inner level is formed by a group of approximately 150 Dutch people, selected by the NIPO, who form a qualitative cross-section of the public. Small groups of about 25 people managed by an experienced panel chair—a moderator—discussed concerns and questions, standards and values, opinions and arguments that were important to them. The groups considered the question of whether they feel that it is acceptable to apply gene technology to food production, and if so, under what conditions. To enable participants to speak freely, the sub-debates were not open to the media. However, environmental and development organisations, as well as Niaba, could have representatives present in these debates. In addition, the reports of the sub-debates were published on the Website, [www.etenengenen.nl](http://www.etenengenen.nl). The following four criteria were crucial in the final selection of participants: residence, age, attitude with respect to biotechnology and food production (for, against, neutral, don't know) and level of education. Extra efforts were made to guarantee that 'the group of 150' would also reflect the multi-cultural character of Dutch society. The debates were held at different locations in the Netherlands, and at each location, different age groups were seated around the table.

To involve the maximum number of citizens and consumers in discussing the use of gene technology in food production, the Committee looked at the 'social midfield', which may be associations and other social connections, such as churches, but which also includes schools—in other words, anywhere people meet in organised groups to exchange thoughts on social and philosophical issues. These public organisations and schools make up the second level in the debate. More than 320 organisations and more than 2400 establishments or schools were approached. They were presented a *toolbox* with tools to conduct the debate (see below); schools could also invite the theatre group Pandemonia to perform the play 'With or Without?', commissioned by the Committee. Eventually about 80 organisations and approximately 200 school-related groups were involved in the debate, of which 50 participated in the theatre performance. By the end of 2001, more than 8000 pupils had seen the performance of 'With or Without'. We estimate that during the past year, a total of about 2000 citizens and a minimum of 10,000 pupils have participated in an activity related to this debate at the invitation of a public organisation. The Internet debate on the student site, [www.metofzonder.nl](http://www.metofzonder.nl), yielded about 1500 reactions. About xxx reactions were received on the site [www.etenengenen.nl](http://www.etenengenen.nl).

After registering, organisations and schools received the *toolbox*. This toolbox contained a *reader* with general information and background articles on how gene technology works, with a focus on important social consequences. In addition, the toolbox also contained a folder that is distributed to the public as an insert in *Allerhande*, a food magazine published by one of the largest grocery stores in the Netherlands. The examples were also elaborated in a separate publication included in the toolbox. The half-hour video tape, 'Does Biotech Taste Good?', briefly explains what gene technology is and what questions the technology invokes by using pictures and interviews about some of the examples included the debate by the Committee.

In addition to this substantive information material, the toolbox contained a manual with practical and substantive directions for the organisation of a debate on Food and Genes.

Immediately after the meeting, all individual participants in the debate were been asked to fill out a form on which they could indicate how they viewed the debate as well as the application of biotechnology in food production.

High school pupils aged fifteen years and older formed a separate target group in the debate.

Educational institutions were informed that they could participate in the debate in three ways (in the subjects biology, social science, general natural science, philosophy, cultural and artistic education and Dutch, for instance):

- through regular lessons or discussions that included an adapted toolbox with material appropriate to the age group for use by the instructor
- student participation in the public internet debate 'www.metofzonder.nl'
- viewing the performance 'With or Without?' by the Pandemonia theater group, along with the accompanying discussion.

### **'The general public'**

Shortly before the presentation of the Food and Genes approach plan on 20 March, the Committee submitted the concept plan to the interdepartmental steering group, where the Ministries of Agriculture, Nature Management and Fisheries; Health, Welfare and Sport; Economic Affairs; Housing, Spatial Planning and the Environment; Education, Culture and Science; and Development Co-operation were represented at the official level. The role of the steering group, on the one hand, was to remain up-to-date about the progress of the debate and, on the other hand, to provide substantive and strategic advice on the Committee's intention. The steering group felt that initially the plan of approach focused too much on the contribution of the stakeholders and did not offer the public enough chance to form and exchange opinions.

The plan of approach was supplemented step-by-step with activities that would appeal to large parts of the population, i.e., the third layer of the Committee's approach:

- advertising in newspapers and free local papers
- radio spots
- a brochure, to be distributed through *Allerhande*, which briefly explains how gene technology works and what it means in practical terms in the grocery store and
- a public hearing in which the Committee, on behalf of the public, would ask clarification on concerns and uncertainties that the consumer and citizen might have.

In addition, the character of the starting manifestation was adapted to the national debate, and obtaining insights into the questions and concerns existing among the general public was given greater priority. In this sense, the starting manifestation became an agenda-driven occasion for continuing the public debate.

Headed by the Twente Institute for Communication Research of the University of Twente, and involving other universities as well, a consortium of researchers carried out a study on the objectives, set-up,

implementation and results of the public debate. As part of this research, how people heard or read about the Terlouw Committee in November of 2001 was examined. It was found that by and large, most respondents who had heard of the debate found out through the supermarket (86 percent), with other sources lagging far behind: work (2.6 percent), family and acquaintances (2.0 percent), Internet and Teletext (1.8 percent) and the media (1.4 percent). The Appendix 'The Newspaper Reader' will explain how the public can be reached through the media.

### **The social parties**

The main objective of the debate was to have the public form an opinion on the application of biotechnology in food production. The Government and Parliament need gain insight into the social scope of this question and to ascertain whether or not the Dutch public considers this technology acceptable, and if so, under what conditions. For various reasons the Committee wanted to have certain groups who are involved in developments on this subject participate in the debate. Members of these groups have put a great deal of thought—often over many years—into the arguments for and against the use of gene technology in food production and have taken strong stands. The public wants to have input from these groups in determining their own opinions. In addition, it is crucial for these groups – trade and industry, non-governmental organisations, consumers and trade organisations – to have confidence in the process of the debate. After all, just like the government, they also have to live with the results of the public debate.

In the course of the year 2000, the following interested organisations were approached by a project group commissioned by the Ministries of Agriculture, Nature Management and Fisheries; Housing, Spatial Planning and the Environment; Economic Affairs; Health, Welfare and Sport; with the mission "To make an inventory of the wishes regarding the objective, substance and form of the debate". From these 'exploratory phases' it appeared that all interviewed parties – from agriculture, science, chain parties and social organisations –were, in principle, advocates of a social debate on biotechnology and food production and wanted to participate themselves. It also appears from the report on this exploratory phase that those involved indeed posed conditions to such a debate, which were later somewhat deviated from, based on instructions from the Temporary Biotechnology and Food Production Committee. The result was that a social 'vision debate' would be scheduled for a period of one and a half years and would focus on 'sustainable food production' as the main theme. Finally, a more important role was allocated to the interested organisations, who would need to discuss their viewpoints outside of the public debate.

In May of 2001, approximately 30 organisations met with representatives of the Committee to discuss the debate's purpose. Shortly thereafter, in response to a letter sent to the Committee, a delegation formed of 12 environmental and development organisations<sup>7</sup> exchanged more specific views on designing the public debate with some of the Committee members, including the Chair. The views of this delegation focused on the following matters:

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<sup>7</sup> Alternative Consumers Organisation, Both Ends, [a](#)Animal welfarists, Greenpeace, Hivos, *Inzet*, Environment Defense, Nature and Environment Foundation, Netherlands Platform General Technology, Novib, Platform Biologica, X minus Y.

- The presentation of the questions: the debate must (also) focus on the question of whether or not biotechnology is acceptable, instead of only focusing on the conditions under which it is acceptable, including gene technology in food;
- The approach: As there is not enough public debate, social organisations and interested members of the Dutch public do not have enough opportunities to participate in the debate;
- The information material of the Committee: in particular the video ‘Does Biotech Taste Good?’ supposedly contained one-sided propaganda in favour of biotechnology;
- The practical examples: the approach was aimed at biotechnological solutions and not at solving the most important problems in food production. In addition, the advantages were fictitious and suggested non-existing advantages, while not enough attention was paid to the disadvantages.

*In response, the Committee stated the following: The debate assumes that gene technology is now used in food production worldwide on a large scale. The question in the debate focuses on: How does the public feel about this? The question is expressly raised if people feel that application of this technology is not warranted. As gene technology appears to be here to stay, the public is also asked about the requirements that must be met for access to the market and the sale of gene technology products. The result could be, as indicated by Committee Chair Terlouw in this discussion, that the conditions demanded by the public are very strict, to the extent that hardly anything would be possible. Fictitious examples were chosen partially to highlight certain relevant aspects, such as animal welfare, that could not be brought into the debate using existing applications. In addition, the debate is also meant to gain insight into how the public feels about possible future developments. To counteract any criticism that the debate would not be ‘open’ enough, the Website [etenengenen.nl](http://etenengenen.nl) has provided a place for all unedited reactions from the public and organisations, and public debates have been organised in 8 cities.*

On 28 September 2001, the environmental and development organisations, now grown to 15 in number,<sup>8</sup> issued a press statement in which they declared that they no longer supported the Committee. This occurred after the Committee indicated that they could not honour the two additional written requests demanded by the organisations. The organisations wanted to have the video ‘Does Biotech Taste Good?’—adapted after the starting manifestation—withdrawn by the Committee, so that it would not be distributed in the *toolbox*. They also felt that the discussions with the 150 selected Dutch participants should be open to the press.

In its reaction, the Committee let it be known that it regretted that the organisations were taking this step. It said that it did not find it correct and would continue to include substantive arguments and opinions in the continued development of the debate. The Committee did not withdraw the information and discussion material (the video, in particular):

After adapting the video, this material contained, in the opinion of the Committee, “balanced information on the possibilities and impossibilities of the application of biotechnology in food production, and supporting and opposing arguments will have full play”. The Committee rejected the request to open the sub-debates with 150 Dutch people to the press, as in doing so, the objective of this activity would be harmed. These discussions were meant to gain more insight into the personal

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The earlier 12 were joined by: Churches in Action, ICCO and Free Laboratory Animals.

considerations, emotions and arguments of people concerning 'Food and Genes'. It was decided not to open these discussions to the media and the public in order to let people express themselves freely. The report of the discussions would be published as soon as possible on the website [www.etenengenen.nl](http://www.etenengenen.nl), and the 15 organisations were invited to send representatives to listen to the discussions. With the exception of the Dutch Biotechnology Association (Niaba), the other environmental and development organisations declined this invitation.

The additional scientific research report mentions two concurrent research projects on extent to which the video 'Does Biotech Taste Good?' attempts to influence the public. Initial research has taken place on the video, which was shown on the starting manifestation and, as commissioned by the Committee, was subsequently adapted. This video has been submitted by Bureau Intomart, under the auspices of Greenpeace, to two focus groups. The additional research states that "it appears that, even after continued questions by discussion leaders, the participants do not find the tape predominantly subjective". The University of Twente has reviewed the adapted video, which was distributed with the *toolbox* in the autumn of 2001. The attitudes of a group people who watched the video were compared to a control group who did not view the video, with the following conclusion: "The video does not prove to have the convincing effect that one would expect, if the video were to influence for or against gene technology. The percentages lead one to suspect that it is indeed possible to find a significant difference by using larger groups.

The biotechnology industry took a positive stand on the debate. As the Chair of Niaba wrote us, in the coming years the debate would be able to offer clarity on the social climate with respect to biotechnology. This is important to the industry as no company wants to invest in something for which there is no market. There is a strong need for clarity on conditions and frameworks in the industry. The biotechnology trade and industry has therefore opted for an active attitude in the public debate, initiating the organisation, for instance, of open days and other information-related activities, theme meetings, round-table discussions, etc. The packet of examples of gene technology applications developed by the Committee for the debate (see elsewhere in this report) also received substantive reactions—that the information on Food and Genes presented to the public should have been 'more neutral and less negative'.

Niaba pleaded with the Committee to involve the 'larger' public in the debate as actively as possible. In the opinion of Niaba, the efforts of the Committee on this point could have been more intensive. Niaba regretted very much the fact that the Committee "did not manage the process around the debate so intensively that the fifteen social organisations continued to participate". According to the industry, it was important to consider how the ethical aspects and public emotions would be well incorporated. Niaba suggested issuing a newsletter to inform interested social groups about the progress of the debate. Those keeping informed on the debate would be able to keep track of the activities of the Terlouw Committee, but could also follow and participate in activities taking place in the country. The Committee accepted this suggestion and has published two newsletters.

The Committee conducted discussions and correspondence with other parties on the purpose of the debate and on the content of the information and discussion material. The report on these discussions is included in this publication.

## **Harmonisation with the House of Representatives**

From the beginning, there were ongoing discussions on harmonising the activities of the Temporary Biotechnology and Food Production Committee of the House of Representatives of the States General (The Terpstra Committee) and the organisation of the public debate. The Terpstra Committee intended to finalise its activities before 31 December 2001, while the results of the public debate could not be reported to the Government and the Parliament any sooner than January 2002. Many criticised these state of affairs, which evoked the image that 'Politics' would determine its opinion before the public had finished speaking. However, it must be noted that a request of the House of Representatives of the States General (a motion by Van Ardenne et al.) was based on the public debate.

The matter of the harmonisation between the public debate and the activities of the House of Representatives of the States General was raised as early as February 2001 in a conversation between Committee Chair Terlouw and the members of the Terpstra Committee. Whilst it was not possible for the Terlouw Committee to develop and finalise the debate—by reporting to the government—in less than the available period of a year, the Terpstra Committee made every attempt to finalise its activities before the end of the year 2001. After all, the election campaign will start soon after the Christmas break: March 2002 for the municipality councils, May for the House of Representatives of the States General. In the spring and summer of 2001, an exchange of correspondence between Committee Chairs Terlouw and Terpstra and Minister Brinkhorst initially led to the agreement that the Terlouw Committee would inform the House on the Integral Memorandum Biotechnology on the state of affairs in the public debate up to that time and would share its first impressions.

This interim solution was, in the opinion of the Committee, still unsatisfactory, a fact that we, once more, expressly pointed out to the Terpstra Committee through a letter in the middle of July. After all, as many pointed out to the Committee, the value of the public debate was limited by the fact that it would not be finalised until after the House of Representatives established its standpoint on the Integral Memorandum Biotechnology Production. The House Committee was ultimately convinced by this argument and judgment on the biotechnology policy was deferred to January 2002, when the results of the public debate would be published. In December, on the eve of the Christmas break of the House, the Terpstra Committee orally informed the Committee on the course of the debate and on the most important results up to that time.

## **In conclusion**

Obviously, the Committee owes many thanks to all people who participated in the debate, either by participating in a discussion, by reacting to newspaper articles or by reporting in other ways how they feel about the application of biotechnology in food production. This debate would not have been possible without all these contributions, and we would not have had any indication how the public feels about this.

We would like to thank the representatives of the groups who were closely involved in the debate because their interest or expertise and who offered their comments on the work of the Committee, and to all who provided their expertise to activities that were developed on Food and Genes.

Finally, the Committee would like to thank the enthusiastic employees who were either involved in the general organisation of the debate itself or who co-ordinated specific parts: the support from the implementing organisation, but also to the many 'externals'.