HOUSE OF COMMONS SESSION 1999–2000

AGRICULTURE COMMITTEE

Third Report

THE SEGREGATION OF GENETICALLY MODIFIED FOODS

Volume II

Minutes of Evidence
and Appendices

Ordered by The House of Commons *to be printed*
28 February 2000

LONDON : THE STATIONERY OFFICE
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The Agriculture Committee is appointed to examine on behalf of the House of Commons the expenditure, administration and policy of the Ministry of Agriculture, Fisheries and Food (and any associated public bodies). Its constitution and powers are set out in House of Commons Standing Order No. 152.

The Committee has a maximum of eleven members, of whom the quorum for any formal proceedings is three. The members of the Committee are appointed by the House and unless discharged remain on the Committee until the next dissolution of Parliament. The present membership of the Committee is as follows:

Mr David Borrow (*Labour, South Ribble*)
Mr David Curry (*Conservative, Skipton*)
Mr David Drew (*Labour, Stroud*)
Mr Alan Hurst (*Labour, Braintree*)
Mr Michael Jack (*Conservative, Fylde*)
Ms Fiona Jones (*Labour, Newark*)
Mr Paul Marsden (*Labour, Shrewsbury and Atcham*)
Mr Austin Mitchell (*Labour, Great Grimsby*)
Mr Lembit Öpik (*Liberal Democrat, Montgomeryshire*)
Mr Owen Paterson (*Conservative, North Shropshire*)
Mr Mark Todd (*Labour, South Derbyshire*)

On 15 Febraury 2000, the Committee elected *Mr David Curry* as its Chairman.[1]

The Committee has the power to require the submission of written evidence and documents, to examine witnesses, and to make Reports to the House. In the footnotes to this Report, references to oral evidence are indicated by 'Q' followed by the question number, references to the written evidence are indicated by 'Ev' followed by a page number.

The Committee may meet at any time (except when Parliament is prorogued or dissolved) and at any place within the United Kingdom. The Committee may meet concurrently with other committees or sub-committees established under Standing Order No. 152 and with the House's European Scrutiny Committee (or any of its sub-committees) and Environmental Audit Committee for the purpose of deliberating, taking evidence or considering draft reports. The Committee may exchange documents and evidence with any of these committees, as well as with the House's Public Accounts and Deregulation Committees.

The Reports and evidence of the Committee are published by The Stationery Office by Order of the House. All publications of the Committee (including press notices) are on the internet at www.parliament.uk/commons/selcom/agrihome.htm. A list of Reports of the Committee in the present Parliament is at the end of this volume.

All correspondence should be addressed to the Clerk of the Agriculture Committee, Committee Office, 7 Millbank, London SW1P 3JA. The telephone number for general inquiries is 020 7219 3262; the Committee's e-mail address is: agricom@parliament.uk.

[1] On 16 July 1997, the Committee elected *Mr Peter Luff* as its Chairman. He was discharged on 21 February 2000.

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MINISTRY OF AGRICULTURE, FISHERIES AND FOOD

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Additional memoranda have been received from the following and have been reported to the House, but to save printing costs they have not been printed and copies have been placed in the House of Commons Library where they may be inspected by Members. Other copies are in the Record Office, House of Lords, and are available to the public for inspection. Requests for inspection should be addressed to the Record Office, House of Lords, London SW1 (Tel 0171 219 3074). Hours of inspection are from 9.30 am to 5.30 pm on Mondays to Fridays.

1. National Farmers' Union (Appendices) (R14)
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HOUSE OF COMMONS SESSION 1999–2000

AGRICULTURE COMMITTEE

THE SEGREGATION OF GENETICALLY MODIFIED FOODS

MINUTES OF EVIDENCE

Tuesday 30 November 1999

SUPPLY CHAIN INITIATIVE ON MODIFIED AGRICULTURAL CROPS (SCIMAC)
Dr Roger Turner, Dr David Carmichael, Mr Paul Rooke and Mr Daniel Pearsall

NOVARTIS
Mr Stephen Smith and Mr Willy de Greef

CARGILL PLC
Mr Graham Secker, Ms Anne Guttridge and Ms Ruth Rawling

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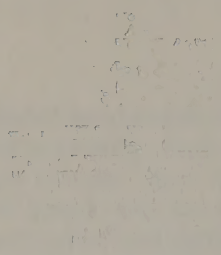

MINUTES OF EVIDENCE

TAKEN BEFORE THE AGRICULTURE COMMITTEE

TUESDAY 30 NOVEMBER 1999

Members present:

Mr Peter Luff, in the Chair
Mr David Curry
Mr Michael Jack
Mr Paul Marsden
Mr Austin Mitchell
Mr Lembit Öpik
Mrs Diana Organ
Mr Mark Todd

Memorandum submitted by the Supply Chain Initiative on Modified Agricultural Crops (SCIMAC) (R21)

SCIMAC was established in June 1998 to support the open, responsible and effective introduction of GM crops in the UK.

SCIMAC represents the UK farms supply chain, from initial seed stock to harvested crop.

SCIMAC represents the UK farms supply chain, from initial seed stock to harvested crop.

SCIMAC supports the provision of full and open consumer information in relation to GM crops and foods, and has established a robust UK framework for identity preservation of GM crops up to and including sale of the harvested crop ex-farm.

The SCIMAC system was formally endorsed by Government in May 1999. It has been welcomed by food processors and manufacturers as a means of satisfying consumer demands for information about the use of GMOs in food products.

However, consistent threshold levels within the food industry to define "GM" and "GM-free" products must be established as a matter of urgency to ensure labelling claims and consumer information are meaningful and can be verified.

1. The Supply Chain Initiative on Modified Agricultural Crops (SCIMAC) is a formal UK grouping of industry organisations representing farmers, plant breeders, the seed trade and biotechnology companies (see Appendix 1 [not printed]). SCIMAC welcomes the opportunity to submit evidence to the House of Commons Agriculture Committee inquiry into segregation of GM foods, and would be pleased to give oral evidence to the Committee if required.

2. SCIMAC membership comprises the National Farmers Union, British Society of Plant Breeders, British Agrochemicals Association, UK Agricultural Supply Trade Association and the British Sugar Beet Seed Producers Association. As such, SCIMAC represents the entire primary supply chain from initial seed stock to harvested crop.

3. SCIMAC member organisations share a common belief that GM crop technology offers benefits for consumers, the food chain and the environment. They support proper, science-based regulation of the technology, transparency of information and responsible stewardship by industry.

4. To this end, SCIMAC has developed an independently audited stewardship programme for the carefully managed introduction of GM crops onto UK farms. The core aims of this initiative, described below, are to provide identity preservation for GM crops, so allowing consumer choice, and to ensure responsible adoption of the technology within UK agriculture through best practice guidelines.

5. In developing this programme, SCIMAC has not sought to reinvent the wheel, but to build on existing, proven systems of identity preservation and crop segregation already in operation within UK agriculture.

6. The SCIMAC stewardship programme, subject to annual review, has been established well in advance of the first commercial plantings of GM crop sin the UK, and currently provides the basis for managing the GM crops involved in the ongoing programme of Farm-Scale Biodiversity Evaluations.

7. The SCIMAC *Code of Practice on the Introduction of Genetically Modified Crops* (Appendix 2 [not printed]) is centred around the need for openness and provision of information at each stage in the farm supply chain. It establishes the premise that meaningful information further along the food chain—and ultimately to consumers—cannot be provided without details of the provenance of a GM product or ingredient from the initial seed stock onwards.

8. The SCIMAC Code of Practice establishes a consistent, industry-wide framework for identity preservation up to and including despatch of the harvested crop from the farm. It specifies that details of GM crops and the nature of the modification should be communicated by successive information transfer at each stage in the primary supply chain, for example via seed labels, product literature, variety guides and post-harvest declaration. It also establishes the important principle that where harvested produce of GM and non-GM varieties are mixed, they should be treated as a GM crop.

9. The Code of Practice provides a framework to establish principles of good agricultural practice in relation to GM crops, highlighting the specific management implications of new traits—such as herbicide tolerance in the first instance.

10. The SCIMAC *Guidelines for Growing Newly Developed Herbicide Tolerant Crops* (Appendix 3 [not printed]) have been drawn up to promote responsible environmental practice, to maintain the integrity of GM and non-GM crops, and to optimise the effectiveness of the new technology within a farm-scale rotation.

11. Specific practical measures to safeguard the integrity and identity of harvested GM (and non-GM) crops include:

— *Seed storage and planting guidelines*—covering basic requirements to store GM seed separately and to clean down seed drills before and after planting;

— *Crop separation distances*—designed to safeguard the integrity of both GM and non-GM crops, including registered organic and certified seed crops. The distances specified in the SCIMAC guidelines draw on experience gained in more than 30 years of growing officially certified seed crops to stringent levels of varietal purity and identity;

— *Harvesting and post-harvest management*—specify requirements to clean down harvesting machinery before and after use, to minimise seed loss at harvest and to prevent seed spillage into unplanned areas of the farm;

— *On-farm monitoring and record-keeping*—are fundamental to the effectiveness of this system and require farmers growing GM crops to maintain full details of crop management, storage and field monitoring throughout the rotation.

12. Application of the SCIMAC stewardship programme (Appendix 4 [not printed]) will mirror the proven and robust legal framework for the production of certified seed. This provides the elements required to ensure compliance, namely:

— Specification of on-farm management protocols within a contractual agreement

— Provision for routine crop inspection by the contract-giver

— Provision for third party audit

— Provision for handling non-compliance or default with the terms of the agreement

13. Formal Government backing for the SCIMAC stewardship programme was announced in the House of Commons by the Rt. Hon. Jack Cunningham, Minister for the Cabinet Office, on 21 May 1999 (Cabinet Office Press Notice CAB 109/99 refers).

14. Furthermore, the SCIMAC initiative has been welcomed by customers in the food industry.The Food and Drink Federation—representing UK food processors and manufacturers—issued the following statement in June 1999:

> *"FDF welcomes the SCIMAC initiative which will greatly facilitate the managed introduction of GM crops to UK agriculture and the provision of associated information along the food chain to food manufacturers and their customers."*

15. SCIMAC fully supports the application of transparent, science-based regulatory controls on GM technology in agriculture and food production. No GM crops can be approved unless they have been rigorously assessed for food, feed and environmental safety.

16. Once approved on safety grounds, the requirement for customers to exercise choice in relation to GM foods should and will be addressed by the market place, not by statute. Labelling provisions relating to "GM" or "GM-free" must urgently be clarified, however, to ensure information presented to consumers is meaningful and consistent.

14th October 1999

Examination of Witnesses

DR ROGER TURNER, Chairman, Supply Chain Initiative on Modified Agricultural Crops (SCIMAC), DR DAVID CARMICHAEL, Lincolnshire farmer and NFU representative to SCIMAC, MR PAUL ROOKE, Policy Director, United Kingdom Agricultural Supply Trade Association (UKASTA), MR DANIEL PEARSALL, SCIMAC Secretary, examined.

Chairman

1. Gentlemen, welcome to the Agriculture Committee and thank you for coming to this our first evidence session on an inquiry we titled The Segregation of GM Food, it seems our witnesses think we should have called The Identity Preservation of GM Foods. I must begin with a personal statement, if you do not mind, gentlemen, just briefly. May I remind the Committee and our witnesses that I have a consultancy arrangement, fully declared in the Register of Members' Interests, with Bell Pottinger Communications and Bell Pottinger Consultants. I understand that various companies within the wider Chime group of companies, of which Bell Pottinger is a part, do act for prominent organisations on both sides of the GM debate. However, my contract expressly prevents me from advising any client where a conflict of interest with my parliamentary duties might arise or be thought to arise. I currently advise no clients of Bell Pottinger and all my work for the company is limited to new business opportunities and other commercial issues completely unrelated to the work of this Committee. The Parliamentary Commissioner for Standards last week repeated to me her previous advice that I have no interest to declare, but in the light of mischievous press reports earlier in the year I thought it wise to make this statement before we begin to take evidence as part of this inquiry. Gentlemen, sorry for that, but I hope it clarifies matters. I would now appreciate it if you would clarify matters for us by identifying yourselves, for the record: Dr Turner?

(*Dr Turner*) I am Roger Turner. I am Chief Executive of the British Society of Plant Breeders, which is a trade association that licenses and collects royalties on plant varieties. I am also Chairman of this SCIMAC grouping, in which capacity I am sitting here today.

(*Dr Carmichael*) I am Dave Carmichael. I am a member of the SCIMAC group, I am also a member of the NFU Biotechnology Group. I am an arable farmer, from Lincolnshire.

(*Mr Pearsall*) I am Daniel Pearsall. I am Secretary to the SCIMAC group, responsible for day-to-day administration and co-ordination of the activities of SCIMAC.

(*Mr Rooke*) I am Paul Rooke. I am the Policy Director of UKASTA and represent UKASTA on SCIMAC. UKASTA is the UK Agricultural Supply Trade Association, representing companies involved in animal feed manufacture, grain trading, seed trading, agro-chemicals and fertiliser distribution.

2. So we have three of the five component parts represented here today.

(*Dr Turner*) Four; BSPB as well.

3. Of course; yes. We do not actually have, or we are just missing, the sugar beet; yes, that is right, is it not?

(*Dr Carmichael*) I am Chairman of the Sugar Beet Research and Education Committee, which is now called the British Beet Research Organisation.

4. So, between you, you can wear all hats of this body. Can you just explain, for the benefit of the Committee, what actually caused you to come together as a grouping in the first place?

(*Dr Turner*) It started off about three or four years ago. We were talking about GM crops generally; we recognised that they would attract some public attention but probably not the level of public attention they have received. And it was really a bit of an *ad hoc* grouping between ourselves, the BSPB, UKASTA and the NFU, recognising we needed to communicate and talk about what was going on; and then, as the debate got more lively, we formally came together in June 1998, and at that point in time we included as well the BAA and the BSBSPA, the sugar beet breeders.

5. Can I put something rather harsh to you perhaps? In your evidence to us you said you were "established in June 1998 to support the open, responsible and effective introduction of GM crops in the UK." It seems to me you failed?

(*Dr Turner*) No; because they have actually not been commercially approved nor released yet, so that pleasure still awaits us. And in this last year I would think we have been relatively successful, we have had an agreement with the Government concerning the field-scale plantings, and as well as that there has been Government support, endorsement, for our Code of Practice and our guidelines. So I actually feel confident that we are moving in the right direction, and I also feel that some of the debate has been, let me say, half-baked, unreliable, lots of scaremongering tactics, and our purpose really is to try to have a calm, measured, responsible voice in the midst of that confusion.

6. You understand, this Committee is not really, in this particular inquiry, at a later date we will look at other issues in the GM area, but in this particular inquiry we are not looking at the merits of GM technology, we are not looking at the environmental threats or the health threats, we are actually looking just at the issue really of choice and how choice is protected for farmers and for consumers. So against that background—there are members of the NFU, for example, who are passionately opposed to the introduction of GM technology into the UK, I took a straw poll of my farmers recently and they split down the middle, 50/50—how do you handle conflicts within your organisations?

(*Dr Carmichael*) The NFU has been working on this since 1995, when the President, at that time, established a working party to look into, examine and study the implications of GM technology to farming; we have been working on that constantly since then to try to get an open understanding, to inform our members and to advise our members. We

[**Chairman** *Cont*]
still are very much in the learning mode, we wish to know where this technology is going, how we can best use it and to inform the farmers who form our membership of that as we go along.

7. You seem to be an organisation which is actually proselytising for GM technology in the UK, that is how it comes across to me, certainly; are you proselytising for GM technology, and if you are not who is, who is actually driving the debate in the UK, do you think?
(*Dr Turner*) I do not think I would use the word proselytising, I think, as I said earlier, we are trying to give a calm, measured view of the benefits that those crops have. I think individual consent holders, who own the intellectual property, they are the people who, if you like, to use your word, proselytise on behalf of their individual varieties, the individual merits of their technology. We are distanced from that, saying we recognise there could be great benefits for agriculture, in the widest sense, the environment, the economics and the farming processes.

8. So do you have any sense of where the debate is being driven from, by individuals, companies, organisations?
(*Dr Turner*) You mean, from an industrial point of view?

9. Yes, from an industrial point of view?
(*Dr Turner*) I think, as I said earlier, they are from the companies that are involved in developing that technology, they are the big, responsible multinational organisations.

10. Responsible, in the sense of technical responsibility?
(*Dr Turner*) No; responsible in the sense of all things. I think it is fashionable these days to knock multinationals, as though they were some evil force; they are not. Companies only get to grow and be big and profitable if they actually persuade the public that they are doing responsible things and selling good products.

11. Let us look in detail at your guidelines. Now your guidelines, which I have got here, for growing herbicide-tolerant, genetically modified crops, seem very detailed, up until the moment when the product actually leaves the farm. Can you think of any parallels elsewhere in industry for that sort of approach?
(*Dr Turner*) Yes. We based the guidelines on the whole of the certified seed industry that has served agriculture very well for the last 35 years. But a good example within that would be malt and malting barley. There is a crop that is grown for a specific market, it is identity preserved. The variety will have characteristics that are going to be sought by maltsters and brewers, and whisky. And that whole thing is tended all the way from the day the bag goes from the breeder's establishment into the farmer's field, the crop is harvested, it goes into the transport system, moves to the maltster, all the way through. It is the variety that is the important thing and not the crop.

12. It has not been segregated, it has been identity-preserved?
(*Dr Turner*) Yes.

13. I would like you just to explain, for the record, the difference between those two concepts?
(*Dr Turner*) Identity preservation, from my perspective, is because the crop will have value, and therefore it is being preserved to retain and enhance that value; it is not going to be dumped on the farm floor, mixed in with something else and sold as grain, sugar, oil, it is going to go as a valuable product. So that is the key difference between identity preservation and segregation, and segregation can be for a multitude of reasons. Many people think about segregation because "it is nasty", or as we see identity preservation, as I said, enhancing and adding value to the farmer's products.
(*Dr Carmichael*) An example of segregation would be high erucic acid oilseed rape, where it is necessary to segregate that from the low glucosinolate rapes; and in that case it is segregated for very obvious reasons all the way down the line, right through to the end user. That is segregation.

14. The issue we are looking at here is whether it is possible to identity-preserve commodities where there is no consumer characteristic at stake which attracts an added value. And all the evidence we have had suggests that there will be GM technologies in the future, we are aware of them, that will deliver identifiable consumer or processor benefits, of one kind or another, in terms of the characteristic of the crop; their identity preservation will be key to maintaining the value of that crop. But the issue is whether or not you actually can identity-preserve, economically, for the bulk commodities, like soya, is it not; so, clearly, there are costs implied in following your guidelines? Is it possible to apply these guidelines without suitable premiums for the farmers who grow the varieties?
(*Dr Carmichael*) There is bound to be a premium somewhere along the line, whether you wanted a premium for crops without any GM, or a premium for the genetically modified crop; there is bound to be a form of premium, whether it is consumer acceptability, marketability, or whatever. So the premium need not necessarily be financial, but it could be increased marketability, it could be an increase in niche marketing abilities, and at this time those are very important to the farmer. And the question of identity preservation is not a difficult one for the majority of farmers to address, that is one of the reasons why the guidelines were developed in the way they were; we have been doing that for 30 years with seed crops, we can continue to do it.

15. Is it not likely that the farmers who choose to continue to grow non-GM crops will actually have to bear the cost of identity preservation because their neighbours or competitors are growing GM crops; does that seem fair?
(*Dr Carmichael*) I do not see why there should be an additional cost to them, because we are very carefully separating GM from non-GM crops by very well defined distances, and the distances have been defined based on our experience with the seed industry for over 40 years, so I cannot see there necessarily being an add-on cost for the non-GM crop grower.

16. So identity preservation does not cost anything?

[**Chairman** *Cont*]

(*Dr Carmichael*) It depends on what level you are trying to do it. For instance, I can grow three different varieties of crop, identity-preserve them all the way through, without any problems at all and without any cost to me; so, on that sort of level. But if I am going to go into a speciality oil, for instance, from oilseed rape, then there may be an additional cost, but that is a niche.

17. But are you identifying the costs on the farm, or the costs in the system, because when it leaves the farm there are costs, are there not?

(*Dr Carmichael*) Yes. I am identifying the costs on the farm.

Chairman: Thank you.

Mr Jack

18. Could you just say a little about the actual method of seed production? In a straightforward, non-modified, either by hybridisation or by GM modification, you can have a simple situation where a farmer may save a quantity of seed from a crop from one year to the next; if you modify, as I understand it, in any way, shape or form, that simple picture I have just painted, then, clearly, somebody else other than the farmer is going to be responsible for producing the next year's seed. I am intrigued to know, you give an interesting example about the difference between malt and malting barley, perhaps you could just say a little bit about how seed is produced for that and, indeed, the high erucic oilseed rape, and also how the seed production process would work in the context of GM, because you have got to have integrity of the protected identity from the start of the process obviously right the way through?

(*Dr Carmichael*) I see it as being identical, in the two cases, between GM seed production or non-GM seed production; and, in fact, all the SCIMAC guidelines have been built on these sorts of principles. For instance, I grow almost only seed cereals, principally wheat, and I am able to-identity-preserve and keep them distinct all the way through the entire production schedule. They are grown in distinct fields, they are drilled by machinery that is carefully cleaned before drilling, they are harvested by machinery that is carefully cleaned before and after, and they are stored in separate seed lots in the barn following harvest, and shipped out by lorry that we have to check before it leaves the farm. That is, very briefly, what is involved. But I do that with over 90 per cent of my wheat crops every year.

(*Dr Turner*) The whole of the certified seed production is a very tightly controlled, very rigorous process, the levels of purity, I believe, are equivalent to the sorts of things you find in pharmaceutical industries, and in many cases higher, so that there is very, very strict control of that process, and that is nothing to do with GM technology, that is production of certified seed. You addressed the question of hybrids, and hybrids actually cannot be farm-saved, the law specifically says that cannot be done, and at the moment the first wave of the technology are hybrid crops, maize, oilseed rape, sugar beet; so the farm-saved seed thing does not come up immediately. But we have said in our guidelines that farmers should not farm-save seed for these crops because of the issues, obviously identity preservation and knowing and tracking and tracing them.

19. So just take me through, for the layman's guide, as to how the seed for GM crops in this context would actually be produced?

(*Dr Turner*) It will depend a little bit, but you have asked a very, very detailed question, I can spend hours talking about this. Let us pick oilseed rape; oilseed rape will be a hybrid. Depending on the sort of technology by which that hybrid is produced, you will have a male and female parent, they will be grown in a field with particular ratios of male to female to produce the right level of seed, they will have a cordon around them of another, non-compatible crop, a barley, or something like that, to give you a pollen barrier between that crop and the others. The hybrid seed will be harvested from the female parent only and then that material will be cleaned, etc., and the whole process, it will be treated with weed-killers, it will be hand-rogued, and it will be very, very intensively managed to make sure that the material leaving that meets the high standards required. As well as that, the fields are inspected by independent auditors, people who have to hold certificates, run by the National Institute of Agricultural Botany.

Chairman

20. If we have any technical questions like this on these issues we might come back to you with other requests.

(*Dr Turner*) Yes, we can provide you with more details.

21. What scientific validation have you had for your guidelines?

(*Dr Turner*) The guidelines went out, and we had 40-plus consultations back from people, and that was a whole range of people; as well as that, we talked to people at John Innes Institute, and at Rothamsted as well, and talked to them specifically about the issues of pollen flow, gene flow and things like that. And, again, as I said, we came back to, not to reinvent the wheel, based entirely on the success of the certified seed industry; so they have been scientifically validated.

22. Is that a formal validation process, or have you just sort of gone out for a casual consultation and people have said, "Oh, yes, that looks alright to me"?

(*Dr Turner*) No; no, we had written responses, from something like 40-plus organisations, and as well as that we had individual discussions with individual scientists.

23. I am just a bit nervous about this, because I still think that you are, understandably, I do not criticise this, protagonists for GM technology, or people who tend to favour it. I would have thought that you would have wanted to get the clearest possible scientific endorsement for what you are suggesting, and actually you might have paid for some proper analysis of your guidelines. Have you not done that; have you just relied on people giving free responses to a consultation?

[**Chairman** *Cont*]

(*Mr Pearsall*) I think it is important to remember that the guidelines did go through a process of evaluation and endorsement by Government, and that did include the Independent Advisory Committee on Releases to the Environment. And it is noteworthy, I think, recently, that the Acting Chairman of the Advisory Committee on Releases to the Environment, Professor Alan Gray, indicated that there was no scientific reason for changing or modifying the guideline separation distances set out within SCIMAC. I think it is also important to remember that the SCIMAC guidelines are not a substitute for regulation, they are a stewardship programme that the industry, voluntarily, has developed, because the industry believes that this is a technology which should be stewarded, should be fostered, that we should not turn our backs on. We should retain an open mind in its development.

Mr Todd

24. You have stressed the link to the certified seed sector and the continuity in the process that you are following here. What degree of tolerance level is imposed in the certified seed sector for contamination or 'adventitious presence', as I think it is called?

(*Dr Turner*) That depends on the crop, the levels vary from crop to crop but they are all 98 per cent plus. They are actually regulations that say it must not contain more than so many wild oat seeds, so many this, so much extraneous material; those are the regulations. But the industry works to HVS, which is higher voluntary standards, they enforce a higher level of purity than that; but it does vary from crop to crop.

25. Have you got a typical example?

(*Dr Turner*) If you are talking cereals, you are talking 99.5 per cent purity, in terms of the genetics and freedom from contamination, and that, I would submit, is pretty damn good.

26. So 0.5 per cent not?

(*Dr Turner*) It could be, yes.

27. So, when someone purchases it, 0.5 per cent is not what they bought; and, at the lower end of that scale, that is presumably one of the higher end you have quoted, I think you said 98 per cent of the others?

(*Dr Turner*) As I say, it varies from crop to crop.

28. Yes; quote a lower example?

(*Dr Turner*) The lower example would be around 98 per cent, 98.5.

29. So the crop would be covered by that?

(*Dr Turner*) Yes, that would be something like oilseed rape.

Chairman

30. Dr Turner, your guidelines have actually been used in trials now, have they not; what has been the feedback on them, and how effective have they been, how onerous have they been?

(*Dr Turner*) We have had them independently audited this year by NIAB. The field-scale planting exercise, the seven farms this year, have all been independently inspected by trained inspectors from NIAB. I think we have had a very good feedback from them, in the sense that the guidelines have been used. They have been followed as rigorously as they can be. There are one or two minor areas that obviously we need to get slightly better on, and they are to do with the detailed understanding of how you actually manage the crop and the crop in the rotation, and I think those are part of that learning process.

Mrs Organ

31. Moving on from that, you said that this is a sort of stewardship programme, voluntarily entered into; so who is responsible for monitoring that the growers of GM crops comply with your guidelines?

(*Dr Carmichael*) It is, again, very similar to the seed production industry. We are monitored on at least three occasions during the season to see that the crop has been grown properly and appropriately. Firstly, NIAB, the National Institute of Agricultural Botany, will monitor that the crop is grown completely according to the requirements and the schedules; they are able to come on to the farm at any time. If I am going to have a seed crop inspected, I get a 'phone call about half an hour before the inspector arrives to say he is coming, will I be available to identify where the field is, and if I am not there he can still come on because it is identified by an OS number; he will come on and inspect, and then his inspections are also vetted by sort of a super-audit body, to ensure that his inspections are complete and are rigorous. So we have a two-stage audit process of all the crops, in this trial phase of production of GM crops.

32. At the moment, of course, we are only on field trials or farm trials, but, if we were to move forward, how are we going to keep up this level of inspection of others and yourselves to keep to your guidelines; there are going to be more inspectors than there are farmers, are there not?

(*Dr Carmichael*) No. There are not particularly many inspectors for growing seed crops now, but they are able to cope, right around the country. We anticipate doing an exactly parallel system for the GMOs.

33. You said earlier, Dr Carmichael, that "we have to check every lorry before it leaves the farm;" how do you do that: every lorry?

(*Dr Carmichael*) Yes. My staff is required to do that and, in fact, they have to sign a document before it leaves the farm, the passport document, to say they have done it. The inspection entails lifting the tail-gate on the lorry, or climbing up into the lorry, to see that there are no traces of other crops present in the lorry from the past load. It is essential for my protection, because if I load a lorry, or if my staff load a lorry, with extraneous material in it I can lose entirely the value of that seed crop, because, I know, as soon as it gets to the seed production factory it is going to be checked as well; so I have to do it, and it is done now.

[**Mrs Organ** *Cont*]

34. I am just a little bit confused about it, if you are saying that every lorry is being checked before it leaves the farm in this way, how can we possibly manage that? I just do not believe that this is actually deliverable.

(*Dr Carmichael*) That is the least of the problems, frankly, because, in my case, the lorry will be loaded by a man with a one-tonne loader; before he takes any grain from store, he will climb into the lorry to check, it is only a two- or three-minute job.

35. But the field trials and the farm trials are not all mixed together, or clustered together, we are talking about people going all over the country to do this, at particular times, when the lorry is leaving the farm; how do you co-ordinate all that?

(*Dr Turner*) I come back to the certified seed situation again. That is being done at the moment, as I said earlier, for particular end uses; where those crops are going into an identity-preserved chain that happens routinely.

36. Can I just ask you, I understand that those farmers who are involved as growers of GM crops may have confidence and understanding of your monitoring process, what have you done to give confidence to those growers of non-GM crops that own a surrounding farm? You say this is your monitoring process, this is your stewardship programme; what information, what publicity, what contacts have you had with others?

(*Dr Carmichael*) I have been willing to grow a GM crop, and I have six farms, or six different farmers, surrounding the field in which I would grow it. I have been to each of those farms in turn, I have talked to each farmer in turn, I have left literature with him, and I have identified the separation distance and assured him that that will be met. I should add that, of those six, four are totally in support of the action I am taking because they believe that farming does need the farm-scale trials to go ahead, and so they are interested in seeing these trials, in understanding what is going on and they have been back to me to find out what is happening next. Two of the farms are concerned, for one reason or another, and they are not interested in proceeding with GM trialling. So that is, of the six around me, two are agnostic, if you like, and four are very interested in seeing the completion of the trials.

37. That sounds pretty good practice, Dr Carmichael, but not every grower in a field trial may take that action. Do you not think that there is a role for SCIMAC actually to be giving out information and publicity and more material? You said at the beginning that you expected some public interest, it has gone much greater than that, we know that 50 per cent of the NFU are not pleased as punch about the idea of GM. Do you not believe that you do have a role to put out information about your guidelines and your process to others?

(*Mr Pearsall*) There is a requirement in the guidelines to notify neighbouring growers where there is a planting which would cross another boundary with a neighbouring grower. I think in this very initial phase there is a great deal of consultation going on by the specific trial growers, given the level of interest and concern that is being expressed about the technology. I would like to refer again to the seed certification system which requires by statute separation distances to be observed between farmers and their neighbouring growers, and that covers something in the order of 9 per cent of the UK arable area. And this is a system which has worked effectively for 30 years, and involves a requirement for farmers to consult with their neighbours and to reach decisions on planting strategies which will enable the non seed grower to carry out his normal commercial business, as well as the seed grower to grow a seed crop which meets those specifications. And, again, it is a model that is proven and it is robust over more than 30 years in this country.

38. But, in order for GM crops to be really successful, we have to persuade, do we not, the consumer, the end of the food chain, that this is being monitored and is safe? One of the problems that we have had in my constituency is, we have a field trial and the parish council, individuals living within the area, not necessarily farmers, wanted to know about it, maybe they kept bees, maybe they had smallholdings, maybe they kept vegetables in their gardens, and had no information and could not get information about it. Do you not believe that you have a role to take your message out to the general public, the consumer, as well?

(*Mr Pearsall*) I am unclear as to which message it is that needs to be got over.

39. About the compliance, and about the effect of your guidelines and what actually is being done to monitor?

(*Mr Pearsall*) I think there is increasing awareness of the role of the farm-scale evaluation programme, which stretches now for the next three years. That is clear; it is there to answer questions that are being raised about biodiversity, and, the farmers involved, certainly SCIMAC encourages them to engage in consultation and dialogue not just with their neighbouring farmers but with the local community as well. That is an important part of engaging in this process.

(*Dr Carmichael*) I would certainly agree with you though that the farmer conducting a farm-scale trial should relate to his neighbourhood. I have spoken to the local parish councillor—

40. And that is not within your guidelines?

(*Dr Carmichael*) Not to go out necessarily and talk to a local parish councillor. I am also talking to one of the local town councils, for exactly the same reason, because I believe the people in these positions should be able to understand the implications of these trials and understand that at this stage we are doing no more than evaluating this technology. We want to ensure the environmental safety of these trials; the health safety of it is already proven and is already accepted, but the environmental safety, and the lack of deleterious effect on the environment, is the reason for running these trials. And I believe that it is beholden on us to make sure that our local parish council and our local town councils as well are fully informed on this.

41. And what happens to GM growers that do not comply with your guidelines, or are seen not to be doing so?

[**Mrs Organ** *Cont*]

(*Mr Pearsall*) I think there is an important distinction to draw between what is going on at the moment, which is the farm-scale evaluations, none of the crops involved yet have all the consents and authorisations required for full commercial growing, and so the direct responsibility at this stage for the crops involved lies with the consent holder, and that is the developer of the variety, because the crops have not delivered all those hurdles. The guidelines themselves have been developed well in advance of the first commercial crops being grown in this country, and it is the technical elements of the guidelines that are being observed by the growers in the farm-scale evaluations, because it is there to replicate normal farming practice.

(*Dr Turner*) I think, as well as that, people who want to trade in certified seed have to hold a licence from BSPB, and that is a pretty onerous licence with lots of very difficult conditions in it. And we do, already in conventional agriculture and plan to do with GMs, BSPB withdraw licences from people who do not behave in a responsible manner.

42. Can I just ask, because you have been, so you say, put on a statutory footing, because the Government has asked the European Commission to develop proposals for placing you on a statutory footing, what exactly does that mean?

(*Mr Pearsall*) I am actually unclear; the statutory requirements, in terms of GM crops, are set out under EC Directive 90/220. The objective of the SCIMAC initiative is to integrate a new technology, once it has cleared all the regulatory hurdles, into existing patterns of agriculture; that, I think, is not an issue of health or safety which should be addressed through regulation but is an issue of observing the commercial interest, the economic interest, of both GM farmers and non-GM farmers. So I think, from a SCIMAC perspective, a voluntary initiative is the best footing on which to address this particular issue.

43. But it does not have any real teeth when people do not comply?

(*Dr Turner*) It does; as I said, to lose your licence and to lose access to the technology. David is a farmer, if I said to him, "You can't grow that crop," that has a significant impact. I do think there are real teeth in there that people will not abuse.

Mr Marsden

44. Dr Carmichael, you said that you spoke to your adjacent farmers about the farm-scale trial?

(*Dr Carmichael*) Yes.

45. What radius do the adjacent farms cover from the centre of your trial?

(*Dr Carmichael*) I suppose the furthest one away would be about a mile, but I really only looked at the farmers that had a field adjacent to my farm.

46. What sort of trial was it?

(*Dr Carmichael*) I am not running one, but I was willing to; it would have been oilseed rape.

47. So do you disagree then with the Soil Association's recommendations for the six-mile radius?

(*Dr Carmichael*) For the sort of trialling that we are doing and the experience we have had, we would suggest that the separation distances that have been put forward in the SCIMAC guidelines are certainly sufficient.

48. So you do disagree with the Soil Association?

(*Dr Carmichael*) I would not agree with the six-mile limit, no.

(*Dr Turner*) And we are in dialogue with the various components of the Organic Farming Association, through UKROFS, trying to resolve that debate.

Mr Todd

49. Growing crops involves birds, bees, human beings, the wind, weather and everything else, disturbing what would be a laboratory process. How certain can you be—and it really comes back to the question I was asking you about the tolerance levels of contamination, or the protection of integrity, depending on how you put it—that a limit such as you have referred to for certified seed can be kept to in this sector?

(*Dr Turner*) I come back to what I said earlier, I think it is the fact that it has worked so well for the last 35 years. Conventional crops are subject to all of the influences you have just listed; the movement of those, the pollen, the genes, and everything, is going on at the moment.

50. Would you appreciate it if someone said, "Well, the risk factor involved in getting it wrong on certified seed is a commercial one, of someone being unhappy about the outcome and feeling that they had paid for something they did not get"? Whereas the risk factor for getting something wrong on a GM crop would be seen as, I would not comment on the science, but might be seen as much, much higher than that, and that, therefore, the tolerance levels you have referred to might be seen as (a) insufficient and (b) not sufficiently certifiable anyway?

(*Dr Carmichael*) Two comments on that. One, the potential contamination is very, very low; for instance, in terms of pollen flow, John Innes Institute has shown it to be several decimal points, 0.001, I think it is, very, very low indeed. And we are only talking about the transfer of, in herbicide resistance, for instance, one gene. Now, if you do convey or confer a resistance to a neighbouring plant, it is only to one herbicide; that particular plant is then susceptible to all the other herbicides in the farmer's armamentarium. So that the end result of this is not going to be environmentally damaging.

51. What you are really going into is the argument over the ethics and science of GM crops, which is not our purpose today. I understand the thrust of what you are saying, but the purpose today is to try to understand the realistic limits of what can be done to segregate the processes you are involved in from the processes that other people who do not perhaps fancy what you are up to, or are involved in, and they have made a commercial judgement as well and have decided to go a different route. So what I am testing out is the realistic limits you have. You have given a statement which says, "Yes, well, they should not really be worried anyway," I think that is broadly

[Mr Todd *Cont*]
what you have said; that is not their response, they are not saying, "Well, we're not worried anyway, we're just making a fuss over nothing," they are concerned. So what realistically can you say, bearing in mind that there is obviously a variance of opinion, as Paul Marsden has shown, between some people's views on realistic segregation limits and yours, what can you say to show that you can offer a guarantee in this sector, or is no guarantee possible?

(*Dr Carmichael*) I can only resort to the scientific studies that have been and are being conducted and the work that is going on in association with the farm-scale evaluation, because that is being very, very closely studied, not just by SCIMAC but also by the environmental groups and the Institute of Terrestrial Ecology, for instance, as well, to ensure that there is no environmental threat. And I think the best that we can do, at the end of all of these trials, is to demonstrate to the general public, to the consumer, that this technology does not confer a risk to either the environment or to the consumer.

52. You have turned the question around again, and I understand why you are doing it, but may I just summarise what I think your position is then, which is that, really, there is no practical way of providing 100 per cent reassurance, or even 99.9 per cent reassurance, to someone with an organic farm that they are not going to face a breach of their integrity from the activities of someone growing GM crops, but the correct answer is to say they should not be worried about this anyway; that is broadly what your position is? And I see your colleague nodding and perhaps being a bit blunter about this, but I think that is what you are saying?

(*Dr Carmichael*) Fundamentally, it is.

53. Yes; right. So what you can offer is ranges of protection of between 98 and 99.5 per cent, according to your methods of measurement; no?

(*Mr Pearsall*) Absolutely not. In terms of the seed production criteria that have been adopted, you will see that we have specifically referred to organic growers in the guidelines and selected separation distances. I believe I am right in quoting John MacLeod, ex-Director of NIAB, at a recent seminar, who stood up and said that the seed purity, the varietal purity rate for oilseed rape, for basic seed production, was 99.7 per cent, and that had never been breached in this country, through observance of those separation distances; so we are talking about minimums here not between 98 per cent and 99.5 per cent, absolutely not.

54. And that is a separation distance of?

(*Mr Pearsall*) In the case of oilseed rape, I think it is 200 metres.

55. Right; so significantly less. There has been a concern about the spread of antibiotic resistance and the development of superweeds, from the lack of segregation; that, presumably, interpreting your previous answers, should not be a concern?

(*Dr Carmichael*) The antibiotic resistance gene is no longer being incorporated, so none of the crops that are or will be commercially marketed will have that as a marker. And with respect to superweeds, I think I answered that one before. I would like, in the longer term, I know this is not the policy at the moment, but in the longer term I can anticipate that the organic movement will be willing to, in fact welcoming the adoption of this technology, because I believe it can bring significant benefits to them. There will be a number of crops that are developed in time that are pesticide-, fungal-, etc., resistant, and that will obviate any necessity to use other chemical methods that are currently approved by the Soil Association, but they will not have to use any of those methods for control.

56. That is an argument ahead of us, I think?

(*Dr Carmichael*) Yes.

57. One last question. When land is used for this purpose, for the growing of GM crops, do you believe, firstly, that that land should be clearly registered?

(*Dr Carmichael*) It is, currently.

58. And registered on an historical basis, so, in other words, if that land then changes use and changes hands, that someone is aware of the heritage that it carries?

(*Dr Carmichael*) We are required to keep records already, and so those records will be preserved.

59. By whom?

(*Dr Carmichael*) By the individual farmer, for instance; it is really a development—

60. Is that enough; should it be held by some other authority, that is an objective observer of this process, rather than an active participant?

(*Dr Carmichael*) If you take that line, in that you are assuming that there is some damage coming from the growth of GM crops, and I am not assuming that.

61. No, we are not assuming that. What we are trying to do is to find out how people who have a concern about this can be reassured at least as to the identification of the process and be aware of where it has happened. Because, I think I would have to say to you, one of the difficulties in this sector is ignorance breeds suspicion and fear?

(*Mr Pearsall*) There is a requirement in the guidelines to maintain records on the farm for a period of seven years. We have indicated that this whole process is subject to review on an annual basis. If there is any requirement to extend that or formalise that, in terms of the on-farm record-keeping, then that may be.

Mr Curry

62. I wanted to ask Dr Carmichael whether he would be happy to conduct a GM rape trial on a field which had a public footpath running through it?

(*Dr Carmichael*) I can see no reason against it. I do not have any public footpaths running through any of my fields, so it is a question that I have not had approached to me yet. But I cannot see any reason against it.

63. Can I explain why I asked the question. I have got a couple of labradors, and when rape is in blossom it is, of course, the same time for pheasants and a lot of birds are nesting, and labradors being

[**Mr Curry** *Cont*]
labradors they tend to go chasing off into the rape to sort of sniff around and they come back looking like somebody has put mustard all over them. Now if I then do a long walk, which is what I like doing, of seven or eight miles, I could easily take those dogs through another field of oilseed rape which was not a GM crop. And I am just wondering, the purpose of my question is, what practical steps would have to be taken to achieve the sort of autonomy and segregation of a trial site from these sorts of everyday occurrences, if you see what I mean?

(*Dr Carmichael*) Yes, I do see what you mean. I understand the point. I am not sure I can give you a good answer yet, because it is not something that has occurred to me before. The question of a footpath, I also border roads, so I will get the same problem; and perhaps that is the most significant of the questions I could have had asked of me.

Mr Curry: So you think there may be some work, there may have to be some—

Chairman: Mr Curry, I think we will actually pursue this question with the scientists next week, because there is a very important question which Mr Marsden must have an opportunity to ask. But I think it is an important issue; we will pursue it next week with the scientists, if we may.

Mr Curry

64. The answer is, it is something we need to do a bit more thinking about?

(*Dr Carmichael*) Yes.

(*Mr Pearsall*) Can I add just one very, very brief point. I think this does pick up on Mr Todd's point earlier, that there are birds, there are bees. All these issues will have been addressed in detail by the Advisory Committee on Releases to the Environment before those crops will be put in the ground, and will have had to demonstrate that the direct risk to the environment would be negligible or nil, before these crops would be grown in the first place.

Mr Marsden

65. SCIMAC's guidelines only extend to the farm gate; they recommend that, and I quote: "the successive transfer of information is maintained [in order to] serve the industry to comply with statutory food labelling requirements and to provide supplementary consumer information on a voluntary basis." Now SCIMAC have reported that the Food and Drink Federation welcome this initiative, but Nestlé have argued to us that issues relating to the trading, use and labelling of GMOs and their derivatives must be considered on an international basis. My question then is, what discussions have you had with the food industry in order to match your guidelines with their needs?

(*Mr Pearsall*) What can we say, apart from that there has been a continuous dialogue, a continuous exchange of information, with organisations such as the Food and Drink Federation, on the progress of the development of these guidelines and the kind of information that would be presented to them as secondary buyers. I repeat that, as yet, no crops in this country have been cleared fully for commercial use and sale, so this initiative has been developed well in advance of that process taking place.

66. And you would agree that we do need to think ahead? For instance, the Royal Institution of Chartered Surveyors believe the Code should be extended from "plough to plate"; so who should take that forward then?

(*Mr Pearsall*) We have always regarded it very much as a relay race, if you like, as passing the baton on to the next stages.

67. But doesn't sometimes the baton get dropped?

(*Dr Turner*) That is only because people are running very fast and are not very skilled in handling it.

68. But you are?

(*Dr Turner*) Yes.

69. So why do you not take it on board then and do it yourself?

(*Mr Pearsall*) We have actually linked into processes that are already there. Again, the bottom line is not to reinvent the wheel but to build on existing systems that work; the declaration, for example, in terms of the transfer of a crop on from the farm to the next purchaser, who may be the processor, who may be a primary buyer, is via an existing system, the post harvest declaration system, which applies to every single load of grain or seed that is purchased.

70. Perhaps then you would be kind enough to send us a list of these organisations; other than the FDF, with whom you have been in continuous negotiations and discussions? The last question that I have is, the guidelines have nothing to say about GM material returning to farms as animal feeds, either from the UK or from imported GM materials. Do you consider this to be an area which you should address?

(*Dr Turner*) Yes, and no. I think there are limits to what we can actually physically do; we see ourselves as the primary end of that supply chain, but that does not ignore the other things. And I think that part of this consultation, discussion, will allow us to explore those avenues and find out who the best point of contact, responsible body, is to deal with us.

Chairman

71. I am going to ask Mr Rooke if he wants to answer that question, because he has been sitting there very silent, and I do not like witnesses being silent?

[Chairman *Cont*]

(*Mr Rooke*) Certainly, it goes beyond the involvement that UKASTA has within SCIMAC, in that that extends to the seed side, but the principles that SCIMAC lays out are now accepted within our organisation as a whole, and our policy on GMOs is controlled by a Crop Technology Forum which represents all of the sectors that we are involved in, or has representatives from those sectors. In terms of the animal feed side, I think it is, as you point out, not only a question of UK production but also a question of imported production, and that is an issue that we and others are having to address at this very moment, and have had to for quite some time. I think, in terms of our own position on that, it is something that we have been very keen to pursue through Government channels in this country, and via that through the Commission, to try to establish, as quickly as possible, a Novel Food Directive, which has been in draft form now for quite some time but which we are now hopeful, under the revisions the Commission has put in place recently, in terms of personnel, may be in place by the end of next year, or certainly at some point through next year, and I think that will address the issues of concern within the animal feed market, certainly in terms of purchased feeds.

Mr Marsden

72. Can I just put this to you, that, with the greatest respect, you say, for instance, that you are encouraging farms to tell neighbours and local communities about what is going on with the farm-scale trials, and that it has not occurred to you before that there should be perhaps better notices to warn the public of farm-scale trials. You are not enforcing any consultations or communications at farm-scale trial sites, and, clearly, the guidelines that you have issued are not endorsed by the Soil Association, amongst others. You are failing miserably when it comes to public relations, and I would say you are failing miserably to tell people what the heck is going on. What is your reaction?

(*Dr Turner*) I do not accept that. It is huge system that you have just talked about. We are limited in terms of numbers of people and resources, and, also, I think, one starts the dialogue, and you have to understand where the sensitive points are. As I said earlier, with the discussions going on with UKROFS, we are planning next year, for some of the farm-scale plantings, that there will be actually dialogues going on in the local site, which will be a combination of farmers, the scientists involved in doing the site, the people who own the consents. So this sort of thing is actually happening; it is not happening in a huge public arena at the moment.

Mrs Organ

73. Given all that you have said today, are you confident that your guidelines will allow, so that consumers can make the choice, to have the term '100 per cent GM-free'?

(*Dr Turner*) They will certainly have the choice to have GM-free, but I do not think anything in life is 100 per cent guaranteed.

74. Except for, if I am eating food that has either got nuts in it or not got nuts in it, I can make the choice. I have a child that has an allergy to peanuts, I can choose a food that is 100 per cent peanut-free, or has got peanuts. Can we not make the same distinction and labelling for consumers to make the choice?

(*Dr Turner*) I am sure we can, in terms of the comparison with nut allergy, yes.

75. And do you feel that your guidelines will allow that?

(*Dr Turner*) Yes.

Chairman: It may well be we will write to you in a little more detail about exactly what that means, because these are issues we want to explore with our other witnesses, too. And we are running very late, but I cannot let Mr Mitchell remain silent.

Mr Mitchell

76. I am sorry I came in late, for which I apologise to you and, more sycophantically, to our Chairman. But it did seem to me that you have had a kind of defensive and dejected air in your answers. I wonder if the ground is not really being cut from under your feet, in this effort to establish the open, responsible and effective introduction of GM crops, by a manufactured panic, which is basically obscurantist, anti-scientific, which is posing as a friend of the consumer, while all it is doing is manipulating fear and hysteria. That is my view, I do not want to put it into your mouth; but I do wonder if that is, in fact, making your job, of introducing these crops and the necessary trial plantings and the research, if it is not holding it all back and making it more difficult?

(*Dr Turner*) I would agree with your description of what has been going on; it certainly has not made our job any easier, it has widened the burden and the load. But, as I said before you came in, I see us as the responsible voice for this technology, and I believe that, given time and the results of some of the work that is going on, we will be able to persuade the public that there are great benefits. I am not normally defensive or dejected.

Chairman

77. The last word is to Mr Pearsall.

(*Mr Pearsall*) I would just add to that, and say, from our perspective, there is a platform now to answer the questions on the basis of good science, and I would say to Mr Marsden, if the SCIMAC initiative were such a failure, why would it be that other countries—I would cite Australia, I would cite Canada, I would cite Germany—are contacting us direct and saying, "Well, this is a vehicle that will enable us to address the kind of consumer concerns

[**Chairman** *Cont*]
and the kind of requirement to provide consumer choice that is being demanded, as we develop this technology and as we take up this technology"? Now I would not describe that as a failure.

Chairman: That is a matter on which we will reach a judgement, I am sure, in due course. Gentlemen, we have overrun badly our time, but we found your evidence so interesting. Thank you very much indeed. We are very grateful to you all.

Memorandum submitted by Novartis UK Ltd (R8)

1. INTRODUCTION

1.1 Public interest and debate overe GMOs and their derivatives in foodstuffs has been exacerbated by confusion over the implementation of EU labelling regulations to achieve consumer choice. Novartis believes that to deliver genuine consumer choice a number of issues regarding labelling and identity preservation standards and procedures need to be resolved. Only a verifiable and scientifically valid system of labelling and identity preservation[1] will achieve the intended goal of providing the consumer with choice.

1.2 Novartis welcomes the opportunity to respond to the Agriculture Committee's inquiry into the identity preservation of GM foods. Novartis is a major investor in biotechnology research worldwide, across both our healthcare and agribusiness sectors. We believe that the responsible application of biotechnology has a significant contribution to make in the development of new medicines and environmentally sustainable options for modern agriculture.

1.3 All of Novartis' activities in biotechnology have three guiding principles: its use must be safe, it must bring benefits and it must be used in a responsible manner.

1.4 Forty per cent of today's harvest is still lost to weeds, pests and disease. Biotechnology, alongside other advanced technologies, offers an additional option for significantly improving crop productivity and quality in a sustainable way.

1.5 Novartis is currently developing GM crops that bring benefits in terms of greater productivity, more environmentally sustainable agricultural production and better food quality.

1.6 Novartis has developed genetically-improved BT-maize that protects itself from the European Corn Borer, a major pest of the crop that can destroy up to 20 per cent of the crop in the US and parts of Europe. On average, 7 per cent of the world's maize harvest is eaten by the pest each year—in calories, this amount is equivalent to feeding the whole of the UK. Novartis' Bt-maize is approved and grown in the USA, Canada and parts of Europe. In the UK, Novartis Bt-maize is approved for import in food and animal feed but will not be grown, as the European Corn Borer is not a pest in this country.

1.7 Novartis is currently developing GM sugar beet suitable for the UK, which will allow farmers to simplify and reduce the use of herbicides to control weeds, whilst maintaining yield. Currently, just four weeds per square metre can reduce the harvest of sugar beet by 10 per cent but as most herbicides control only selected weeds, weed control is a complicated and costly process, with farmers needing to use a number of different herbicides. Broad spectrum herbicides cannot be used as the crop would also be affected. Novartis' GM sugar beet variety, currently in field trials in the UK, is tolerant to a broad spectrum herbicide, allowing the use of one crop agent as opposed to several and reducing the number of applications.

1.8 Novartis is an advocate of informed consumer choice and we fully endorse the clear, informative labelling of goods that contains GM ingredients, where the market or local regulations demand it, and where the food supply chain can meet this need in a scientifically validated way. We work in good faith with authorities to provide data and advice that can help facilitate informed policy-making. We have experience of regulatory systems in other countries where the topics of labelling and consumer choice have been under consideration and resolved.

2. CONSUMER CHOICE

2.1 The ability of the consumer to exercise a choice whether or not to consume food containing GM crops should not be confused with the safety of that food or GM ingredient. Before GM foods are approved for sale in the EU, they are rigorously assessed for safety in accordance with the requirements of the EU Novel Foods and Novel Feed Ingredients Regulation (258/97).

2.2 Novartis firmly believes that to provide for informed and genuine consumer choice there has to be consistent, verifiable and scientifically valid standards for labelling and identity preservation all along the food chain.

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[1] Segregation is the commonly used term to identify GM crops from non GM crops. Novartis prefers to describe the concept as "identity preservation" and this is the term used throughout this document.

2.3 For the food chain to deliver consumers GM-free food via identity preservation, a number of issues concerning labelling and threshold levels need to be resolved.

2.4 Novartis Seeds supplies seeds clearly labelled at source. However, we have no control over the use of our seeds, clearly identified as GM or non-GM, once they are supplied to the grower. This means that much of the input required to secure an adequate identity preservation system will naturally have to originate from growers, food commodities suppliers and the food industry.

2.5 Novartis will support every effort to help farmers, grain merchants and food processors achieve identity-preserved lines and to comply with any identity preservation controls that are put in place. However, for such a system to be successful, consistent and workable, threshold levels and credible validation systems must be established.

3. Labelling, Legal Standards of Food Purity and Threshold Values

3.1 The current EU system is committed to standards of GM-free purity that amount to zero tolerance but no food production system can provide this standard.

3.2 The labelling requirement that came into force on 1 September 1998 meant that all foods in which a detectable level of GMO products was present would have to be labelled as "containing GM products". However many foods identified as "GM-free" can contain traces of GM ingredients because detection methods of DNA today are so sensitive. The difficulties of the present labelling system in the EU originate from this de facto zero tolerance.

3.3 As the detection levels of current DNA-based measurements are easily in the range of 1 in 10,000, almost all commodity crop shipments test positive.

For example, if a "GM-free" shipload of soya beans is transported across the ocean it may be in a ship that has transported GM soya beans during the previous trip. The dust in the ship may comprise minute particles of seed skins from that previous shipment which may mingle with the "GM-free" shipment and could give a positive GM reading.

3.4 The standards of purity of certified seed for commodity crops is typically in the range of 5 per cent to 0.2 per cent, depending upon the crop. It is impossible to produce food with greater standards of purity than the seed from which it is derived without major production changes and cost increases.

3.5 For these reasons, the current de facto zero tolerance level cannot be guaranteed and is not practically possible. Therefore, threshold values and detection methods need to be established to properly provide the consumer with a valid choice.

3.6 The practical solution would be to introduce a threshold value or level of purity below which food products are considered to be free from GM content.

3.7 Some guidance can be taken from the EU rules on labelling of organic foods. It is accepted that organic foods can contain up to 5 per cent of compounds from non-organic foods. There is no reason, based on science, to suggest that different standards should be applied to GM crops.

3.8 In discussions about thresholds, the range of 1–3 per cent is often mentioned. Novartis believes that 2 per cent is technically feasible at a cost that would be reasonable for the consumer.

4. Identity Preservation at the Start of the Food Chain: Seed Purity Levels

4.1 For food manufacturers to deliver specific levels of purity, seed producers, at the beginning of the food chain, need to be able to provide a sharper level of thresholds. For example, to achieve a 2 per cent threshold level at the finished food stage, a seed producer would need to deliver a lower than 2 per cent threshold on the seeds.

4.2 As a seed producer, Novartis believes that the seed industry cannot consistently guarantee the seed purity levels required for food manufacturers to deliver absolute standards of zero GM content in "GM-free" food. In some countries, we would consider that relative risk and potential damage to our business and reputation and would consider withdrawing from the market.

4.3 Working experience with seeds identity preservation by variety shows that it is difficult to achieve seed purity levels below 1 per cent and maintenance of such standards is very difficult.

4.4 There are variations between different crops in achieving levels of seed purity and a strict standard across the board would not be practical. Certain established commodity crops, eg corn and soya, have seed supply mechanisms that can be adapted to adhere to any identity preservation controls. Other crops may have a supply chain that is far more diverse and therefore not as easily adaptable. For this reason, we would recommend that standards and thresholds are set either on a crop specific basis or at such a level that is flexible enough to be achieved by a range of crops. The World Seed Federation (FIS) are currently reviewing this topic.

4.5 A workable identity preservation system needs to take into account the trade-off between cost and achievability. The purity of any seed variety, GM or conventionally bred, can only be guaranteed to certain practical levels. Increased levels of specified purity will carry a cost implication.

5. Traceability, Validation and Certification of GM-free Identity Preservation Systems

5.1 To develop and maintain public confidence, and to provide the consumer with genuine choice, identity preservation systems and "GM-free" labels need to be independently validated.

5.2 For retailers to label products as "GM-free", self-certification is not sufficient because of the potential for fraud.

5.3 Novartis proposes validation by independent and reliable institutions, using consistent and reproducible methods of audit, scientific detection and validation, harmonised at an EU level.

5.4 To achieve this, Novartis also recommends the establishment of a European certifying authority that would issue standard reference materials.

5.5 To adhere to proper regulatory standards, any certification system needs to provide for a method of appeal.

6. Official Detection Methods

6.1 The EU currently requires de-facto DNA detection based on PCR, since this standard is the limit of detectability, and since this is the most sensitive method. PCR, while being very sensitive, is not accurate though.

6.2 Once a workable threshold is in place, the EU will need to establish, as a matter of urgency, the range of methods, DNA or protein based, that are allowable and certify them.

7. GM Crops in Animal Feed

7.1 Reinforcing our commitment to consumer choice, Novartis supports any decision to create a channel for the production of meat and dairy products that are produced without the use of GM crops in animal feed, provided that the supply chain can adequately meet these demands and allow independent verification of this status.

8 October 1999

Supplementary Memorandum submitted by Novartis UK Ltd. (R24)

The purpose of this memorandum is to provide additional written information in advance of Novartis appearance before the Agriculture Select Committee on Tuesday 30 November.

This document provides our perspective on:

— Identity preservation and threshold levels

It also provides background information on:

— Novartis witnesses
— Introduction to Novartis and developments in GM crops
— GM crops world overview
— Genes and genetic modification in brief

IDENTITY PRESERVATION AND THRESHOLD LEVELS

1. Freedom of Choice

1.1 Novartis Seeds is clearly in favour of freedom of choice for both consumers and farmers. We support the development of identity preserved* and/or "GMO-free" channels, where the logistic chain allows for proper identity preservation and where market demand exists for such products, thus providing freedom of choice for the consumer. *(*See point 2, below)*

1.2 Farmers have the choice to use either traditional seed or genetically enhanced seed (which is properly labelled).

1.3 Farmers choose seed based on their specific agricultural and economic needs. If they can deliver their grain to a grain handling facility that can ensure proper identity preservation along the chain to the processing/food industry, then identity preserved raw materials can be made available. Such identity preservation may entail additional costs.

2. Identity Preservation

2.1 Identity preservation (IP) is a means of ensuring that crops which have special characteristics can be traced from the field to their final destination. The special trait may be improved end-product quality for the consumer or improved growing characteristics for the farmer. IP is much used in world trade; eg to distinguish between commodity crops and value-added varieties.

3. Threshold Levels

3.1 There is a difference between a non-GMO and a GMO-free channel. In the non GMO channel (defined as food that does not have to be labelled under the EU directive 258/97, and the recent decision on the 1 per cent threshold), adventitious GM components are accepted up to a certain threshold. In GMO-free channels, the objective is to provide maximum guarantees of absence of GMOs in the end product and absence of any components produced in GMOs (eg enzymes produced in GM microbes, which is the norm today). Non-GMO food as defined through the 1 per cent threshold is much less onerous to produce than GMO-free food, which will be very expensive.

3.2 Feasible threshold values and detection methods need to be established to provide the consumer with a valid choice. The practical solution is to introduce a threshold value below which food products are considered to be free from GM content.

3.3 The recent EU regulation on thresholds suggests a 1 per cent level. Whilst Novartis believes that a threshold level of 1 per cent is technically difficult to achieve for many food ingredients and it may add extra costs to the consumer, 1 per cent is a vast improvement on a de facto zero tolerance level. On this basis, Novartis supports the draft directive although we believe that 2 per cent is technically feasible at a cost that would be reasonable for the consumer.

4. Identity Preservation at a Seed Supplier Level

4.1 Novartis Seeds supplies seeds clearly labelled at source. Each seed packet has clear information identifying the GM variety, allowing seed handling and storing on-farm to be carried out to best management practice.

4.2 However, we have no control over the use of our seeds, clearly identified as GM or non-GM, once they are supplied to the grower. This means that much of the input required to secure an adequate identity preservation system will naturally have to originate from growers, food commodity suppliers and the food industry.

4.3 *Example of an existing Identity Preservation channel*

Identity preserve channels are currently in operation for some Novartis seed varieties that command a premium due to specific traits. Below is an example of this, illustrating the various stages and processes of maintaining IP.

Crop:	Spring Barley
Variety:	Clarity
Trait:	"Pro Ant" (non-GM)
Trait delivers:	Reduction of "haze" and extension of shelf life (freshness) in beer.
Market practice:	Three years, approximately 2,000t per annum
Seed production:	All within the control of Novartis, observing established separation distances. Purity check performed on all seed lots. Current delivery of varietal purity 99.0 per cent (also inspected by the National Institute of Agricultural Botany, NIAB, at Pre basic and Basic stage)
Seed delivery:	Established I.P.A. with seed retailer to deliver to contracted farmer producers.
Storage/drilling:	As per SCIMAC* guidelines/Code of Practice. *Supply Chain Initiative on Modified Agricultural Crops
Growing season:	Regular inspection by Novartis staff and seed retailer.
Combining/storage:	On farm. Hygiene and separation stipulated in contract. As per SCIMAC guidelines/Code of Practice. Post harvest sample

	inspection for purity.
Movement ex Farm:	Haulage contractor required to implement hygiene standards; previous lorry cargo clean-down. Lorry inspected by farmer on arrival.
Delivery to Maltster:	Maltster is also enjoined in I.P.A. with Novartis and seed strictly under the above terms and at no time has the ability to trade the crop elsewhere, The grower receives a premium above feed barley price for activity.

During the process, the grower is contracted to produce seed retailer. Sample analysed and inspected on intake. Dedicated storage processing deliver to brewer.

BACKGROUND INFORMATION

1. Novartis Witnesses

1.1 Willy de Greef is Head of Regulatory and Government Affairs for Novartis Seeds AG, based in Switzerland. He is by training a plant breeder, with most of his professional experience gained in breeding of tropical crops. He has 14 years of plant biotechnology experience. Prior to joining Novartis he was an advisor to the Belgian government, the EU, UNIDO, OECD on biotechnology regulation. He has been chairman of the Group of National Experts of OECD on Biosafety in Biotechnology (1991).

1.2 Stephen Smith is CEO of Novartis Seeds in the UK and Head of Business Area Cereals worldwide for Novartis. He has more than 16 years' involvement in the plant breeding and crop protection industries Stephen is Vice-Chair of the British Society of Plant Breeders. In addition, he is also Vice-Chair of the Supply Chain Initiative on Modified Agricultural Crops (SCIMAC). SCIMAC is a formal grouping of industry organisations representing farmers, plant breeders, the seed trade and biotechnology companies. On 30 November, Stephen Smith will be giving evidence on behalf of Novartis Seeds and SCIMAC.

2. Introduction to Novartis

2.1 Novartis is a world leader in the Life Sciences with core businesses in Healthcare, Agribusiness and Consumer Health. Headquartered in Basle, Switzerland, Novartis employs about 82,000 people worldwide and operates in over 100 countries. Novartis is one of the world's leading investors in research and development with an annual worldwide research budget of around £1.5 billion.

In the UK, the Novartis Group employs more than 3,000 people and has a current capital investment programme of £100 million over a number of sites.

2.2 As a major investor in biotechnology research worldwide, across both our healthcare and agribusiness sectors, we believe that the responsible application of biotechnology has a significant contribution to make in the development of new medicines and environmentally sustainable options for modern agriculture.

2.3 All of Novartis' biotechnology activities have three guiding principles: its use must be safe, it must bring benefits and it must be used in a responsible manner.

2.4 Novartis is currently developing GM crops that bring benefits in terms of more environmentally sustainable agricultural production, better food quality and greater productivity. For example, Novartis has developed genetically-improved Bt-maize that protects itself from the European Corn Borer, a major pest which can destroy up to 20 per cent of the crop in the US and part of Europe. On average, the pest eats 7 per cent of the world's maize harvest each year—in calories this is equivalent to feeding the whole of the UK.

In the UK, Novartis Bt-maize is approved for import in food and animal feed, but will not be grown, as the European Corn Borer is not a pest in this country.

2.5 Novartis is also currently developing GM herbicide tolerant sugar beet which will allow farmers to simplify and reduce the use of herbicides to control weeds, whilst maintaining yield. Currently, just four weeds per square metre can reduce the harvest of sugar beet by 10 per cent but as most herbicides control only selected weeds, weed control is a complicated and costly progress, with farmer needing to use a number of different herbicides. Broad spectrum herbicides cannot be used, as the crop would also be affected. Novartis' GM sugar beet variety, currently in field trials in the UK, is tolerant to a broad spectrum herbicide, allowing the use of one crop agent as opposed to several and reducing the number of applications.

3. GM Crops World Overview

3.1 A fifteen-fold increase in planted hectares of genetically modified crops was observed between 1996 and 1998. In 1998, 27.8 million hectares of genetically modified crops were planted, compared to 1.7 million hectares in 1996 and 11 million hectares in 1997. At the start of 1999 it was predicted that approximately 40 to 50 million hectares would be planted that year with genetically modified crops.

3.2 The increase in planted acreage in the near future will be due primarily to a further expansion of the area planted and the amount of crops planted in the major countries already growing transgenic crops today (US, Canada and Argentina).

3.3 The five principal transgenic crops grown worldwide in 1998 were soybean (52 per cent of the crop), maize (30 per cent), oilseed rape/canola (9 per cent), cotton (9 per cent) and potatoes (< 1 per cent).

3.4 In 1998, herbicide tolerant soybean was planted on 36 per cent of the US soybean acreage and on more than 60 per cent of the Argentinian soybean acreage. 22 per cent of the US maize area was covered with insect protected maize and 50 per cent of the Canadian canola area was planted with herbicide tolerant canola.

3.5 .The major transgenic crop producing countries in 1998 were USA (74 per cent), Argentina (15 per cent), Canada (10 per cent) and Australia (1 per cent). Small amounts of genetically modified crops (< 1 per cent) were also planted in Mexico, Spain, France and South Africa. This implies that approximately 84 per cent of all transgenic crops in 1998 were grown in industrialised countries.

3.6 The principal traits introduced in transgenic crops in 1998 were herbicide tolerance (71 per cent) and insect protection (28 per cent). About 1 per cent of the genetically modified crops planted were "stacked varieties" which combine herbicide tolerance with insect protection. Only 0.1 per cent of the genetically modified crops planted in 1998 contained improved quality traits.

3.7 This indicates that today more than 99 per cent of the genetically modified crop area is planted with crops with modified "input" agronomic traits; the area devoted to crops with improved "output" quality traits is negotiable. In the future, a shift will probably occur from the current generation of modified "input" traits to the next generation of modified "output" traits.

3.8 All these data were derived from "Global review of commercialised transgenic crops: 1998" by C James (1998). Note that China has not been taken into account in these analyses due to a lack of verifiable information.

3.9 Due to the importance of sugar beet for Europe, research and field trials are being carried out to try to develop several types of genetically modified sugar beets. Sugar beets tolerant to glyphosate and glufosinate ammonium have been developed for improved weed control. No GM herbicide tolerant sugar beet is currently approved for commercial growing in the EU, though varieties are expected to enter the DETR's biodiversity evaluations next year.

3.10 World production of sugar beet in 1998 was approximately 260 million tons. The most important sugar beet producing countries are to be found in Europe and the former USSR. The US also produces a substantial amount of sugar beet. The UK is the eighth biggest grower of sugar beet in the world, planting 170,000 ha annually. About 40 per cent of the world's sugar production is provided by sugar beet.

3.11 Sugar beet is an extremely important crop for the production of sugar. Sugar beet is the main source for sugar in temperate climates, while sugar cane is the main source of sugar in tropical and semi-tropical regions. Sugar production is unique because it comes from two main sources and can therefore be produced in almost every country in the world.

Source: Food Biotechnology Communications Initiative, Briefing Paper 10.

4. Genes and Genetic Modification in Brief

4.1 All living things, whether human, bacteria, plant or animal, rely on the same basic material to define what they are and what each cell does: DNA—a complex molecule that contains all the information for building and controlling a living organism.

4.2 Genes, made of specific sequences of DNA form a code of amino acids that determine the kinds of proteins made by a cell. These proteins then control all the cell's functions.

This coded information is stored as a specific sequence of bases made up from the four chemical building blocks of DNA—T,C,A and G—and is known as the genetic code.

4.3 Being able to identify a gene or a number of genes that control particular functions means that scientists have the potential to introduce a desired function into an organism or to switch off an undesirable effect.

4.4 *Genetic Modification*

— In genetic modification, genes can be divided, altered, added, removed or transferred from one organism to another. To transfer one gene to another organism, the process can be broken down as follows:

— DNA is extracted from the cell containing the gene of interest, broken down into fragments and the pieces separated.

— The desired gene is located on a fragment, and precisely removed from the surrounding DNA using specific enzymes.

— The gene is copied, multiplied, and a copy is inserted into the genetic material of a single cell of another organism.

— The new gene becomes incorporated into the DNA of the recipient cell.

— A new organism possessing the desired trait is propagated from the modified cell.

4.5 *Marker Genes*

— When scientists had their first successes of transmitting new genetic information to a cell, it happened fairly infrequently and scientists had no way of knowing whether a new gene had been accepted apart from the visibility of the desired characteristic.

— Marker genes allow scientists to confirm the uptake of new genes by cells because they can identify the "transgenic cell". In transgenic plants, the most common way of doing this has been to add in the laboratory an antibiotic resistance gene to the gene to be inserted. If the organism survives treatment from an antibiotic, this is proof that the market gene along with the gene bearing the desired characteristic has been accepted.

— The antibiotic resistance gene is then "switched off" as the organism with the confirmed new gene is then transferred to the plant.

— There has been concern expressed that antibiotic resistance genes might pass from a transgenic plant into disease-carrying bacteria and that this could contribute to the problem of antibiotic resistance. Novartis Bt 176 maize, one of two GM products Novartis has on the market, contains the ampicillin resistance marker gene. The results of extensive studies on the antibiotic-resistance marker gene used in Novartis Bt-176 maize have shown no health risk or threat to the effectiveness of antibiotics used in humans or animals.

— Recently, Novartis announced the development of a new selectable marker technique based on the enzyme PMI (Phospho-mannose isomerase). This marker is naturally present in higher animals as well as in many micro-organisms. It allows the plant cells to grow in the laboratory with a nutrient that it is not normally able to use.

— *Promoters*—Each gene is controlled by "promoter" sequences of DNA which act as a switch turning the production of a protein on and off. These can ensure that the protein is only produced in one part of a plant, eg the leaves, or is only produced when the plant needs it. The most commonly used promoter in GM foods is obtained from the cauliflower mosaic virus (CaMV). This virus occurs worldwide and is commonly found in commercial crops of cabbage, cauliflower etc.

24 November 1999

Examination of Witnesses

MR STEPHEN SMITH, Chief Executive Officer, Novartis Seeds UK, and Head of Business Areas Cereals, Novartis, and MR WILLY DE GREEF, Head of Regulatory and Government Affairs for Novartis Seeds AG, Switzerland, examined.

Chairman

78. Gentlemen, I am sorry to keep you waiting, I apologise to you for that, but you saw what we were doing, at least, as you sat in. I hope we will not have to curtail our questioning of you, and particularly you, Mr de Greef, because you have come all the way from Switzerland to be with us today, so we are grateful to you for that. I wonder if I could just begin by asking you, for the record, to state your names and roles in the organisation?

(*Mr Smith*) Stephen Smith, Chief Executive of Novartis Seeds UK, also Vice Chairman of the BSPB, and, as such, an active member of SCIMAC, also representing the British Society of Sugar Beet Producers; and I will act as Chair for our part of this.

(*Mr de Greef*) My name is Willy de Greef, Mr Chairman. I am Global Head of Regulatory and Government Affairs for Novartis Seeds, and I am based in Basel, Switzerland.

79. Thank you very much indeed for your evidence, which I personally found fascinating, and I am grateful to you for it. Can we just have a little

[Chairman *Cont*]
clarification, I think we will do this with a number of witnesses, you may have heard us do it with our last witnesses, this is the business about segregation and identity preservation. Monsanto's evidence to us, which was surprisingly brief, implied there are big differences, they said: "Segregation of crops would require large scale duplication..." and, on the other hand, they identified identity preservation as the right route. I think we will have to go through this formula more, too. Can I ask you to tell us what the difference is?

(*Mr Smith*) I think there is a fundamental difference in terminology, in segregation meaning the active separation along a chain, whereas identity preservation is something that the industry can deliver from the starting-point, and, I think the word was used earlier in the evidence session, the genetic integrity can be maintained throughout the process. It involves segregation post the farm gate and inside the farm, but it is a process that starts with the genetic integrity that has a trait that is in demand, or needs identification and preservation through the chain, that can result sometimes in a consumer benefit, or a premium, or sometimes in a sale or an ability to transfer crop, rather than just the segregation issue, which is, in fact, part of that, through the chain.

Chairman: Fine. I think I understand that.

Mr Marsden

80. So what about the identity preservation of organic crops?

(*Mr Smith*) It is a graphic example of identity preservation, yes, and they are segregated during that process.

81. But, I put it to you, you are not doing enough to actually help them preserve their identity?

(*Mr Smith*) Actually, at Novartis, we are interested in many channels, one of which is the organic industry; and I think industry is the right word for that organisation, it is an industry, it currently represents 1 per cent of the surface area of the UK's agriculture and 2 per cent of the value. There is a graphic example of identity preservation which actively employs segregation into the supermarket, and we are one of the investors in developing organic technology.

Chairman

82. You were using the word 'segregation' there?

(*Mr Smith*) The genetics and the processes identity-preserved from the application of the seed into the organic grower and their wish to have organic seeds, which we are an investor in, in developing that technology, through to segregation of produce, through the rest of the chain, so it can appear on the shelf as an organic produce.

83. I am sorry, I am afraid I do not understand, and you must excuse me, but I am trying to come to terms with this. Organic foodstuffs sold in British supermarkets and at farmers' markets, and so on, is it segregated or identity-preserved?

(*Mr Smith*) It is an identity-preserved channel which results in segregation on the shelf, where it is separate; and, secondly, it is segregated during the transport process, storage and handling.

84. So segregation can be a component of identity preservation?

(*Mr Smith*) We believe it is a fundamental component of it, but the whole process is the preservation of the identity of that genetic integrity.

Chairman: It is fair to say, there is a fascinating difference of view within the evidence from different commercial organisations, like yours, about the extent to which you can achieve these things.

Mr Jack

85. Can I just ask a technical question. You were talking about, I think, if I understood it, the genetic identity of the sort of finished product was preserved by the processes you have just described. In the case of GM sugar beet, when it is processed into sugar, what happens as far as the genetic modification part of it is concerned?

(*Mr Smith*) Sugar, as you know, is a product that in output from the sugar beet factory is a pure sucrose crystal, and therefore contains minimal, if any, DNA or protein, so, therefore, there is a route. There could be a position where you could positively identify sugar beet grown from a GM source, if it were beneficial to biodiversity, etc., so there may be a positive reason for identification, in that case. Also, equally, sugar beet is a classic example of substantial equivalence, given that the sugar that we consume, whether it be from Tate and Lyle cane source or from sugar beet, comes from very different genetics, but clearly is still a classic sucrose molecule.

86. But would I be right in assuming that you said almost but just hesitated for a moment saying you could have 100 per cent GM-free sugar?

(*Mr Smith*) I think, one thing, and I will hand over to Willy in a second, there are no guarantees in anything, and I think it would be very foolish of industry to give 100 per cent guarantees; that is not the case.

87. So would I be right, in practical terms, to ensure the integrity of the separateness right the way through to the end, that you would have to have dedicated plants, by that I mean processing plants, to produce sugar from GM crops as from non-GM crops?

(*Mr Smith*) Whilst there were separate channels, if those existed, yes, that would be one route you could achieve that.

Mr Mitchell

88. I hope with dedicated transport and everything, right the way through?

(*Mr Smith*) Yes.

Chairman: I suspect Mrs Organ is going to ask about peanuts.

Mrs Organ

89. No, not at all. I was very interested in the comment that you cannot say anything is 100 per cent one thing or the other. Would that apply to organics, organic farm products, when people in the supermarket, consumers, are saying they think this is a wholly organic product, and sometimes on the labelling it says that, you are saying that, it might not be so?

(*Mr Smith*) Yes, and it comes back to the point of consumer choice and thresholds; there is a threshold in organic agriculture for 95 per cent organic, and in their feedstuff to livestock I think it is 80 per cent only. So there are already established thresholds; and that is the issue at stake in an industry on a global basis where 100 per cent cannot be guaranteed.

90. And what about safety, because there are concerns about health with GM crops, which may not be quite the same with why consumers choose to take organic produce?

(*Mr de Greef*) I do not accept that. We have heard earlier during this session that there is a very overwhelming consensus among European expert advisers everywhere that we do not have a food safety issue; if there were a food safety issue that we could see coming, in any way, we would not be putting these products on the market, the liability to the company would be huge. We have an enormous vested interest. As soon as we have even the slightest inkling that we have a safety problem, we do not further develop these products.

(*Mr Smith*) Could I just add that that is the issue of why we are in business, we are utilising innovative technology to bring safe products to the market-place.

Chairman

91. I must emphasise, we are not really looking at those issues today. The difficulty with this issue is it is so huge it is a question of trying to compartmentalise into a small enough inquiry to produce some realistic results, and we are not getting into the health arguments of GM foods yet, we may do that at a later stage but we are not doing that today. So can I just come back to some technical issues on traceability. SCIMAC, which you are obviously a member of, Mr Smith, in fact I think you even thought of giving evidence with them, earlier on.

(*Mr Smith*) That was a thought.

92. Are you aware of any other organisations like that internationally, doing the same sort of thing?

(*Mr Smith*) I am aware that there are certain organisations that are investigating how they can manage the transfer of this technology from a trials process, similar to a Part B or a farm-scale trial, to an active industry; and, as such, SCIMAC is being viewed as one of the more established and credible organisations. And I have had dialogue with Germany, Australia, France and elsewhere, who view it as a system, not the ultimate ideal system but that can be taken as a template to apply across Europe. And that also bears out the regard that other countries have for UK legislation and regulation, be it in the area of pharmaceuticals, crop protection chemistry, or this area is very, very highly valued, and I think that is an extremely positive position for us to be in.

Mr Jack

93. Just a quick technical point. I was reading a little note in an NFU publication about something called chimeraplasty, which suggested that there was a way of genetically modifying plants which did not introduce into them a gene from outside that individual plant. I posed that question because I just wanted to know if there were any scientific limits on identifying at the end of the chain something that had come from a genetically modified plant when it comes, for example, to the foodstuff in a non-processed form that might be used by the public?

(*Mr de Greef*) I think the limit is always the question whether there is still DNA in the end product, or whether there are still recognisable individual proteins in the end product, because both of these components we can measure with enormous sensitivity. One of the problems of the present *de facto* zero tolerance, until a few weeks ago, in the European Novel Food Directive, is precisely that we can measure DNA at concentrations down to one particle in 1015, that is a million billion. At that level, you will find everything is everywhere, absolutely; it is a principle of microbiology a century old. The point is, as long as there are measurable amounts and identifiable amounts of the specific DNA or of the specific protein in there you can follow it. In very pure products, like double crystallised sugar, you will probably not be able to have measurable amounts of DNA or protein any more.

Chairman

94. What happens after the farm gate? Monsanto's evidence to us suggested it was not any responsibility of theirs, but your evidence to us is very different and looked at the whole chain.

(*Mr Smith*) Yes. I think, first of all, I would say that our commitment to safety is never-ending; our active involvement in the industry chain is clearly inside the farm gate, as a seed supplier and input supplier. But, clearly, we already operate, if there is a genetic integrity that has value, either as a brand equity or a consumer benefit or a sale benefit, then it is our duty to manage that through the system, and, therefore, in malting barley, bread wheats, biscuit wheats, we manage a series of inter-professional agreements to ensure that that passes right through and post the chain. Our point would be that our involvement in trading, movement, transformation of material, as a baker or maltster or a brewer or a retailer, is not active, it is a passive management of the system, as opposed to our active delivery of seeds and the advice on their growing. So our only time that we can actively identify and start the chain is when we deliver seeds that would have a voluntary label on them. Post the farm gate, we are extremely interested in managing that process where there is a trait that has to be managed, but it is not an active involvement, we are not owners of collect companies, distribution companies, processing companies or retailing.

[Chairman *Cont*]

95. I think I accept the argument from SCIMAC that there are limits to what they can achieve, just simple organisational issues obviously dictate that, but should there be something like that set up to monitor what happens post farm gate?

(*Mr Smith*) Two answers to this, I think. One would be that the baton-passing concept of SCIMAC I think is very valid, because having them all into one organisation may actually give the public a degree of concern, if it is from gene to branded supermarket, I think that is a clear issue in public concern. Secondly, in history, we do not need to reinvent the wheel for genetic modification because its performance in the field, other than that trait that it has been modified to, is identical to that which occurs in agriculture today. And, clearly, the primary industry chain worked very well with such companies as intermediary movers, or first processors, such as Cargill, who I believe are giving evidence later, the maltsters, the bakers and the millers and then through to the retailer, that is already happening in vast areas of agriculture, in crops such as malting barley, where we produce nearly four million tonnes of malting barley, which is all varietally identity-preserved.

96. What about the question of cost? Identity preservation does carry a cost, it does demand new procedures, new monitoring, it does cost something; we heard evidence this morning it does not cost much on the farm but it clearly costs quite a lot after the farm. Where is the cost, on this whole GM debate, going to fall, is it going to fall on those who choose to continue growing non-GM crops, or is it going to fall on those who grow the GM crops, and is it right those who do not want to change might have to bear some of the cost of change, via the farmers?

(*Mr de Greef*) I think we can answer by experience on this one, because this question is being faced by the United States farmers at this moment. The US wants to be able to export corn and soybean to Europe, as it did before, and for that the US agricultural system is setting up a *de facto* identity preservation scheme. If my memory is correct, the premium price that is being paid at the farm gate to the farmer to take these elementary precautions of seeing that his machinery is clean, and so on and so forth, was of the order of eight dollars per bushel, that is about eight cents per 25 kilos, for maize, and, depending on the place, between 15 and 18 cents per bushel for soybean. But these are relatively small proportions, we are talking about a few per cent at the farm gate, which reflects, actually, the fact that, indeed, there is no major cost involved. We assume, and we hear from the US colleagues, that once it gets out of the farm gate, where normally this material all goes into big units of transportation, then, indeed, you start to run into higher cost, because you have to have dedicated silos, dedicated ships, and very well cleaned-out trucks. So we would expect that you will see a significant price increase there, yes.

(*Mr Smith*) And, just to add for the UK, it is clear that on-farm identity preservation is occurring now in wheat, where we are at a commodity low price, and although there is no differential price or premium paid by the purchaser it is preserving a purchase, so it does not always have to have a premium to be utilisable. But, clearly, there is one important point, the consumer of anything is the person who pays for any industry chain, because they are the end arbiter and the end purchaser, so that the costs of every industry chain are borne by the final price of the product.

Mr Jack

97. Your last answer neatly leads me to the question of consumer choice. In your evidence, and I quote, it says: "Novartis firmly believes that to provide for informed and genuine consumer choice there has to be consistent, verifiable and scientifically valid standards for labelling and identity preservation all along the food chain." I wonder if I could just ask you a simple question; how, in your judgement, should that be achieved?

(*Mr de Greef*) For a labelling system to work, there are a number of elements that must be there at the minimum. First of all, you need to be able to control, you need to have the technical tools to verify that what is on the papers is also in the truck; second, you need a threshold, because zero does not exist with living organisms, you need a threshold. The failure of the novel food regulations in Europe over the last two or three years to provide consumer confidence I put to a large extent on the fact that there was a *de facto* chase for a zero tolerance, which meant that anybody who could find anything, in any product, would basically make the producer *de facto* technically illegal. What that did was demonstrate that zero does not exist. You need the threshold, you need the control, you need certification of the authorities or the companies that do the controls, and you need an appeal procedure. Last, and that I have not touched because it is of a totally different order, you need information about the label; the label only is there to give you the choice, the label is not by itself information. Nobody reads the small print, things that are on the box of margarine, it is only something that is there so you can choose; the information of the consumer definitely has to come through other channels, and the one does not come instead of the other.

98. The onus on satisfying the requirements that you have just described would, obviously, in the first instance, be on the different elements in the supply chain, but in terms of consumers turning to other agencies for, if you like, reassurance and for other agencies to be able to validate the claims of different people in the GM food chain, do you believe that the technology is (a) widespread enough, and (b) well enough resourced for consumers to be able to seek validation from other agencies, under the current arrangements in the UK?

(*Mr de Greef*) I strongly believe that. Anyone who wants food tested can go to a diversity of private companies or Government laboratories or public laboratories. The technology to measure one or another of the genes that may presumably be in the food is very widely distributed, it is taught in undergraduate college, it is a standard part of training, actually some high schools work with DNA, so there is no lack of the technology, it is not very expensive technology, and I would say that it is one of most widely available testing technologies that you could have. There are, for example, a lot more

[**Mr Jack** *Cont*]
laboratories that can test genes, that can look for genes in a food, than there are laboratories that can look for pesticides.

99. There is a new connotation on the words comprehensive testing.

(*Mr Smith*) If I may just add, from the UK perspective, not only is there that testing mechanism for identification but there are many identity preservation or reverse traceability, whatever you wish to call it, schemes and software programmes that have been developed, with the involvement of seed houses, grower organisations and mass retailers, that are available, and we would be more than pleased to send you information on such software programmes that actually handle the information, because that probably is a key.

Chairman: We accept that offer; thank you.

Mr Jack

100. Given your observations about the science of not being able to have zero levels, do you think, in the sense that consumers might understand these matters, there is going to be real consumer choice between GM and non-GM, when it comes to end products?

(*Mr de Greef*) I think, to the same extent that you have the choice for other types of products, yes, that we can guarantee, and, probably, given the amount of work done on these products, we can guarantee at least as good as the best identity preservation schemes for other types of food or other types of material products that the consumer buys.

101. Given the consumer reaction so far, how are you going to take their views into account in the future in planning further developments certainly of GM seeds?

(*Mr Smith*) I think that is a very valid point, because, regardless of regulation thresholds, or whatever, the public will be the final arbiter of this technology's success or otherwise, because I do not know any farmers yet that are willing to grow produce that nobody will buy and is not subsequently consumed, and identification with public interest is key, absolutely. And that is a very critical point, that they will be the final arbitration of the success. And it is in our interests to ensure that we do address those concerns and deliver them, in terms of a confident position on the elements of public concern, one of which is labelling and choice, as long as that labelling and choice is not confused with safety. If I put a label on me, unfortunately you may be able to avoid me but I am no safer than I was before I put the label on myself; and it is something I think is really quite important, that labelling is a choice issue, not a food safety issue, that is key.

102. In paragraph 1.8 of your evidence, you conclude with the sentence: "We have experience of regulatory systems in other countries where the topics of labelling and consumer choice have been under consideration and resolved." That is reassuring, but where has this happened, and how has it happened?

(*Mr de Greef*) I will give, as an example, Mr Chairman, the case of Japan. Japan was relatively late on the novel food issue about it, talking food labelling at this moment, but having been relatively late the Japanese authorities took a very, very wide consultation round of what happened in other places of the world. And a lot of the actors in the European and North American markets have been able to provide them with evidence, which led them to leap-frog European regulations, if I may say so, by basically identifying that they needed a threshold, they needed certifiable control methods, and they needed to certify authorities or companies that would do the control, and they put that straight into their system. Something very similar happened even more recently in Australia.

103. When you said just a second ago "authorities or companies" to do that control, is the principal regulatory mechanism in Japanese Government, or is it a combination of private and public?

(*Mr de Greef*) It is the Government, but the actual technical measurements very often are done by private companies. It is the Government that puts the stamp of approval on it, but the actual measurements, like in Europe, are mostly done by private companies who specialise in diagnostics and in measuring technologies.

Mrs Organ

104. If we are saying that segregation is possible, we can sort it out with labelling so that consumers can have choice, that is all well and good, but would you not say that in the UK market we have actually gone beyond that, the consumers have made their decision with their feet, they do not want to buy the product, so that our major supermarket chains have just stopped putting it on the shelves? And, in fact, in Sainsbury's submission to us they say Sainsbury's always wanted GM and standard crops to be separated and were extremely disappointed when this did not happen with the US soya crop: "in the absence of segregation we had to take it upon ourselves to try and meet our customers' demands for non-GM food products" and so they now take it all off the shelves. If you look at what happened to them in the period, they set up a hot line to give information and thousands of people were ringing up because the public was very concerned, and what they have done is they are just not going to buy it?

(*Mr Smith*) Yes, and, in response, they were one of the two companies that sold the 3.5 million cans of genetically modified tomato purée, which was on their shelves and clearly labelled; so people do buy it when it is clearly labelled and they have choice, that is clear. The public have concerns, they will be the final arbiters, and we, as an industry grouping, must identify with it. We also do not believe that this is the single channel that will go forward, we are equally interested in investing in organic agriculture, non-GM and GM, and they must live side by side and must bring benefits. This technology, we believe, has an ability to maintain productivity of safe food and clearly lead to less dependency on some of the inputs that may be damaging to our biodiversity. Those, we believe, are true benefits that can be grasped by the consumer; they may not be consumer benefits like enhanced vitamin A in rice, or removing the allergy from peanuts, which is, I am sure, of interest to you, Madam.

[**Mrs Organ** *Cont*]

105. And not the loss of consumers?

(*Mr Smith*) The important thing is that there are many reasons, but an improvement in our maintenance of productivity and quality and safe food, whilst being more sympathetic to our environment, especially in the UK, where we farm 76 per cent of our land area and have a large population, must be of consumer benefit, in the same way that dolphin-friendly tuna fish is viewed as a consumer benefit, even though it is more expensive to the consumer, or eco-friendly detergent.

Mr Marsden

106. Novartis have supplied us, very kindly, with two different submissions, totalling 11 pages, and you have quite kindly taken the view that you believe there is a responsibility by Novartis to discuss and put forward its views on the whole food production process. As our Chairman alluded to before, Monsanto have sent us three paragraphs on one page and basically said, "Nothing to do with us, Guv," and I quote: "Monsanto's involvement in crop production is limited to the first step of both agriculture, agricultural supply chains and the supply of seeds to the farmer." I just wondered, without necessarily actually mentioning Monsanto, in particular, whether you actually thought that attitude was irresponsible?

(*Mr Smith*) I do not think we should be asked to respond to that in relation to that individual company. All I can say is, from our perspective, our submission is related to our experience in the industry, which by necessity is a food production industry, it is not anything else, and, therefore, if you do not have some degree of impact down the food chain then probably you are not managing your business properly.

Mr Todd

107. One hundred per cent GM-free is not possible?

(*Mr Smith*) No.

108. You have suggested 98 per cent is; 98 per cent of what? Because in your evidence you point to the fact that the certified seed sector can provide assurances of between 5 and 0.5 of a per cent, so you start with the position of 95 per cent certainty on your seed. Where are we at?

(*Mr de Greef*) I think that, first of all, we have started from terrain that we know, we know a lot about preserving seed purity, because that is our business. Then we have looked at existing standards, and you will see some inconsistencies between what was presented by SCIMAC and by us, that refers essentially to the fact that the standards in the UK, on average, are higher than in some other parts of the world. When I referred to 95 per cent, for example, that may be in other countries where not the same standards of purity for some crops are asked.

109. I think SCIMAC said 98 and 99.5.

(*Mr de Greef*) Yes, that is the source of that discrepancy.

(*Mr Smith*) Just to add, that would be the norm in the broad acre, open pollinated crops in the UK, that is clear.

(*Mr de Greef*) From there on, what we can do is go a step further, because if we want to guarantee that, at any batch, you get 99.5 per cent purity, in practice, of course, technically, you are targeting, you are setting the targets of your own people in the production plant, and in the field, you set those targets higher, to make sure that all the batches will actually meet the target. But, again, this is standard practice, that is the way we produce seeds; and we believe that we can give better assurances of reaching the targets that public authorities set for us by trying to work our way into this issue from ground that we know.

110. I understand that. So your answer is, firstly, 95 per cent is inferior to that achieved in this country anyway, it would be possible to raise the standards elsewhere and refine the standards here to achieve a certainty of 98 per cent or better, but that is of seed. Now are you referring to 2 per cent being a tolerance level on seed, or on the product that sits on the shelf which the customer eats?

(*Mr Smith*) I think, first of all, in our submission, you will clearly see that, although we started from the principle that 2 per cent was something that could be applied to a global production industry that has no 100 per cent guarantees in it already, we are not applying this to a brand new industry, agriculture is going on out there and GM will be subject to all the same certification regulations that exist, plus other rigorous demands of regulation. But we clearly see that a threshold is necessary and we are fully supportive of the 1 per cent that is the direction of the agreed legislation.

111. Yes; not quite what I was asking. What I am trying to determine is, are we talking about 98 per cent of seed being GM-free, or 98 per cent of the product that is at the end of the food chain, with all the risks of contamination that we have touched on already and will certainly address further with other witnesses: which are we talking about?

(*Mr de Greef*) In our submission, we certainly refer to the end product, and, when we talk about the 1 per cent threshold there, we refer quite explicitly to the threshold that is now being agreed in a European Union regulation; that means that, as a seed producer, you have to go a bit beyond.

112. I was going to say, what you have got is, if you start with a 2 per cent tolerance level of your seed, it can only drop below that level, can it not, it cannot improve, because the various stages that go between that and the plate will only reduce that tolerance level? So the seed has to be significantly higher than that, you might argue, to achieve a position where the consumer says that it is 99 per cent GM-free on the supermarket shelf. What level must it be for seed?

(*Mr de Greef*) The only country that is really near term with determining that at this moment, that I am aware of, is Switzerland. Switzerland was also, before the EU, setting the 1 per cent threshold for food, and they recognised exactly the point that you are making. And at this moment there is a proposal of regulation on the table which is proposing 0.8 per cent of the level of seed.

[**Mr Todd** *Cont*]

113. Now is that feasible, in the seed sector? The Swiss are saying yes, the UK achieves relatively high standards but certainly could not achieve that now?

(*Mr Smith*) I would disagree with that. I think you have to look at various—

114. They do not achieve it now; they perhaps could?

(*Mr Smith*) They certainly can, and, in a great deal, as I said, the self-pollinated crops, the evidence is already there, through the certification scheme that has been in operation for 30 years, through the MAFF and the National Institute of Agricultural Botany, that would actually establish that we work to a higher voluntary standard, which is in that region, and it can be improved. I think, if I may, Chairman, would it be also appropriate if we submitted the development of a seed from its breeding stock, which is the original purity standards that meet the regulations of value for cultivation and use, distinctiveness, uniformity and stability, and then also submitted the process by which it actually arrives at a farmer as seed?

Chairman

115. Yes, that would be very helpful.

(*Mr Smith*) I am not trying to be evasive, but that is a long process and you may have many generations.

Mr Todd

116. The point I am trying to get here is, where do we set these percentage barriers? If it is right at the start of the process, with your supply of a certified seed, and then, between then and the plate, there is the actual growing of the crop, the shipping of the crop, the processing activity, and all of the other things, then, clearly, if we are going to have something which the consumer wants, because, to be honest, I do not think the consumer is interested in the seed issue quite so much, they are interested in what they are buying in a shop. So if they are to be assured of a 99 per cent position on that then, logically, your seed, and I would have said even 0.8 is very tight because it leaves very little space for any errors or difficulties in the growing of the crop, in the manufacturing process, in the shipment, and so on?

(*Mr Smith*) Clearly, I think you have picked the consumer's position right, but they must have confidence that down below there are systems involved actually to deliver that. I think that is clearly the important thing.

117. The last point, which is, who certifies this process? So you assure us and say it is 98 per cent, or whatever figure we are going to say is the target; do we just take your word for it and say, well, in your terms you have said the industry would die if we had got these kinds of things wrong, clearly your word must be serious, or do we set up some arrangement to ensure that we have an independent arbiter of this?

(*Mr de Greef*) Why does industry ask to be regulated; it asks for independent advice.

118. Normally, for commercial advantage.

(*Mr de Greef*) Because it is to our advantage, certainly. Because industry by itself has limited credibility, I am weighing my words, therefore industry has also the technical capabilities to work up to standards that are imposed by public authority, but it will still want the independent verification of the quality of its work and the stamp of approval, which provides credibility.

(*Mr Smith*) Could I add just one thing, please, I think it is very important. It is the fact that because the material is GM or non-GM it will undergo exactly the same statutory assessment for purity in seed production; so there will already be checks and balances on the genetic purity of that material, whether it is GM or non-GM. Those regulations already exist and are enforced by MAFF and NIAB. So there is no distinction there. Genetic purity is genetic purity, whether it is a GM material or a non-GM material.

Mr Todd: Last question. If you were to add up the cost of the additional processes that you would have to go through to achieve the percentage performances you are talking about, and add in the likely regulatory burden to the public of ensuring that what you have done is actually done, has anyone measured whether GM crops actually have an economic advantage after that process has been followed?

Chairman

119. It is a good question.

(*Mr de Greef*) It is indeed an important question, and, just like the only real arbiter for acceptability of GM food is the consumer, the only real arbiter who can answer your question is the farmer, because the modern farmer is a manager and he is an accountant.

Mr Todd

120. He has not had to face this dilemma yet, because he is not trying to do it commercially?

(*Mr de Greef*) He does in North and South America at this moment, where they have important export questions, and I am mentioning specifically South America as well; and we find out that, for most farmers, the answer is, "Yes, we want to grow them."

Mr Mitchell

121. I just want to get straight on thresholds, because you point out that, the thresholds for organic food, they can contain up to 5 per cent of compounds from non-organic origin; there is no reason based on science to suggest that different standards should be applied to GM crops. You then go on to suggest a different standard for GM crops: why?

(*Mr Smith*) One, because we clearly identify with public concern, and the whole point of threshold is to give choice and underpin public confidence in this technology; and, clearly, the organic industry currently enjoys a greater degree of confidence in its food safety, for what reasons, scientific, I do not know, that is far enhanced of the GM industry, and, clearly, we have to have what is seen and is applied as rigorous thresholds that are deliverable, that do relate to public confidence. So that is the reason.

[**Mr Mitchell** *Cont*]

122. You then say: "Novartis believes that 2% is technically feasible at a cost that would be reasonable for the consumer." That must mean that the 1 per cent that you were thinking about imposes a cost which is unreasonable for the consumer?

(*Mr Smith*) Our initial position was that we had to apply an assessment of something we believed was applicable, and practicably applicable, to a mass commodity market that is extremely global, because we are not just identifying smaller niche markets of the UK and identity-preserve what I would call equity benefits and consumer benefits, we are talking of applying the system to a very broad spread across, and therefore we felt that 2 per cent would be a realistically applied level to that. Clearly, we are supportive of the 1 per cent level that has been agreed as the process, but clearly there will be additional cost implications; how significant they will be, we are yet to fully analyse in the crops that will be critical.

Mr Jack

123. Animal feed: after BSE, people are worried about what goes into animals, they are worried that something might happen to the animals. Should they be worried if animals feed themselves on genetically modified crops, like soya?

(*Mr Smith*) The instant answer to that, from the UK perspective, is no, and, also, clearly, we should follow the development of the Feed Directive, which I believe is in the final throws of being established.

124. But why should they not be worried?

(*Mr de Greef*) If people would be worried about the welfare of animals, that would mean that there is an identifiable food safety issue, which we would assume would have turned up when we do our analysis for human food. If we come to the scientific conclusion and if we see that we are being endorsed in that by every scientific committee that has looked at it, that the product is safe for human consumption, a lot of the trials to establish that were done with animals, and that conclusion, that it is safe for human nutrition, comes on the basis of experimental evidence that it is safe for animal nutrition.

125. GM animal feeds have been around for some time in America; can you just tell us briefly what procedures are adopted there, in terms of their use, in terms of safety and the benefits that they might confer to the farmer, to animals, to humans, just enlighten us on what happens on this in America?

(*Mr de Greef*) The situation, as it is assessed at this moment, both by USDA and FDA in the States, is that, clearly, all the enormous scale use of this maize and soybean as animal feed has turned up no evidence that that feed behaves in a different way in the farmer's hands than feed from conventional sources.

126. And no change on the outcome, as far as the animal is concerned, it has exactly the same effect as non-GM?

(*Mr de Greef*) The question is always what do we call exactly, it is like the zero standard. You will have seen in the literature some—

127. Let me be blunt and say have any control trials been done?

(*Mr de Greef*) Yes; definitely.

128. And no difference in the trial outcome?

(*Mr de Greef*) You see differences, but they are well within the statistical boundaries; that is why I say exactly the same is like zero, it is a word that, as a scientist, I feel uncomfortable with.

129. You mentioned the Feed Directive; how would you contrast the requirements of that with the present situation in the US?

(*Mr de Greef*) The US does not have a Feed Directive, the US authorities have cleared the different GM varieties that are approved for the market, have cleared them for unrestricted use. The US system is not an approval system, it is a deregulation system; the moment the product is, what we call, approved, the USDA says it is deregulated, i.e. the farmer can use it as if it were a conventional variety. So it is mixed.

130. Is there anywhere in the States where there is labelling to indicate that there is GM material in the animal feed, or is it just animal feed?

(*Mr de Greef*) It is animal feed.

131. What do you think about labelling in Europe?

(*Mr de Greef*) I think that, like with GM food, we will have to ask the question whether the consumer wants it, and whether the consumer is interested in paying a price for it.

132. In this case, the consumer is not able to speak too much, in terms of sort of cows, livestock, or whatever, that may eat it, and the first person is going to be the farmer, who may well be asked questions about where is the animal feed coming from; do you not think they deserve to have that information?

(*Mr de Greef*) They certainly do, if they wish so, and I am certain that the animal farmer can have that information if he wishes.

133. So do you think it is right that some retailers are already saying that the meat, for example, that they sell, the products that they sell, come from "GM-free" sources; is that a responsible thing for them to do?

(*Mr de Greef*) If they can back that up with good scientific assessments, on top of the traceability, as evidenced by the documents that go with the feed, then, if they see there is a market advantage in doing so, that is entirely their decision, it is not our decision. Our job is to make sure that the actors we interact with in the food chain are fully aware that some of their customers may want to separate them and to make sure that they can comply with that, if there is such a request.

Mr Mitchell

134. This will have to be brief. It seems to me there is a class of panic merchants going around the country, kind of like the reverse of the character in Dad's Army who said "Don't panic, don't panic, don't panic," to the consumer. Now has this kind of engendered panic made your research and development work more difficult, and is it in any way holding back research and development in this country?

[**Mr Mitchell** *Cont*]

(*Mr Smith*) I think, one, it certainly has not diminished our dedication to this technology, in this arena or the other arenas in which we operate, in health care—

135. You should be in politics, with an answer like that.

(*Mr Smith*) Or pharmaceuticals. And you should be in comedy, I should say.

Chairman

136. He is.

(*Mr Smith*) I know. That is one thing. Secondly, clearly, it has also made us more dedicated to, one, address the public concern, rather than perhaps what we had been doing in the past which was not ignore it but just basically shove science back to it, and I think that is a great lesson that we have learned, as a company. And, finally, clearly, the environment in which we find ourselves in the UK is, one, very important, because it is seen to have regulatory gold standards in pharmaceuticals, in crop protection products, and is looked to in this arena as being a responsible country that relies on good scientific principles and the legal system. However, day on day, as the environment is more difficult, clearly, as new projects come on, the UK becomes less favourable. I would not say it has affected our investment today, but we would hope that, now we have slightly calmer waters, with the agreement with Government, we can go forward, we can develop good data, deliver it to the public, on which they can make reasoned decisions.

Chairman: Thank you. I am sorry; we could have gone on a lot longer. We are very grateful to you for your evidence, it is very clear, and you actually answered Mr Mitchell back, which is something not many witnesses have done before; so congratulations on that. Thank you very much.

Memorandum submitted by Cargill plc (R12)

OUR INVOLVEMENT

1. Cargill buys agricultural crops, such as wheat, barley, maize, soybeans and rapeseed, from farmers and co-operatives around the world. We move these crop supplies to where they are needed, a distance of a few miles to several thousand miles. We may use our own transportation, lease transportation or ask others to transport crops for us. Often we undertake the first-stage processing of these crops into basic food ingredients such as wheat flour, maize starch and soybean oil, and basic animal feed ingredients such as wheat bran, maize gluten feed and soybean meal. Our food ingredient customers are primarily food manufacturers, although we also refine, bottle and pack vegetable oils for retailers and caterers. Our feed ingredient customers are livestock farmers to whom we supply grains and oilseeds directly or products such as gluten feed and soybean meal. We carry out all of these activities in the UK, with the exception of flour milling.

TERMINOLOGY

2. Segregation of crops and the products of first-stage processing has been a topic of discussion since 1996, but it is often ill-defined. Segregation often appears to imply a separation of the normal bulk commodity flow, perhaps government imposed, which is not end-user specific. It suggests two or more supply chains in place, each with unspecified volumes, and with additional costs somehow integrated into both chains, without any clarity as to who bears such costs. In our view such segregation is a misleading focus for debate. No separation requirement exists for conventional crops, even when they are known to be toxic to humans, as is the case with high erucic acid rapeseed grown for technical uses. A separation requirement would seem absurd for genetically modified crops which have been authorised as safe to consume.

3. Governments are no longer sole purchasers of crops and cannot know the requirements of the thousands of direct customers and millions of indirect customers for those crops. Some customers, such as baby-food manufacturers, demand much greater degrees of control over their raw materials than others. Governments cannot legislate for this without discriminating amongst customers. Government's role is surely to ensure that what is marketed is safe in health terms; and what is grown in their country is safe in environmental terms. Since both GM and non-GM soya and maize crops currently on the market have been authorised, the question of separation is not a safety one but a marketing one, concerning the provision of consumer choice.

4. In this context using the terminology "identity preservation" seems more useful. Many conventional crops are already identity-preserved because the customers for those crops find there is a value in doing so. Crops grown to provide the seed stock for the next year have to have a high degree of purity and are identity-preserved to a very tight specification and a premium to the farmer. Milling wheat is identity-preserved and kept separate from feed wheat so it can be delivered to flour millers and obtain a premium over feed wheat. Waxy maize is identity-preserved to deliver to starchers who make certain kinds of modified starches, again at a premium. High erucic acid rapeseed is identity-preserved because its technical customers need assurances of the acidity. Moreover, mixing it with conventional rapeseed would make that crop unsuitable for food use and the high erucic crop unsuitable for technical use: there is a clear market incentive to keep the two separate.

5. Identity-preserved supplies serve specified customer needs alongside the bulk commodity market. Identity-preservation is customer driven and begins on the farm at the time of planting: the farmer must take account of cross-pollination issues and the likelihood of "volunteer" plants from seeds from his previous crop appearing in the field. Through the growing season he must minimise contamination of the crop and plan harvesting and sale specifically. To ensure he is paid for this extra work an identity-preserved crop is usually grown under contract. Trying to identity-preserve a crop only after it has left the field is much more difficult and allowances for cross-contamination have to be much higher.

The Role of Regulation

6. Regulation can help the issue of identity-preservation by providing clear definitions for the market to work with, as well as sampling standards and approved testing methods for enforcement purposes. Conventional crops are traded according to standard definitions. There is a standard quality of barley which is acceptable for intervention buying-in; other qualities are given premiums or discounts on the intervention price. When barley is traded on the open market, the parties to the transaction can either adopt a standard quality like the intervention standard or agree on their own definition of quality. Trade associations such as GAFTA have a set of standard contract terms which can be used.

7. One of the reasons that identity-preservation has proved difficult to implement for GM and non-GM crops is that the definitions and test methods have not been agreed. As a result, each supplier and each customer is struggling to work out their own standard. For fear of being caught out by their competitors, our customers tend to go to the more extreme ends of the scale in stating their requirements—making it more difficult for those requirements to be fulfilled. Testing laboratories are having a field day in offering tests of different shapes and sizes. The difficulties of testing and sampling for the presence of GM with accuracy mean that there is not yet a practical way to guarantee the absence of GM.

8. The rules on labelling have gone down the route of labelling GM foods where the modified protein or DNA is detectable in the final product. To avoid such labelling, particularly as no de minimis thresholds were set or test methods specified, many food manufacturers and retailers decided that they did not want such labels on their products and therefore reformulated their products or sought alternative supplies. These were principally marketing decisions. But given the way the market is developing, it would probably make more sense if a strict labelling standard were to be developed for "non-GM" products, so that a marketing virtue could be made for products which did not contain GM products. That is the clear intention of some of the labelling on the market today, although it is not backed by a specification. If one were developed, those that wanted to have such products could give the specification to their suppliers.

9. A final regulatory reason why identity-preservation has been slow to develop for non-GM crops is the delay in legislative approval for GM crops in certain countries. If conventional crops are still relatively freely available (as is the case for maize in France and soybeans in Brazil, although some GM soybeans have clearly been grown in Brazil this year, despite the fact that there is no legislative authorisation) then a "quick fix" solution is tempting. For some manufacturers a guarantee of origin of the crop is good enough. For others, a test (determined by the customer) on several lots to reveal which has the least amount of GM contamination is a short term solution. This approach is not sustainable beyond the very short term: seed suppliers in Brazil indicate that up to 10 per cent of the crop currently going into the ground for harvest next spring could be GM. Going forward there will be far fewer alternatives to the full system of identify-preservation of the crop from the time of planting.

Traceability

10. In the traditional bulk grain handling system, grain is not traceable to its farm of origin. The customer asks for grain delivered to a specification eg milling wheat with a protein content of 12 per cent, a hagberg falling number of 230, a specific weight of 76 kg/hl and less than 0.5 per cent of extraneous material (such as seeds of other crops, husks, stones, ergot, dead insects, etc). In its long journey from farms in the northern US or Canada to the UK the grain will have been sampled and blended several times to check that it still meets the specification, so the customer is sure of what he is getting. This checking is done by internationally accredited inspection services such as SGS or FOSFA or GAFTA accredited agents.

11. Milling wheat from several farms is stored and transported together in ever greater quantities as it passes through the intermediate transport stages from the farm to the export terminal. Ocean-going vessels contain 30,000 tonnes or 50,000 tonnes of wheat—the produce of many farms. In the health food sector there are examples of grains/soybeans coming from particular farms (eg organic farms) in the US or Canada which are traceable by the UK customer. These are not handled through the commodity system; they are bagged or shipped in containers from North America and they cost 200–300 per cent of the commodity price, ie £260–390 per tonne of soybeans as opposed to £130 tonne at today's prices. Such grains are serving a specialist, niche market and exist side by side with the vast majority of the grain that comes to the UK through the bulk commodity system. Segregating the bulk system would not provide traceability.

12. It is obviously easier to ensure traceability back to a farm if the farm is local to the processor or customer, although even then, since many food processing systems run continuous processes, the identity of the product gets lost at the processing stage.

Requirements and Costs of Identity-Preservation

13. Identity-preservation of conventional crops comes at a price as the above example shows. That price depends on the stringency of the identity requirements—95 per cent pure is cheaper than 99 per cent pure. 100 per cent pure does not exist in nature. It also depends on the number of stages the crop passes through before it is part of the final product bought by a consumer. The economics are complex and usually worked out on a one-to-one basis.

14. Commodity crops are traditionally handled by bulk handling systems which are economical. For example, ocean transportation from the US to Europe may only add $14 a tonne to the price of a tonne of soybeans ($200)—if 50,000 tonnes are shipped at a time. The total cost of transportation from farms in the mid-west US to an English port may only add 10 per cent to the farmgate price of the soybeans. Disaggregating that system will have a cost, particularly if ships have to run half full or have separate systems for filling their holds; if storage has to be duplicated for conventional and GM crops; if trucks and railcars have to be more thoroughly cleaned out between loads, and held empty while waiting for non-GM crops.

15. To get an idea of the cost of identity-preserving a crop from sowing through to processing into biscuits it is only necessary to look at what happens for conventional crops.

On farm

16. Where crops are required to be grown separately or in some way handled differently from neighbouring crops, these terms need to be spelt out in a contract with the farmer. He will expect to be paid a premium for special handling. For example, farmers growing a wheat crop for seed for the next year's planting have to retain a high degree of purity of the crop—99.7 per cent, free of injurious weeds and with 85 per cent germination rate. Identified varieties of seed are planted in identified fields and given an ID number. Several inspections take place at different stages of growth to verify varietal purity. The crop is isolated from other crops (pollen sources) at distances which vary from 2m to 1km depending on variety sown and purity required. Growers have to ensure the crop is harvested cleanly and stored cleanly: verification takes place before the crop goes to a seed plant for dressing and packaging. The farmer will obtain a premiumof 15–20 per cent for all the extra work required compared with growing a normal wheat crop for commercial sale (where up to 5 per cent of impaired grain and extraneous matter may be allowed), i.e. perhaps £80–84 tonne versus £70 at today's prices.

17. The size of the premium will vary with the degree of purity required in the crop and the amount of extra work that requires: this can be complex to determine. Some farmers who have enough on-farm storage may find it easier than others. The amount of cleaning of harvesting equipment required and the time in which it has to be done will vary depending on what else is grown on the farm. Farmers growing waxy maize are required to meet certain conditions from planting but may deliver the maize with only 95 per cent purity to the processor. In such a case the premium would be closer to 5–10 per cent of the maize price.

18. Apart from the additional work involved and the cleaning of equipment and storage bins, farmers growing identity-preserved crops also face additional price risks and lack options for delivery of their crops (the buyer decides when he is ready for it). The price will also be influenced by the overall availability of supply of both the specialist and bulk crops and the location of supplies in relation to the others.

Farm to processor

19. Identity-preserved crops have to be transported separately to their customers. Where the customer for waxy maize is the starch mill down the road this is relatively easy and may only require a clean storage silo and a clean truck. Where the customer is a Japanese tofu producer for soybeans grown in in the US this is more difficult. A US soya farmer will truck his harvest to his local elevator (silo)—that truck needs to be cleaned. The silo operator must find clean separate storage. Soybeans from the silo will often be transported by railcar to a river terminal—the car needs to be separately identified and cleaned. The river terminal needs a separate silo. The soya is then transported by barge down the Mississippi river to the export terminal. The barge needs to be identified and cleaned. The export terminal needs separate storage. Beans are then loaded onto an ocean going vessel (30,000 to 50,000 tonnes). Obviously, if the entire vessel can be filled with the identity preserved product then there is no issue as long as it is cleaned. Where a vessel is going to carry different products it needs to separate-off holds and clean them separately. On arrival at the importing site, separate machinery must be used for each hold and there must be separate storage. At each stage in this process there may also be requirements to sample and test the beans to ensure varietal purity and the storage required may have to be held open specifically for these beans—losing opportunities to store other crops.

Where the product being identity-preserved is still a bulk product that can fill an ocean-going vessel (or several), then the additional costs may be only 5–10 per cent. For smaller quantities these costs increase significantly.

20. Another problem with identity-preserved supplies is that the crop is often seasonal. The UK is supplied from different parts of the world depending on the time of year. For example, soybeans come from Brazil and Argentina in the summer but from the US in the winter. So if identity-preserved supplies are required all year round, two chains have to be set up, eg one in Brazil and one in the US to ensure a constant stream of supplies. The alternative is to store enough material from, eg the US to see through until the next harvest. Storage is more costly than transportation and depending on interest rates and the amount of care required can easily add 15–25 per cent to the price of the raw material stored.

At the processor

21. The larger processing plants for soybeans or maize run continuously except once a year when they are taken down for repairs and cleaning. They may process between 2,000 and 8,000 tonnes of a crop a day. It is not economical to stop the plant and clean it before running through it one shipment of identity-preserved beans. Instead, the identity-preserved supplies are run through for a few hours, effectively "cleaning" the plant of other beans in the system. These beans are then regarded as part of the other beans. Only after these few hours are the identity-preserved supplies which go through guaranteed to retain their identity—the product from these beans (meal, oil, etc) can then be stored separately. The cost of this clearly depends on how many identity-preserved beans are then put through.

22. If there are sufficient identity-preserved supplies of a crop it may be possible to dedicate a plant to processing such supplies, in which case there are no additional costs involved from separate processing and storage.

From processor to customer

23. On outtake the material will have to be stored separately and trucked separately. This probably means less efficient use of storage and transport compared with bulk handling and therefore would carry a cost.

At the customer (food manufacturer)

24. The customer would have to store the incoming material separately (unless, for example a customer is only using this identity-preserved type of raw material). If the material is an ingredient for one manufacturing line there may be no additional costs of putting it through the plant. But if for example, a food manufacturer with several different lines of processed foods wanted an identity-preserved vegetable oil he might only have one edible-oil handling system in the plant, providing oil for frying operations, coating operations, etc. Therefore he cannot just take in a batch of IP soyoil for one product while continuing to use ordinary soyoil for all other products. He would need to switch the whole system, or none of it, to the identity-preserved product.

25. There are added costs in purchasing speciality products: if something goes wrong there is no spot market to fulfil the supply need and storage may be required for several months' supply if the material is only processed intermittently. An individual crop or a crop grown in one small area is more vulnerable to weather and disease from year to year than the average for the whole market. A price needs to be agreed in advance and cannot take account of the spot price. The market is so thin that any deficit is difficult to remedy.

At the customer (feed manufacturer)

26. The BSE issue showed us how difficult it is to guarantee isolation of individual feed ingredients at a feed compounding plant or on a farm. A feed plant taking in non-GM raw materials would almost certainly want to convert its entire supply of that particular raw material, to avoid the costs and difficulties of keeping materials separate at the plant.

CONCLUSION

27. Identity-preservation of a crop should be considered as provision for a specialist market, where the economies of scale of commodity buying and bulk transport and storage no longer apply. Even if the entire UK market for soya wanted to go to a non-GM supply it would be a speciality customer in the eyes of the Brazilian and US farmers given the size of the UK market compared to the size of these total harvests: 1 million tonnes of soybeans and 1.3 million tonnes of soybeanmeal versus a US harvest of 75 million tonnes and a Brazilian harvest of 30 million tonnes.

28. There are the direct as well as the indirect costs of specialist markets—uncertainties increase and the options for coping with them decline. Commodity markets provide affordable food supplies and hedge against a myriad of adverse developments; these advantages get lost in specialist markets. That is why food safety issues need to be squarely faced and real concerns separated from false ones. Ultimately it will always be the consumers who bear the costs of a non-commodity market.

29. But for those who are determined to have non-GM supplies there are gains to be made in coming to terms with identity-preservation of non-GM crops at this time. Future crops are likely to be developed with more direct benefits for the consumer—oil with less saturated fat, grains with added nutritional value, maize with modified starch content. Nutrition and health benefits will require a system that keeps such crops identity-preserved right up to the final consumer. The sooner the learning process begins on how to supply identity-preserved crops at minimal additional cost, the better the chances are that we will all be able to capture the benefits of the technology.

8th October 1999

Examination of Witnesses

MR GRAHAM SECKER, Managing Director, MS ANNE GUTTRIDGE, Commercial Director, Grain, Feed and Oilseeds, MS RUTH RAWLING, Vice-President, Public Affairs, Cargill plc, examined.

Chairman

137. Mr Secker, I am sorry that we have kept you waiting. My Committee, as always, has been asking too many questions, it is a very interesting subject; and I apologise for the delay. We will have to go up to one o'clock, I fear, now. Can I begin by asking you to introduce yourself and your colleagues and, very briefly, just to explain the scale of Cargill's operation and what it actually is, as a company?

(*Mr Secker*) Yes, indeed; thank you, Mr Chairman. I am Graham Secker, I am the Managing Director of Cargill plc, which is Cargill's operating company in the UK. On my left is Ruth Rawling, who is Vice-President of Public Affairs for Cargill in Europe; and, on my right, Anne Guttridge, who is the Commercial Director for our Grain, Oilseeds and Feed operations in this country. Cargill is a US privately-owned corporation, headquartered in Minnesota, with about 80,000 employees around the world, in 65, or so, countries, principally engaged in agricultural commodity trading, shipping and distribution, in food ingredient manufacturing, we are in industrial products, in steel and fertiliser, we trade financial products, and financial brokerage, and we are in the meat and animal nutrition business.

138. Thank you; that is helpful. I am grateful for that. Can you just explain how you handle GM and non-GM products within your company; do you have different systems?

(*Ms Guttridge*) This is an evolving arena, as you can imagine. Maybe I should first explain which crops we are involved in, in the UK, that are relevant to this debate. Clearly, it is soybean; that is a product that has a seasonal impact, so, traditionally, before the GM debate would start, we would bring in United States soybeans in our winter, in the north hemisphere winter, which would be typically October/November through to January/February, and then we would typically move on to the South American product, this was before the GM debate started. And that is still the case, although increasingly we are being asked to get involved in identity-preserve programmes, which involve some segregation. But that is where we are at, we are at a crossroads, I would say. To also talk about corn: for technical reasons, we have two uses of corn in our process in the UK, one is in our wet corn milling process, which is based in Tilbury, and for technical reasons that has been using French maize and continues to do so, and our dry corn milling operation, which is in Seaforth, again, is using a non-GM source of corn, which is currently from Argentina. And that has been quite an interesting process for us, because it is the first identity-preserved programme that we have had in the United Kingdom, but it was based on a non-GM issue, it was based on the technical qualities of the corn in Argentina. So that is where we are today.

139. One food processor, Northern Foods, whom I expect are customers of yours, I expect them to be, certainly, they say in their evidence to us that they never specify the use of GM ingredients in foods, they never specify the use of GM ingredients. The quote says: "Like most UK food companies, Northern Foods has never specified the use of GM ingredients in its foods," in other words, it happened by accident. What are your customers saying now to you about the specification of GM and non-GM products?

(*Mr Secker*) I think, increasingly, the food manufacturing industry have specified that they will no longer take GM ingredients into their products, and I think the area where we have been involved more than any is in vegetable oil, where that move has been relatively easy to accomplish, in that there was a readily available alternative product for them which is a non-GM product and grown in the UK, which has been rapeseed oil; so a relatively easy move to accomplish. But that is really where the food manufacturing industry is today.

140. And, interpreting that attitude on the part of your customers, my reading is that they are actually doing this as a temporary operation, to try to ensure that the option of going back to GM sources is there in the future when consumer confidence has been rebuilt. Is that your reading of the situation?

(*Mr Secker*) We recently surveyed a group of 30 or 40 customers on that basis, and that is our reading. I think there is a debate on timescale; most companies are suggesting that it would be in the four- to seven-year period, rather than anything earlier than that.

[**Chairman** *Cont*]

141. Do you find the difference between your human customers, those that are produced for human consumption, if you know what I mean, and your animal customers, those that are produced for animal feed purposes, is there a distinction in sensitivity?

(*Mr Secker*) I think the two industries are at different points in an evolution. As I said, the food industry have largely replaced GM ingredients with non-GM ingredients, subject to the definitions that each customer has put on those products. The animal feed industry is not at such an advanced stage in wrestling with this issue and finding a solution, in that some of the ingredients in animal feed are not as easily replaced. It is for sure that we had chickens before we had soybean meal, but the production efficiency for those chickens before we had soybean meal, with its very high protein content, was way less efficient. So it is a much more difficult issue for them to resolve.

142. So the implication of your comment there is that you expect the animal feed industry to want to specify more and more non-GM sources but it is going to find it very difficult to do, in practice?

(*Mr Secker*) We are having increasing conversations with the animal feed industry along those lines. We expect that they will probably be talking in some great detail with the retailers, who seem to be driving this initiative, and the signals that we are getting are that they will seek to go to a non-GM basis at some point in time.

143. And what about on the other side of the pond, you have a lot of experience in America, obviously, being an American company, what are the sensitivities there of the customers of Cargill?

(*Mr Secker*) I think the biggest difficulty that we have had, from our side of the pond, as you call it, has been to educate our colleagues in the States that there is a real consumer issue in the UK and in Europe. Only very recently have we started to see real consumer concerns being expressed and changes being made by some people in the food industry there.

144. So the process is beginning in the States now of what has unfolded so dramatically here?

(*Mr Secker*) Yes. I think the degree of confidence that the US consumer has in the safety of his food is somewhat different from the experience that we are seeing in Europe, certainly.

145. Any prophesies about the long-term trends in the States?

(*Mr Secker*) I do not know; would you have a better idea of that one?

(*Ms Rawling*) I think that is very difficult to say, but there is certainly a lot of debate at the farm level in the States at the moment about what farmers should plant for next year's harvest, planting time January/February next year. There is a lot of anecdotal evidence which suggests that the trend of uptake of GM crops will certainly flatten out, may even go into reverse, but it is too early really to say what is going to happen; and I think until we get to about February that will be very difficult to see.

Mr Marsden

146. You said in your evidence that segregation is often ill-defined and might imply two supply chains. Maize and soybeans obviously are not mixed because there are two separate markets. By analogy then there are two separate markets existing for GM and non-GM. So why do you think, and I quote, "segregation is a misleading focus for debate"?

(*Ms Rawling*) We heard you ask this question earlier, too, the difference between segregation and identity preservation. I think people can get too hung up on words, but identity preservation does imply traceability, which segregation does not. Also, I think, segregation, wheat is kept separate from barley, or maize from soybeans, as you say, because they have a different functional use, whereas, for the soybean market, whether genetically modified or not, the functional use is the same, and a large number of customers of those soybeans will accept both because they have equivalent function, whereas some people are concerned, that they do not want genetically modified soybeans, but it is only a part of the market. Also, I think, there is the issue of thresholds and tolerances here. Because in Europe we are talking about a tolerance of 1 per cent or less, the only way you can really achieve that is through identity preservation, starting at the beginning and really keeping control of it, because you would not be able to achieve that degree of purity by a simple segregation system.

147. On language, the analogy I would draw is with you may call it the community charge and I call it the poll tax, but, nevertheless, I take your point. In terms then of what you were saying though, there is a distinct market for non-GM food, so I disagree with you. You are saying it is part of an existing market, I would say, no, it is completely separate, there are people out there who do not want to buy GM food. What do you have to say?

(*Ms Rawling*) As Mr Secker was describing, the food market, yes, and we have seen our customers reformulating to take GM ingredients out.

148. So there are two separate markets; that is my point?

(*Ms Rawling*) But they have gone to alternative sources, like rapeseed oil instead of soya oil.

149. You say, in paragraph 2 of your submission: "No separation requirement exists for conventional crops, even when they are known to be toxic to humans," and you give an example of, and forgive the pronunciation, high erucic acid oilseed rape; but then you go on, in paragraph 4, to say that this particular crop "is identity-preserved because its technical customers need assurances of the acidity." So the question then is, does this mean that technical customers require it to be kept separate, or segregated, at least, from other forms of oilseed rape?

(*Ms Rawling*) Perhaps that was not worded very clearly. There is no regulatory requirement for separation but there is a market requirement to keep it separate.

[**Mr Marsden** *Cont*]

150. I would have thought there was a market requirement to separate out GM and non-GM. Can I ask then about transportation. What particular problems would segregation of the GM and non-GM crops cause in the context of transportation?

(*Mr Secker*) We have identified, in the case of the major commodity crops produced in countries such as the United States, that there are something like eight stages in the supply chain where the product goes through a period where it could be co-mingled accidentally with another commodity. And those stages are from the US farm to the local storage silo, from then on in a train, in all probability to a river silo, probably on the Mississippi, where, again, they are unloaded, stored for a period of time, reloaded into barges and shipped down the Mississippi to the Gulf, where they are transhipped from the barge into the ocean-going vessel. All of those points in time, where you are handling through a conveyor and elevator system, could lead to a risk of co-mingling. From then on, they are shipped to destinations across the world, where, again, during the discharge they are handled through grain terminals that also handle other products. So at each stage in the process there is a requirement to separate, to use machinery that could ensure the product integrity.

151. So you would say it was extremely difficult, if not impossible, to separate?

(*Mr Secker*) The difficulty we see is that the market is in a period of transition from not understanding whether it has a requirement to segregate, to identity-preserve, to have non-GM supplies, and fully going to the position of having a non-GM system. So we have got a number of different customer requirements, different situations, and that is causing a complication that is leading to difficulty. I think our view is that if we were to achieve one position or other, GM or non-GM, then life is considerably less complex and we could achieve the degree of segregation, identity preservation, that would be necessary. Could I just give you an example. I have attempted to be very helpful, and I am not sure if it will be helpful.

Chairman

152. It is difficult to read into the record, that is the trouble with visual images.

(*Mr Secker*) I will pass it around; but if I could just attempt to illustrate the scale of the problem that we are dealing with. This is a picture of our own installation in Liverpool, which is a soybean processing plant, and this part of it here is a grain terminal which stores about 140,000 tonnes of commodity crops in a series of bins that are linked by common conveyors and elevators, and our raw materials arrive in 60,000-tonne shipments that are stored in the grain terminal, and hence processed in the processing plant. So, in the journey from the hold of the vessel through to the customer's vehicle, the product is probably travelling through 500 or 600 metres of conveyors and elevators. So if there is one product in there the issue of co-mingling does not exist; if, in a situation where this is the scale that we are dealing with, we attempt to put multiple products through then co-mingling is a real problem.

Mr Marsden

153. I appreciate the technical difficulties with your existing plant and machinery, but are you for or against the segregation of GM and non-GM for customers? It is a simple question; are you for or against the segregation?

(*Mr Secker*) We are for providing customer choice, for providing the solutions that our customers want, and if they tell us that they would want a non-GM food ingredient then that is exactly what we will attempt to provide.

Chairman

154. Can I exercise the Chairman's prerogative and just quote some of your evidence, because you seem to be saying, in paragraph 27, that actually it is not possible for commodity crops, that is the implication, and you say: "Even if the entire UK market for soya wanted to go to a non-GM supply it would be a speciality customer in the eyes of the Brazilian..." and the economies of scale, you say, do not exist; you seem to be saying it cannot be done for commodities?

(*Ms Guttridge*) Can I pick up on a point there. Graham mentioned the problem of timing, and we could move back to this high erucic question, the high erucic market was well defined and separate, it did not just appear on a news bulletin that suddenly we needed a different rapeseed, it was designed technically for a different usage, actually for the plastic industry. So the industry had to get itself organised and to organise the chain into separate crushing, and so on. The problem with the GM debate is that it has kind of happened in a very subjective, knee-jerk way, which has not allowed the industry the proper time. I will give you another example. When the GM technology arrived, we, as a company, expected that within five or seven years we would have the opportunity to segregate special traits, which would bring a consumer benefit, and we would have time to plan that through our elevator systems, these eight chains that Graham mentioned through the line. The problem is the timing. I hope that clarifies that for you.

Mr Marsden

155. Can I put something to you and see if you agree with this, or disagree. This is a quote from one of the UK's largest poultry producer/suppliers: "I know that we were strongly considering a total switch a few weeks ago but we were unable to secure non-GM supply for forward cover already on the buying book. The intermediaries," which I assume are yourselves, "who market the soya are unwilling to make the change to wholly non-GM in their crushing plant..." So is that correct?

(*Mr Secker*) I am bursting to answer that. I suspect that they were not talking to us; had they talked to us and expressed a desire to have a non-GM protein meal then that is exactly what would have been provided, and we would not want to conduct this debate on the basis that we, as an organisation, are unwilling to provide what our customers want.

[Mr Marsden *Cont*]

156. So if that were true you would investigate it thoroughly?

(*Mr Secker*) Certainly.

(*Ms Guttridge*) Again, it is the timing issue, if I may say. If they said, "Can you start on Monday morning?", clearly, there is a clean-down process, there is a pipeline; so I think the timing is an issue as well.

157. I will supply more details at a later date, according to the source, but I would like to ask this. The world's second largest grain-carrying processor, Archer Daniel Midland, recently made a public statement to encourage their suppliers to segregate non-GM crops to preserve their identity. Would Cargill do the same?

(*Mr Secker*) I think the statement that was made has been often quoted and I would not be able to provide any feedback on the success that they have had in achieving their objectives there. I think it is worth repeating the point, if our customers desire us to segregate, to preserve identity and to provide non-GM ingredients, we will do that.

158. The EU has proposed a standard for the definition of GM and non-GM labels. Do you think the standards proposed are practical?

(*Ms Rawling*) You are talking about the 1 per cent threshold.

159. Yes.

(*Ms Rawling*) I think 1 per cent is difficult but not impossible. I think you also have to look at it in terms of what it implies. I said earlier that in order to achieve that level of purity, if you like, you need to be able to control the chain right from the beginning, identity preservation. Identity preservation brings with it a cost, because you are asking the farmer to do special things, you are having to organise special storage, special transport. Even if you manage to get large volumes, which means that by the time you get it to the UK you do not any longer have to keep it separate because you are not bringing anything else in, for example, nevertheless, there is a cost there implied in the chain; and I think that whatever tolerance is adopted it has to be seen in the context of what cost it brings with it. One per cent, I think, is quite difficult, because, starting with the seeds not being 100 per cent pure, to start with, and then the prospect of co-mingling through the chain, it is not easy to do.

160. Not easy to do; so are you going to do it?

(*Ms Rawling*) I suppose the answer to this question is, are our customers willing to pay for what we think at the moment it would cost us to do it; because there is a cost in identity preservation, we cannot do it for nothing, given the state of the US market, that is the issue.

161. Are we going to be faced with the situation where non-GM food is going to be more expensive than GM food, because of what you are saying, since you cannot change over, is it too hard?

(*Ms Rawling*) I think that is a question of which way the market goes. It is an issue which the market is currently exploring, it is not determined one way or the other.

162. If consumers then require 100 per cent GM-free, whereby we accept 100 per cent may not be exactly 100 per cent, can either IP or segregation deliver it, are you confident it can deliver it?

(*Ms Rawling*) Yes, I think we are confident that we can deliver, for example, to the threshold standard; 100 per cent is not achievable, no, that is too much.

Mr Marsden: What are the true costs then of segregation, because I think in your evidence you imply they will be considerable, but other evidence to us has argued that premiums can be as low as 10 to 15 per cent, which could mean less than, say, two pence on the price of a chicken, for instance; so what is your view?

Chairman

163. We have had quite a wide variety of evidence on this issue, very different views have been taken on this, so we would be interested to know what your view really is?

(*Mr Secker*) I am sure you have. I think that the price depends on the degree of rigour in the system and the thresholds that are required by the system. The work that we have done, in terms of providing non-GM soybean meal for the animal feed industry, suggests that the premium would equate to something of the order of $25 to $30 on a product whose value is $200.

Mr Marsden

164. So 15 per cent, upper end of that range.

(*Mr Secker*) Yes.

(*Ms Guttridge*) But it does depend on scale; for example, if three-quarters of our customer base asked us to change it would be a different answer to your question than if 10 per cent asked, because of the clean-down. If you think of the eight stages before the ship, then there is the ship which you clean, I think, there are typically seven holds in a Panamax 60,000-tonne, and it arrives in the processing point and there is the clean-down time during the process that can add substantially to the cost.

165. Because that is the point really. If a vast majority of customers said "Switch over now, as quickly as you possibly can," then there is no reason why non-GM food would be more costly, it would actually become less costly because it is in the majority?

(*Mr Secker*) Then I think the issue of a premium is irrelevant. If we have a common definition of what is required by the UK industry then we no longer need to talk of premiums and discounts.

166. Another witness suggested that there should be an EU certifying body, organisation, for GM status, and I just wondered what your views are on that?

(*Ms Rawling*) I think what we are lacking, to some extent, at the moment, is an agreed testing methodology and an agreed sampling standard, which would mean that whatever test people used they were complying with a standard; because it is very clear that different tests produce different results. I think, once the testing methodology and sampling is laid down, it can equally be private

[**Mr Marsden** *Cont*]
companies who check that a cargo is meeting the standard, because in our normal business we employ private companies around the world every day to check that a boat-load of soybeans coming from Brazil is actually a boat-load of soybeans. That testing goes on all the time.

Mr Jack

167. In paragraph 12 of your evidence, you say, under Traceability: "It is obviously easier to ensure traceability back to a farm if the farm is local to the processor or customer, although even then, since many food processing systems run continuous processes, the identity of the product gets lost at the processing stage." That almost says that even if the customer wanted to be assured that there was full traceability of a GM product right back to source, somehow, in the real world, it is not going to happen. Is that right?

(*Mr Secker*) I think there is a misunderstanding as to how large food manufacturing factories work; most of them do operate on a continuous basis, so it is very important that the raw material that is coming in the front end of the factory is to an agreed specification, that is checked, is adhered to, such that when those raw materials enter into the continuous process you can be assured of the quality that is going to be produced and the safety of the end product. But in terms of identifying a packet of crisps to a field that the potatoes came from then I think we would say that is not possible.

168. But in terms that if somebody was advertising, say, potato crisps made from potatoes that were GM-free, and bearing in mind there would be a multiplicity of sourcings of potatoes, is it possible, under those terms, to have for a given batch, because a crisp processor, when he tips the potatoes through his hoppers, and everything else, will know where they came from, I assume so, is it possible, under those circumstances, with a multiplicity of sources, to have full traceability?

(*Mr Secker*) I think you have got to have then a situation where that processor buys all of his potatoes, his raw materials, on the basis that they are non-GM, that those farms have grown non-GM potatoes, and when the raw material enters the process there is not an issue of traceability any more because you have got an agreed standard.

169. So it comes back, effectively, to an organisation like yours marshalling together sufficient sources of raw material to provide the processor with what they want, and under those terms traceability is quite feasible should consumers want it?

(*Mr Secker*) I think, if you take the case of the animal feed industry in the UK requiring about two million tonnes of soybean meal a year then, out of a US crop of 70 million tonnes, we are talking of identifying a niche requirement for a niche market, and that is possible. The system that you would need to put in place to ensure full traceability to a US farm would be extremely complicated.

170. It would. In terms of the processors of major arable commodities that you are presently serving, certainly as far as the UK is concerned, are they actually asking for some form of complete traceability already, in terms of GM-free raw materials?

(*Ms Guttridge*) You are talking in general on commodities?

171. Any that you are dealing with. I am just looking for examples of some other—

(*Ms Guttridge*) Yes; one example is the one I started with, which is the dry milling process for the manufacture of corn flakes, that is a full traceability system that has been built over a number of years, backed by full traceability of the audit, right back to the individual farm in certain states in Argentina. So, yes, it does exist. And it comes back to this issue of timing. For example, we may have had lots of letters like the one you mentioned over there from people saying, "Can you start on February 1st? We would like to consider, with our customers, the switching to poultry fed on non-GM from February 1st," it is a commonly quoted number. It is the timing issue. The farmers plant the US beans in about February, so for them to get something in place it is almost too late for February. It is the seasonality of agriculture that provides us with the problem, and the retailer the problem, because he is asked by people to come up with a solution too quickly.

Mr Mitchell

172. Just to come back to the comedy star, just a question which is a bit offline, but you emphasise the difficulties in commodity markets of segregation and different distribution systems, but do you see a fear, or do you feel a fear, that all this agitation about segregating GM crops and non-GM crops, given the fact that the regime in the United States is much more liberal, if it is authorised for use the farmers can use it and you do not have to have traceability or declarability, or anything like that, do you see a fear that this will be used as a non-tariff barrier to trade, particularly with US commodities?

(*Mr Secker*) You are in the best position to answer that.

Chairman: Mr Mitchell is anticipating our WTO investigation here, but never mind.

Mr Mitchell

173. It is an important point, and all this argument.

(*Mr Secker*) Yes, it is.

(*Ms Rawling*) It is true, if you look, for example, the US maize trade into Spain has stopped because of the GM issue. That used to be perhaps a million and a half tonnes, something like that, a year, and that has stopped because there are 11 varieties of GM maize approved in the US and only four here, and it was just proving too difficult to be absolutely sure, to keep the unapproved varieties out of that export stream, and the trade has more or less stopped. On the other hand, it has been partially filled by corn from Argentina, and also the Spanish also have things like barley for their feed market, so the demand on the Spanish side for this US maize was perhaps not so great to force the system to try to find a solution to the problem. But I think you could say that was some kind of a non-tariff barrier. I think identity preservation may be a way through, if the

[**Mr Mitchell** *Cont*]
approval systems remain sort of out of synchronisation with each other for a long period of time.

174. There have been some reports of US farmers contemplating returning to conventional crops because of the problems of marketing GM crops. Do you know whether this is happening on any significant scale, or is it just rumour?
(*Mr Secker*) There is a certain amount of anecdotal evidence that chief operating officers from seed companies are touring the mid west and holding town hall meetings to encourage the farmers to continue with the planting of GM crops, evidencing an amount of concern that that is going to happen. I think our view is that it is too soon, we will have a better view in February, at the planting time. There seems to be some system in the US where even if farmers place provisional orders for seed for planting then they are able to return those seeds to the vendor if they choose not to go ahead with the planting. We are not too keen on replicating that system anywhere else in the world, but we understand it does exist.

175. What would be the consequences for segregation and identity preservation if farmers did switch around between GM and non-GM crops; is it going to throw the whole system into confusion?
(*Mr Secker*) I do not think that is possible, frankly. I think we are in sufficient confusion as it is.

Mrs Organ

176. You mean, we are already there?
(*Mr Secker*) To a degree, we have got the worst of all worlds, in that 50 per cent of the US soybean crop is planted with genetically modified varieties today, and that gives the most challenge for a segregation system. I think 90 per cent of one thing and 10 of another is much more manageable, but we seem to have got to a point now where we either need to go one way or the other.

Mr Mitchell

177. You have been reported as offering premiums to farmers who supply non-GM crops. Is that the case?
(*Mr Secker*) There has been differentiated price put into the US market during the harvest season that we have just seen, and the degree to which that has been successful I do not have any feedback. It is something that we would be quite willing, I think, to do some further work on and provide you with some more information, should you be interested in it.
Chairman: I think we will use that as an excuse to terminate Mr Mitchell. Thank you very much, we accept that offer.

Mr Todd

178. Very briefly, which markets that you have experience of are rejecting GM product, in the same way as is happening here? We know enough about this country, but you trade internationally; what other trends can you identify?
(*Ms Rawling*) What we are seeing in the European market is that there is a similar situation in some other countries.

179. Which ones?
(*Ms Rawling*) For example, in France, some of the retailers are adopting very similar positions to the UK retailers; similarly in Germany as well. We also have a situation where many of the major food manufacturers make a product in one country and sell it throughout Europe; so if they are deciding to go non-GM on their food ingredients that is actually covering the European market as a whole. The Japanese market has decided to label GM and non-GM food ingredients through some legislation which is coming in, I think, in 2001, but that is already having an impact on the market, in terms of supply; however, they have adopted a 5 per cent tolerance, which means that meeting the standard is actually much easier than meeting the European standard.

180. Reading your evidence, there was a certain tone to it, which indicated that those who did not particularly wish to have GM supplies were being perverse; for example, when you say "those who are determined to have non-GM supplies". Could you understand the feeling of those who say, "Well, we were quite happy receiving what we had before, we would like to carry on receiving that in the same way," without what they would regard as contamination and without having to bear premium costs; would you see where they were coming from?
(*Ms Rawling*) I think, absolutely, but you cannot put the genie back in the bottle.

181. Yes, but they did not ask for the genie to be taken out?
(*Ms Rawling*) Neither did we, and in some respects you could say we ourselves faced a lot more complications in our business because of this development.
(*Ms Guttridge*) Can I just add something there. What the consumer has consistently asked us for until now has been cheaper food, and there has been some evidence that on the soybean it was reducing the cost of production, but because it was not a consumer trait, as the tomato paste was, it was not something the consumer was interested in, actually.

182. Yes, I agree that consumer messages are often contradictory; it is a difficult world, is it not?
(*Ms Guttridge*) Yes.

183. Obviously, your business is to respond to the market-place. What are your projections; you run a large business, which must operate on assumptions of three, four, five years hence, what are your projections?
(*Mr Secker*) Our projections are that the food industry will remain where it is for that period of time, i.e. that it will not receive GM ingredients. We would predict that the animal feed industry would follow, and that position will be maintained until such time that we see introduced into the market-place GM products which provide a discernible benefit for the consumer, and we do not expect that the consumer will react any differently for all of the time that the only things that are available are products with agronomic benefit only.

[Mr Todd *Cont*]

184. So you foresee stasis, really, at the moment, a stalemate, in which there is no significant further progress by GM product into the market-place?

(*Mr Secker*) I am not sure whether I would describe it as a stalemate, but I think we will—

185. But no substantial retreat either?

(*Mr Secker*) No; that is correct.

Chairman: Sorry; we would have liked, again, to explore with you at much greater length these issues, and I am sorry but it has gone one o'clock and we must draw things to a conclusion. I apologise. We will remember this evidence session, for many reasons, not just for the quality of your evidence. We all know where we were when Kennedy was shot, but this is also the session when we were joined by Mr Lembit Öpik for the first time on this Committee, and when we all saw on the annunciator that the 'beef on the bone' ban is about to be lifted, or we assume that is what it is. So thank you very much indeed for your time and your frankness, we really appreciate it. Thank you.

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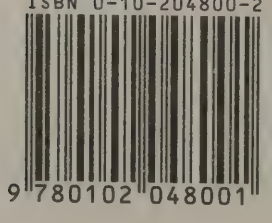

HOUSE OF COMMONS SESSION 1999–2000

AGRICULTURE COMMITTEE

THE SEGREGATION OF GENETICALLY MODIFIED FOODS

MINUTES OF EVIDENCE

Tuesday 7 December 1999

Dr Philip Dale and Professor Alan Gray

FRIENDS OF THE EARTH
Mr Peter Riley

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Members present:

Mr Peter Luff, in the Chair

Mr David Curry
Mr Paul Marsden
Mr Austin Mitchell
Mr Mark Todd

Memorandum submitted by Dr Philip J Dale, John Innes Research Centre (R27)

There are various stages in crop production, storage and handling during which GM and non-GM plant material can become mixed. The potential causes and the factors influencing the extent of mixing are summarised below.

1. Seed Supplied to Farmers

Farmers often sow Certified Seeds that have been produced using Statutory procedures to ensure high genetic purity. These measures include cleaning the machinery used to sow and harvest the crop, and the physical separation of similar crops to minimise pollination between crops. The usual genetic purity of Certified Seed is over 99.7 per cent.

Seeds produced by farmers from their previous crop ("farmer saved seed") would generally not follow such strict procedures and are likely to be less genetically pure.

2. Crops Grown by Farmers for Food

The potential sources of GM and non-GM crop mixing are as follows:

— Certified seed used to establish the crop, could be up to 0.3 per cent impure;
— Crop mixing with GM volunteer plants that are already present in the soil when the crop is sown;
— Mixing with GM seeds present in sowing, harvesting and storage equipment;
— Cross pollination with adjacent GM crops. This will vary with the distance and sexual compatibility between the GM and non-GM crop, and the method of pollen transport (e.g. insects, wind).

3. Commodity Crop Production

Commodity crops are grown and handled on a substantial scale, especially in North America. The biotechnology companies release GM breeding lines under licence to plant breeding companies, who develop GM crop varieties from them. Seeds of these GM varieties are sold to farmers, and the biotechnology company sometimes collects a technology transfer fee as part of the cost of the seed. The GM crop is often produced, marketed and transported, along with non-GM crops. Because of the nature of commodity crop production, there is no easy mechanism for a biotechnology company to orchestrate crop separation and seed segregation between GM and non-GM crops. Effective segregation is probably only possible by regional separation of GM and non-GM crops.

4. Organic and GM Crops Production

The following considerations are important (see Moyes & Dale 1999; www.gmissues.org).

— GM crops are approved following a rigorous regulatory assessment;
— The two methods of GM and organic crop mixing, are by seeds and pollination;
— There is extensive experience of the production of high genetic purity seeds (as described above) that can be used in the production of high genetic purity organic crops;
— Some seeds used for organic agriculture (especially maize) are imported from North America, where there are large areas of GM maize production. It is possible that some of the imported seed already has GM seed mixed with it;

— Organic agriculture has experience of setting tolerance limits for spray and fertiliser drift from non-organic agriculture;

— There is pollination and the movement of pests and diseases between organic and non-organic crops.

5. Methods to Prevent or Minimise Gene Flow by Pollination

Various methods, in addition to physical separation, are sometimes used or are being considered.

— Removal of flowers is sometimes practical during the experimental phase of GM crop trials;

— The production of sexually sterile plants and the use of vegetative reproduction;

— Chloroplast transformation to minimise pollen transmission of the GM character;

— Terminator technology to produce crops in which a hybrid between a GM and non-GM crop are non-viable. This is currently not a workable system.

6. Conclusion

In practice it is virtually impossible to guarantee complete genetic purity of any field grown crop. The only practical solution is to accept tolerance limits of mixing between GM and non-GM crop material.

The degree of mixing between GM and non-GM that should be allowed depends on scientific and ideological arguments. A useful baseline would be the 99.7 per cent purity defined in the production of high purity Certified Seeds. There has been extensive experience with crop management procedures to achieve this level of purity.

30 November 1999

Memorandum submitted by Professor Alan Gray, Institute of Terrestrial Ecology (R28)

SEGREGATION DURING GROWTH OF THE CROP—GENE FLOW

At least in theory, the living products of GM and non-GM crops, whether seed, fruits, leaves or whole plants, can be separated on the farm by strict rules governing their sowing, harvest and handling. (In practice, of course, this may prove to be difficult where GM and conventional crops are grown on the same farm.) Of rather more concern, judging from media coverage, has been the possible mixing of GM and non-GM crops by cross-pollination and hybridisation—probably because this is determined by "natural" processes over which we appear to have little or no control, such as the wind or the vagaries of honeybee behaviour ("bees can carry pollen for many miles").

This note briefly introduces the issues of segregation of the growing crop. The first, and arguably the most important, point is that the ability to segregate the crop by physical separation varies considerably from crop to crop. In the case of oilseed rape, for example, it is not possible to guarantee full segregation on anything but a regional scale of separation, although, as shown below, much can be done to minimise cross-pollination in this species. With wheat, and to some extent maize, segregation is feasible by growing crops at specified distances apart.

The basic elements which determine the extent of gene flow at a given distance apart (defined in this note as the transfer of genes by cross-pollination) are the breeding system of the plant (whether it is self-pollinating or outcrossing— and its mode of pollination (by wind or by animal vectors, such as insects). In a sample of seed crops in the USA listed by Levin and Kerster (1974), the average isolation distance for self-fertilising species is around 300 metres (± 150 metres), and that in primarily or exclusively outcrossing species is 800 metres (± 240 metres). In practice, for any particular crop species there is known to be enormous variation in the levels of gene flow, depending not only on distance but on factors such as coincidence of flowering, the period of pollen viability, the variation in weather conditions, the size of the source, and recipient populations, the nature of the intervening vegetation, and so on. There is also considerable year-to-year variation.

The difficulties of making accurate predictions (ie how much gene flow occurs at a specific distance) are partly illustrated in the figure [not printed]. This gives average dispersal curves for three sites in France in which herbicide-tolerant oilseed rape varieties were grown in adjacent fields; doubly-resistant genotypes were detected in plants grown from seed collected at various distances from the edge of the crop and in volunteers emerging after harvest (Champolivier *et al*, 1999). The results indicate average hybridisation rates of about 2 per cent at one metre, 0.2 per cent at 20 metres, and less than 0.01 per cent at 65 metres (oilseed rape is

self-compatible and between 40–80 per cent of pollinations are self-pollinations). The best mathematical description of such a curve varies from species to species but has a very characteristic shape with a rapid fall from near-neighbour pollinations within a metre or two, according to some exponential power function, and a very long tail with gene flow occuring at extremely rare frequencies, sometimes over considerable distance.

Dispersal curves such as this have been helpful in determining appropriate isolation distances for small-scale R&D releases of GM crops (so-called Part B releases). Working on a case-by-case basis, the Advisory Committee on Releases to the Environment (ACRE) has been able to agree appropriate isolation distances, sometimes combined with other risk management procedures such as a border or barrier of non-GM plants of the same species around the GM trial. Establishing such isolation has been made a requirement of the consent to conduct this trial.

The separation distances which would provide acceptable segregation of GM and non-GM crops once the former were grown on a commercial scale presents more of a problem. In the applications to place on the market (Part C applications) considered by ACRE to date, the advice that a GM crop presents a low or effectively zero risk of harm to human health and the environment has included the explicit assumption that low but undefined levels of gene flow between crops (or to wild relatives of that crop) are possible and acceptable (ie do not constitute a hazard). This has been because the inserted gene (transgene) and its effect on the crop or wild relative was not considered *sui generis* to be a hazard.

In making this assumption, ACRE has taken note of research such as that at the Scottish Crops Research Institute (eg Squire *et al.* 1999) on gene flow in oilseed rape at the landscape scale. One study of a patchwork of fields in Tayside used pollen traps, male-sterile bait plants and mathematical modelling to demonstrate a greater complexity and more gene flow than would be predicted from measures of dispersal from single-source fields. In addition, it should be noted that volunteers and feral populations (the latter being very common in oilseed rape growing regions) provide a means of transferring genes from GM to non-GM crops over time (so-called "green bridges"). Since seed from this crop may persist in the soil for 6–10 years, there is a considerable potential for transgenes to move around in space and time in regions where the crop is grown in high density year after year.

The key question, therefore, becomes "What separation distances *on average* over a range of conditions will provide 'acceptable' isolation of crops?".

Fortunately for many crops, including those so far considered by ACRE for large-scale release, these distances have been calculated as part of the process of producing seed of known purity. Experience from around the world has led to internationally-accepted isolation distances for various levels of seed purity. In the UK these are governed by a range of legislation (eg for oilseed rape *The Oil and Fibre Plant Seeds Regulations 1993 (as amended)*), based on practical experience and extensive seed-testing over many years. Thus, to produce Pre-basic and Basic standard seed (with not less than 99.9 per cent purity), oilseed rape varieties must be separated by at least 400 metres. To produce Certified seed, the distance in this species is 200 metres (99.7 per cent purity), and at 50 metres a level of 99.5 per cent purity is achieved. By contrast, for wheat, barley and oats, a compulsory isolation gap of only 2 metres is required, although an isolation distance of 50 metres between different varieties is recommended. For maize, the highest standard of varietal purity requires 200 metres isolation.

Thus, international seed certification standards provide a guide to the physical segregation of GM and non-GM crops during growth and flowering. For most crops they do not guarantee complete segregation, but when combined with agronomic practices designed to reduce gene flow, and perhaps regional agreements such as those for industrial and food oils in oilseed rape, can lead to extremely low levels of cross-pollination. It is very difficult, if not impossible for a crop such as oilseed rape, to guarantee that cross-pollination will never occur—a situation which emphasises both the need to focus on the risks posed by specific transgenes and the need to develop mechanisms for preventing hybridisation between GM and non-GM crops.

29 November 1999

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Examination of Witnesses

DR PHILIP DALE, John Innes Research Centre, and PROFESSOR ALAN GRAY, Institute of Terrestrial Ecology, examined.

Chairman

186. Gentlemen, welcome to this second session of the Committee's inquiry into genetically modified foods and the segregation issues. As I think you understand, this inquiry is primarily about how you can protect choice, it is not about the merits of the technology as such, although inevitably from time to time our questioning does stray into those areas. However, the principal issue is about choice. May I first express my real gratitude to you both for going to the trouble of writing such helpful written memoranda. We are going to have something of a tutorial from you this morning. We need to learn and we are very, very grateful to you both for agreeing to be our tutors. May I ask you each individually to introduce yourself. We have your CVs so we know something of your track record, but perhaps if you could summarise your track record in the area and very briefly give us an overview of what you have learned about the issues, which are relevant to our inquiry as a result of the work which you have undertaken. Would that be possible?

(*Dr Dale*) Thank you for the invitation to participate in this. I am a research scientist trained in plant genetics. As the subject developed I moved into the development of genetic modification methods and then later into assessing the safety of genetically modified crops for food and for the environment. This has included measuring gene flow and measuring the possibility of mixing one crop with another. So I and others have generated data on the likelihood of pollination between one crop and another and various aspects to do with the possibility of mixing. I have believed, right from the start, that the future value and use of genetically modified crops would be served best by giving the consumer and the farmer choice. So the consumer needs to be able to choose, as far as is possible, products that do not have genetically modified components in them; and farmers and consumers need to have the choice to choose genetically modified crops if they wish. The difficulty at the moment is that because of what has happened, that many have the choice to have food and crops without GM in them, but it is very difficult for those of us who believe that there is an important future in GM crops, for the future of our agriculture and the future of our environment, that they can make a useful contribution to these. We have been denied largely the choice of genetically modified crops and food ingredients.

187. That is a reversal sometimes of the position which is widely perceived. Thank you.

(*Professor Gray*) I too am a research scientist. Unlike Phil Dale I have worked principally with wild plants, with natural populations of plants, and my interest has been in genetic variation and the reasons why they vary in the traits they have and how they are inherited. That has involved us in study of gene flow, cross-pollination and hybridisation between different populations. In more recent times, principally in relation to the GM issue, I have been interested in gene flow between crops and some of their wild relatives in the British countryside because there is a limited number of our crops which can, and presumably have been for some time, exchanging genes; (and in a future scenario this might include transgenes, genes which have been put there by modern biotechnology), with their wild relatives. That has been my research and interest, looking at how far genes travel, how well plants survive when they have new genes in them from different plants and so on. I share Philip Dale's enthusiasm for choice and people having choice. This has been a constant source of concern for those of us involved in the regulatory side or advising on the regulations of GM crops; but this choice, both as he says, to eat products or to use products which are in some sense GM free, is a difficult thing for us to define. Also, where possible, where those farmers around the world who have taken out this technology with enormous enthusiasm, that their choice too is maintained.

188. Thank you. I just want to make sure we have this right. Dr Dale, you are a member of the Advisory Committee on Novel Foods and Processes, and the Advisory Committee on Releases to the Environment, ACRE, the sub-group of that. Is that right?

(*Dr Dale*) Yes. I was a member of ACRE for six years. I came off earlier this year but I am on the sub-Committee which is looking at wider biodiversity issues. I am a member of the Advisory Committee on Novel Foods and Processes.

189. Professor Gray, you are acting Chairman of ACRE?

(*Professor Gray*) Yes.

Mr Curry

190. Professor Gray mentioned the phrase, "GM free, a difficult thing to define". Could you explain what you mean by that?

(*Professor Gray*) The difficulty is relating the amount of actual gene or the protein the gene makes in, say, a hybrid between a plant which has the gene and a plant which does not have the gene, and the final commodity. This could be quite different in things like oil or maize—flour that is fed in proportions that may be quite different in the final product to those which are in the original hybridisation. So you might talk about a percentage of hybridisations if you were using certified seed but that might be quite different from the percentage ...

191. You were not suggesting that you might have a plant which was AC/DC?

(*Professor Gray*) No.

Chairman: We will probably pursue these questions of what is GM free a little later.

Mr Curry

192. But it goes into it?

(*Professor Gray*) Yes, that is right. It is what is the percentage, the proportions and so on. How it is defined in relation to the final item that you have.

Chairman

193. That is the final issue. One that we will be looking at this morning. Mr Todd will be doing that later. Just on these two committees, I have to say I do find the regulatory arrangements a little baffling sometimes. The division between MAFF and the public environment is sometimes also a little bit difficult to understand. I wonder if you could describe the work of these two committees and what you actually do on them; perhaps to help us to understand how these function. I suppose we ought to begin with the Chairman really.

(*Professor Gray*) As you say, I am acting Chairman of the Advisory Committee on Releases. The Committee comprises a group of independents, largely scientists. There are ecologists. There are molecular geneticists, people who understand the genetics, they can characterise what goes into anything that comes before them. There are some farmers. There is somebody who has been concerned with sustainable agriculture. There is quite a range of expertise. They are independent experts, on the basis of their science and the advice they can give. We deal on a case-by-case basis. The day-to-day business is a case-by-case consideration of the applications from industry or from the universities to release genetically modified materials; it has been mainly crops and things like vaccines and so on, which have been looked at. So on this case-by-case basis, in most of these cases these are for specific trials for research and development. The companies want to grow the plants, see how well characterised they are, and whether they do what they were designed to do, by the people who put the genes in them. These are so-called part B releases, limited trials of limited size. The dossiers come to us, having been dealt with by the Secretariat of the Department of the Environment, Transport and the Regions. At the same time, those dossiers are seen by other interested organisations: e.g. MAFF. They go to Scotland, conservation agencies and so on, so there is wide consultation at that stage. We discuss these individual dossiers and offer our opinion, our advice, which we are statutorily obliged so to do, to the environment minister on a particular release: whether it is safe or whether it carries an effectively zero risk to the environment. In more recent times, beginning in 1994 but with something of a gap, the Committee has considered so-called part C releases. These are to place on the market—these are the big issues as far as you are concerned, I imagine—which may come to us either from the DETR, who may be the competent authority within Europe to deal with it, or it may come from another Member State. So from one of the 15 Member States, we may get their competent authority's deliberations on this release. There are periods of time: 90 days if we were the competent authority and 60 days otherwise, when we have to consider this particular application and give advice. So this is our bread and butter. This is what ACRE principally does. We advise the Minister on consents and we will attach conditions to consents where we may have anxiety about managing the risks involved. We also, from time to time, look at other sorts of releases: releases of insects for biological control. We advise on the research which we think is important to underpin the risk assessment process. We identify gaps. There are quite a lot in our knowledge of the risks posed by a particular gene in a particular plant. We advise that this research is funded. This is our statutory role within the Advisory Committee.

194. There has been concern expressed that these committees are dominated by those who either have a vested interest or an intellectual interest in promoting GM technology. Do you understand those criticisms?

(*Professor Gray*) I understand them. I do not accept them. I have not worked on both committees. I have worked on the committee which recently Phil Dale has joined (ACNFP). In ACRE I was impressed throughout by the incredible care with which each issue was considered. The range of expertise and integrity is a tremendous tribute to public service, in my own view. Whenever there was a potential interest this was declared. The whole committee has been concerned from its beginnings with transparency. The minutes are published on the DETR web, where possible, within 15 days. Where a particular application may have contained commercial in confidence information or was involving some individual, then that person would leave. On the new committee there are fewer direct contacts with the biotechnology industry but, of course, with several of the research scientists, parts of their organisations will probably be receiving funds to do research from those organisations. In my view, having worked on peer review committees and other committees like this, the integrity of the people involved and their basic honesty was unparalleled.

195. Dr Dale, the same question.

(*Dr Dale*) I agree with what Alan has said. The debate in these committees is very robust and it would be very difficult for an individual to argue for something if it was not accepted by the majority of them. I am a fairly new member of the AC&FP and I am just developing familiarity with the way it works. I understand Janet Bainbridge is here next week and will be able to give you detail. Essentially it works in the same sort of way. The flavour of the committee is different, reflecting the difference in expertise needed. There is an ethicist, there is a consumer representative, medical doctors are represented fairly strongly, there are geneticists, people expert in allergenicity, toxicity and food testing. We consider proposals. It is not only about GM. It is about novel foods in general. So there are a range of different kinds of products coming forward for consideration. I am there principally because of my expertise in GM crops We take proposals in the same sort of way as ACRE and go through the evidence, ask for further evidence, further testing where that is considered necessary, and make a recommendation at the end of that process.

[**Chairman** *Cont*]

196. I again admit some ignorance here. The new Agriculture Environment Biotechnology Commission is about to be established. How will it relate to those organisations and will either of you gentlemen play any part in it?

(*Dr Dale*) As I understand it, the decision has not been made as to who will be part of that. The process is still running forward. The role of that commission, as I understand it, is to form an overviewing committee. That will look at the responsibility of the advisory committees and will look for gaps, (and look for areas of duplication probably), and, in a sense, stand back from the day-to-day consideration of proposals and be more visionary perhaps. The work of ACRE is driven very much by considering proposals, making decisions, asking for further data and so on, but this new Commission will stand back from that and try to look at the subject in a more visionary sense.

197. Is that your understanding, Professor?

(*Professor Gray*) That is my understanding. It pretty well implements the recommendations which were in the Royal Society report on how to handle the issue of GM crops; and would be an over-arching body which would consider the scientific risks, the food aspects, the sociological aspects, the business aspects, and the ethical aspects. This was my view as to what was likely to happen.

Chairman: We will now get on to the nitty-gritty of the issue. I will turn to Mr Mitchell.

Mr Mitchell

198. Dr Dale, in section 2 of your evidence, you identify four mechanisms there whereby genetically modified and non-modified mixing can occur. Now would it be right to think that the only way the integrity of growing plants can be damaged would be through pollen transfer when the crop comes into flower?

(*Dr Dale*) That is one way.

199. It is the only way for growing?

(*Dr Dale*) Once you have an established crop, the principal way of genes coming in will be by pollen. What I am trying to argue here is that there are other sources.

200. I am just concerned about those growing crops and the problem of pollen transfer. Now are there any crops grown in the United Kingdom which do not have to flower before they are harvested, so that they do not produce pollen?

(*Dr Dale*) Many of the vegetable crops are harvested before flowering. If a cabbage flowers it is useless. So vegetable crops principally would be harvested before flowering. If one is producing a seed crop to produce seed that will sold to farmers for growing cabbages or cauliflowers or so on, those are grown specifically for seed production, so you would leave them and let them provide seed heads.

Chairman

201. Professor Gray, we are grateful to you for sharing the platform together. This is a relatively informal session so if you want to chip in and amplify what Dr Dale has said please feel free to do so at this stage.

(*Professor Gray*) I was going to add that, of course, one possible source is that there may be in the soil of the field in which that plant is grown, so-called volunteers from a previous crop; so when the crop is growing in the ground, unbeknown to us some seed from a previous year, or even several years before, has been lying dormant in the soil.

Mr Mitchell

202. What are "volunteers"?

(*Professor Gray*) The plants that come up as weeds in the crops in following years.

203. But they could also be debris, root structures which are ploughed into the soil, could they not?

(*Professor Gray*) In some cases, in potato, that is a common source of so-called volunteers. There is another technical term for it which is "ground keepers". The potatoes that get left and chopped up in the soil will appear sometimes as small plants in the crop the following year. This is very common, for example, in sugar beet crops. You often find there are volunteer potatoes in your part of the world.

204. Is it also possible for GM to leach into the soil through root structures?

(*Professor Gray*) No, not in the context of herbicide tolerance, no, which is what we are talking about when we talk about these things.

Mr Curry

205. Could I clarify. *Nature* has recently published some material about maize found to excrete toxin. "Maize engineered to resist insects has been found to excrete toxin into the soil." Chapter New York University. "Toxin associated with the plant passes into the soil where it may be active up to 25 days. The team had not realised that such a large protein could pass out of the root in such a way." Could you put that in context for us?

(*Professor Gray*) It is not my area of science. I do not know how having Bt toxin in the soil that has come from plants, how it will affect the organisms that are there; but the particular gene concerned, these toxins which are engineered—

206. It does not absorb genes from the soil, does it?

(*Professor Gray*) No. It is usually bound on to clay particles. This often happens in arable situations. But the actual gene we are concerned with is targeted at particular insects which it will kill and it is non-toxic to all others.

(*Dr Dale*) Most plants have substances in them that act against micro-organisms. It is a natural defence mechanism. In some cases, in rape seed for example, you would let the straw lie on the surface of the ground for leaching to happen. That is called biofumigation. It actually destroys pathogens, and perhaps seeds to some extent, in the soil. This leaching is quite a natural phenomenon. This is an

[**Mr Curry** *Cont*]
important study. It is the kind of information that we need to build into the assessment process to make it more scientifically informed but it is a fairly natural phenomenon.

Mr Mitchell

207. Going back to those crops which flower before they are harvested, do they have wild equivalents which could be cross-pollinated?

(*Professor Gray*) Yes, most of them do. Perhaps the best example is beet or sugar beet which normally does not flower but, of course, in many fields you will find flowers, flowering beet. These are "bolters". Instead of putting on a tap root or just having leaves, for some reason they have been stimulated to flower in their first year of growth. So that is one particular example. The ones which I mentioned, all the brassica family, cabbage, sprouts, kohlrabi, which in fact is the same species, have a wild relative of the same species growing in the British Isles on the coast in fairly restricted areas, (it is called wild cabbage strangely). Many of our crops—in fact, many crops around the world—have wild relatives growing alongside them. Often these are the weedy antecedents of them. They may be different species but they could have been used in the breeding. Oilseed rape has a wild relative.....

Mr Curry

208. It is a brassica as well, is it not?

(*Professor Gray*) Yes. But it is a different species of brassica. It is actually cross-compatible with wild cabbage. You could make that cross.

209. You should not grow Brussels sprouts in your garden if you have rape in the next door field.

(*Professor Gray*) I do not think it makes any difference. You will not normally have hybrids because your Brussels sprouts will not flower.

Mr Mitchell

210. Going back to the volunteers which you also mentioned in section 2, how prevalent are self-seeded volunteers of agricultural products that flower before they are harvested?

(*Dr Dale*) It depends on the crop. Rape seed has lots of seeds and often there is seed shedding at harvest. The thing about most crops is that they do not have much of a dormancy period. It is not only what seeds are in the soil but the length of the life of those seeds once they are in there. Oilseed rape lives possibly to the next year. It depends on how it is handled. If it is buried deep, if you do deep ploughing, you can keep oilseed rape seeds going much longer. But, generally, ones on the surface germinate the same year, in the autumn of harvest or in the early spring, but in our experience we do not get very much after that. So they are there. It is a consideration. That is why one usually has a rotation so you would have a break from a crop for, say, three or four years. Again, if it is rape seed, you would have a break for several years to clean the soil of that particular crop.

211. Tell us what happens if pollen from a genetically modified variety gets into a wild equivalent, or a volunteer, or a conventional crop in a nearby field.

(*Dr Dale*) If that becomes established, if it flowers at the same time, if it is sexually compatible and hybrids can form, then there is a chance that a hybrid will form. Some crops are outbreeding. Some crops are inbreeding. Many of the cereals will self-pollinate preferentially, so you get very little cross-pollination. With oilseed rape there is a certain proportion, 5 per cent sometimes, of cross-pollination. This may well happen.

212. Will the trait that is being introduced pass through subsequent generations in the normal way? Is there a 50/50 chance of it being inherited or will it always be inherited?

(*Dr Dale*) If it is something like herbicide tolerance, then the hybrids are quite likely to be herbicide tolerant. Now, as you go through subsequent generations, some will be herbicide tolerant and others will not. So it depends very much on whether you have selection pressure. If that hybrid occurs in an environment where you are spraying with herbicide, then you would select hybrids that have that herbicide tolerant gene. So it depends on management. In principle, hybrids and subsequent generations could carry the introduced gene.

(*Professor Gray*) It is too difficult to lay down hard and fast rules of how well genes will survive in the wild plants, particularly since there may be quite a lot of differences between, say, the arable environment and an environment which is not managed. We have good evidence with hybridisations of wild turnip, which occurs as an agricultural weed in some parts of Europe. This is another brassica, *brassica rapa*. It occurs as a weed in Denmark, quite a serious weed. It occurs as a weed in North Lincolnshire actually but farmers do not get terribly worried about it. It also occurs as a naturalised plant on river banks and canals, where it is known as Bargeman's cabbage. What work has been done on this suggests that if you get one or two wild turnips in a field of rape, then you will get quite extensive hybridisation. If you collect the seed from three or four plants that are in the middle of an oilseed rape field, then up to 80 per cent of the seed you collect from those plants, the father will have been an oilseed rape plant, so there has been hybridisation. That was known a long time ago—certainly in the 1960s—that turnips and swede, which is what rape is really, will hybridise in this way if you have a few of one in a crop of the other. Wild turnip, when it grows outside of the crop—or even very close to the crop, about a metre or a couple of metres apart, or if it grows in these so-called natural populations; if it is growing there with lots of its own species (and, as Philip Dale says, wild turnip is actually self-incompatible—it cannot pollinate itself). Therefore, when it is growing in oilseed rape, which can pollinate itself, it can pollinate other things, so it will hybridise. When it is growing nearby it is much more likely to cross-pollinate other plants in that population. So with those very difficult probabilities the end product has to be something that has survived all that. The question to ask is how many surviving individual hybrids do you get the

[**Mr Mitchell** *Cont*]
following year or even the year after that? That will tell you whether the trait you have put into this plant improves its fitness; whether it is acting under selection. The view about herbicide tolerance is that at best it is neutral. Therefore, unless it was transferred in large numbers, to a large number of plants, it would disappear or not be important in wild populations. But something like resistance to a pest or a virus or a fungus might have an impact on the wild population because that wild population may be suffering from that pest or virus and may suddenly get release from that. Part of assessing risks is to find out what the role of these genes is, and how important they are in controlling wild plants.

(*Dr Dale*) If I may add to that. These principles are not unique to GM crops. People have been inserting virus resistance measures by conventional breeding and it is important to ask these questions of conventional varieties as well. In a sense, GM development is requiring us to ask those specific questions about this set of crops, and we are asking very few similar questions about conventionally reared ones.

Chairman

213. This is a matter not so much of recessive dominant genes but of natural selection?

(*Professor Gray*) Absolutely, as far as the natural environment is concerned; and, indeed, as far as the farming environment is concerned. Applying the herbicide would be the most powerful selective force you could have for a plant which is tolerant to herbicide, so that is the major force involved in all this, the force of selection.

Chairman: I am going to ask one more question myself and then bring in Mr Marsden to discuss the issues of segregation distances, which is obviously very important. Then my colleagues might wish to ask some further questions to follow up. Dr Dale, in your memorandum you discussed ways of actually preventing gene flow by pollination. This is in section 5. Now one of them you say is not a workable system, which is terminator technology. The other three you say are being considered. How widespread is the use of these approaches?

Mr Curry: And what does "chloroplast" mean?

Chairman

214. If you could give us a brief definition of chloroplast transformation that would be great.

(*Dr Dale*) Chloroplasts are the green things in plants. They contain green chlorophyll. Those are the little sacs within plant cells that hold the green material. I will go through these. The first one is removal of flowers. With some of our early release field experiments we were required to remove flowers. That is practical with a small-scale experiment where you perhaps have a 30 by 30 metre plot. On a large scale it is not practical. The second one is the production of sexually sterile—

Mr Curry

215. Even in a 30 by 30 plot there are a hell of a lot of plants. Do you do this mechanically or by hand?

(*Dr Dale*) By hand. We employ students.

(*Professor Gray*) These trials have to stay small, of course.

Chairman

216. Commercial apple growers will routinely go around removing flowers from a number of their trees to enable proper growth, so on quite a large scale you will get flower removal from crops.

(*Dr Dale*) We went through every day and removed them. That is practical for small-scale experiments and it may be considered in the experimental releases that we have just heard about. The second one I have here is the production of sexually sterile plants. There is work, mainly in trees that may live a hundred or so years, to produce sterile lines; and many of them can be vegetatively propagated. That is a way forward with certain crops, vegetative propagated ones, where the inserted gene is considered to have some potentially undesirable environmental impact. The chloroplast transformation: when you insert genes, normally you put them into the nucleus. In the nucleus these are inherited by all of the offspring. If they are put into the chloroplast, they are inherited principally through the female side and not through the pollen. So the idea there is that an inserted gene would be quite effective but it would not be transmitted by pollen. It is not an absolute rule. There is a small amount of pollen transmission—it depends on the species again—but as a general principle these chloroplasts are not transmitted through pollen. Technically it is very, very difficult. I think the application of chloroplast transformation is very limited for all kinds of reasons. There may be applications but it is going to be difficult. The final one here is terminator technology. Again, that is very topical. This is where you have gone through the patent stage, so the principle has been patented. There are three elements to it that have never been put together as a package to get it to work but essentially it is a means of modifying crops so that you buy the seeds, grow the crop, and the seeds produced from that crop will not germinate. So it is terminated at that stage. Now much of the debate and the press interest in terminator, and the concern expressed by some, is about its use to prevent farmers saving their own seed, particularly in the developing countries. Traditional practices may be compromised in that sense. Here we are looking at it from a different point of view. It would be a way of stopping gene transfer. It would be a way, if any hybrids form, then these would not be viable.

Mr Curry

217. This is just what Monsanto said it is not going to do?

(*Dr Dale*) Yes.

Chairman: Thank you. That will help us very much. Mr Marsden.

Mr Marsden

218. I would like to talk about segregation distances. I am not a scientist. I enjoy science but when it gets to the *Trivial Pursuit* part of the science questions I always flinch, so forgive me, please bear with me, and let us try and keep it as simple as possible. Any mechanism to allow consumer choice between GM, non-GM, (and organic, for that matter), requires that all of those can be identified and adequately guaranteed. The Soil Association proposes a six-mile notification zone, based on the distance bees can travel, and on wind contamination. So my question is this, does a crop being self-pollinating or pollinated by insects affect the distance over which pollination can occur?

(*Professor Gray*) I will pick this up because I did mention, in general, in the note I have prepared for you, that it does indeed. In general, in wild populations, although insects can travel considerable distances, there is much more variation in the average distance that pollen travels. In effect, insects tend to pollinate near neighbours of plants; and their transmission of pollen to other plants beyond a fourth, fifth, sixth plant they visit is often very low because they have picked up pollen *en route*. So insects often confine pollination to small groups of plants, whereas wind pollination can sometimes, particularly if it is acting as a vortex, move pollen considerable distances. On the other hand, of course, bees can catch trains, as it has been said, and you could have some spectacular pollen movement. One of the problems is that there is a clear difference between the pollen travelling and it making an effective cross-pollination. This will vary enormously between crops and enormously between plants. It depends on how viable pollen is of a particular plant and how easy it is for the bee to deliver pollen to that plant. So if you take something like corn, for example, which was particularly controversial in the context of organic issues, we know that bees can travel considerable distances. They do not, as a matter of course, pollinate corn but they will be found on corn occasionally. It is actually very difficult to get maize to cross-pollinate. If you have ever grown any in your garden you know you have to shake it out. It is not a thing which effectively cross-pollinates over considerable distances. But it can—and this is the problem that I was trying to raise—enormous distances can be achieved by vectors of pollen, whether it is wind or whether it is bees. Particularly if you are growing the crop year after year in a patchwork, and sometimes the fields are quite close together; and particularly if you have these volunteers that we have heard about, and also feral rape, which is wild populations growing on the roadside; you have the wherewithal to connect genetically plants at quite considerable distances. The problem is that these are very rare events.

219. I take the general thrust of what you are saying. There are obviously exceptions. There is no such thing as zero risk. I appreciate that. Let me quote from the Soil Association submission to the Committee: "On the basis of the information, we concluded that there should not be an organic and GM site in the same three-mile radius around a bee hive." So do you think that is scaremongering and simply unacceptable?

(*Professor Gray*) It is not based on science in the sense that you might expect to be worried about the gene being found in sweetcorn. It is based on the view that GM and organic should be totally separate. It would be an issue for things like sweetcorn but not an issue for things like oilseed rape where I understand there are no organic versions.

220. Although it is, as I understand it from their evidence, the oilseed rape in particular and maize should have a six-mile limit.

(*Dr Dale*) The point is that there is no—

(*Professor Gray*)—cross pollination, as far as I am aware, with organic maize.

(*Dr Dale*) There is hardly any organic oilseed rape. There is hardly any organic sugar beet. There are certain crops—

221. That is not the point, is it? The fact that there may not be much there, does not surely mean that they are not right in saying that they are the recognised distances which they are stipulating at the moment, which we are looking at. 1 per cent of agriculture is organic, and it might go up to a few more per cent in the coming years, but if we are trying to encourage organic, then surely this is a very, very important step we are taking at this stage and we have to make sure we get it right? Either somebody is right and somebody is wrong or there is confusion.

(*Professor Gray*) This would be a considerably more stringent view of the degree of cross-pollination which might be allowed than is currently allowed for certified seed. When it came to placing crops on the market and one was faced with the problem of what distances one would like to advocate in those situations, because there is so much variation, because of all the scientific studies which have been done—whether they are from single fields or large groups of fields—these show that there is this variation year on year, and what we fell back on, (I think sensibly), was what was found to be on average *actually* happens. What actually happens, if you grow crops at certain distances, is that you can predict the amount of impurity that you would get in the seed of one or the other grown perhaps over specific distances. These have, over the years, become part of the regulatory system for producing seed of a known purity. So in oilseed rape, if you want to produce seed of basic and pre-basic standard, so-called (these are all laid down in the Oilseed and Fibre Regulations, which farmers have to use if they are growing for seed), you have to keep them at 400 metres apart and at that distance your seed is slightly different because here you are dealing with things coming into your crop and not going out.

222. May I stop you here. Oilseed rape should be kept 400 metres apart?

(*Professor Gray*) If you are growing a crop of oilseed rape to produce seed to sell on the market, guaranteed as a certain purity, (that is, of basic or pre-basic standard), one of the rules you have to follow is that there must be a distance of at least 400 metres between that and the next oilseed rape.

223. This is where the confusion comes in; it leads to my next question. You referred in your submission to Levin & Kerster, which found that the average

[**Mr Marsden** *Cont*]
isolation distance for self-fertilising species to be 300 metres. Now SCIMAC last week told us that a 200-metre margin is adequate for seed production.

(*Professor Gray*) Of a different quality. That is seed of certified seed level, which is not 99.9 per cent but 99.7 per cent. These are not figures pulled out of the air. They are based on seed testing stations around the world, whether it is in Boston[1] where they do these things, or whether it is the OECD. They have tested the seed and they tell us it works. When you look and see what is being submitted as being of that standard of purity they do not get batch failures. It works on average most of the time.

224. You are saying the baseline should be 99.7?
(*Professor Gray*) I am not saying anything about what the baseline should be. I am just telling you what are the scientific targets.

225. The reason why I said that— I am sorry if I have got it wrong. It is Dr Dale who says 99.7 per cent purity. I presume you disagree with that? Professor Gray has just said that he does not think there should be a baseline.
(*Professor Gray*) No. I said I am not telling you what the baseline should be.

Chairman

226. That is a commercial issue really.
(*Professor Gray*) Yes, the issue to do with organic.

Mr Marsden

227. Perhaps you could say what you think it should be.
(*Dr Dale*) Isolation distances and procedures depends on the crop. It depends on the outbreeding, the inbreeding, the nature of the pollination. All of the criteria are different for the different crops. In cereals it is 2 metres to achieve whatever level is chosen.[2] I think the reason why I suggested this really, as a basis for discussion, is that there has been a lot of experience of achieving those kinds of levels. It may be that on a large agricultural scale it is very difficult and uneconomic to achieve. Maybe one can achieve higher levels of purity. But let us talk about what level is appropriate. I think the difficulty with that is that there is, as Alan Gray has said, no scientific basis for accepting or rejecting 0.1 per cent and so on. The GM crops have gone through a regulatory process and have been shown to be acceptable. Many of these crops have been grown in North America on millions of hectares. So there is all of that experience.

228. That comes back to my original point about consumer choice. People out there are very upset and clearly very anxious: first of all, if they are consumers themselves, about is it non-GM or is it organic? and, secondly, for organic farmers out there who are extremely concerned. I have them in my own constituency who say to me, "We do not want them within six miles. We agree with the Soil Association." All I am saying is that it may be very clear in your minds, but I am just a very humble, ordinary, lay person trying to get to grips with this. What I am saying is that I am seeing different figures quoted, and I am obviously trying to get to the bottom of that.

(*Dr Dale*) Let us talk about the principle of "GM free". It is virtually impossible to guarantee absolute "GM freeness" because in some cases seeds are brought in from abroad, from North American maize. It is quite likely that some of those, with a very, very low frequency, may have some GM in them. As has been said, bees could potentially travel a long distance. We know in oilseed rape that honey bees will transport pollen for kilometres. If we are talking about absolutes we really cannot say.

229. Forgive me, but I am not saying that. I have acknowledged the point you have made. The same point that Professor Gray has made. What you are both saying though is that it is appropriate, based on science. What I am saying back to you is that the Soil Association are saying that it is not appropriate, based on their science. They obviously quote—this is not just off the wall—they are quoting the National Pollen Research Institute, the NPRI, in their evidence.
(*Dr Dale*) Well—

230. From that reaction I take it, for the record, that you disagree with the findings of the organisation?
(*Dr Dale*) No. It is essentially about this principle of GM free state or not. If you accept the principle that there may be some pollination of organic crops, then you have accepted that we are really talking about tolerances. If we are talking about tolerances, then the debate is: what is a reasonable tolerance? If we look from the science, there is no reason (from my point of view anyway) whether it should be 1 per cent or .1 per cent. If we are talking about the ideology, that is outside of science. Therefore, I believe that what we are really talking about are practicalities: what kinds of levels are practical? How can we nurture organic agriculture? How can we accommodate the other 99 per cent of agriculture? How do we work it together? If you have a six-mile radius, or whatever it is, then essentially you have to police a six-mile region around an organic farm. That would be very, very difficult to achieve in practice.

231. I am glad you have raised this because you have both acknowledged in your written submissions: you say, Professor Gray, that "... full segregation on anything but a regional scale of separation ... can minimise cross-pollination in the species." Dr Dale, you have acknowledged that effective isolation is only possible by " ... regional separation of GM and non-GM crops."
(*Professor Gray*) That depends on the crop. To qualify it again, with oilseed rape that would be true. There is not quite a parallel but there is practical experience in segregating oilseed rape which has been grown for industrial oils and food consumption. There is a scheme (I have forgotten its name) which MAFF operates, in order to ensure that these crops for those two purposes are grown at sufficient distance, so that the final product gives less than a 2 per cent contamination, in this case, of the oil with the high glucosinolates, the erucic acid, the chemical

[1] *Note by Witness:* ie, the National Institute of Agricultural Botany.
[2] *Note by Witness:* ie, certified seed genetic purity standard.

[**Mr Marsden** *Cont*]
which you want to keep out of the food that might have come from the oil. That is what farmers do in that case. That is done with MAFF approval and you could set up such a scheme. If you wanted to do the sort of thing you are going to do say that no hybrid was produced which had a GM mother or father you would have to do it on a regional scale for oilseed rape.

232. What do you mean by a region? How big is it?
(*Professor Gray*) North Lincolnshire.

233. Literally that big?
(*Professor Gray*) Literally that big.
(*Dr Dale*) It is not only about pollination. It is machinery. It is about these volunteers that we are talking about.

234. Professor Gray, you noted that ACRE has agreed appropriate isolation distances on a case-by-case basis for small-scale research and development releases of GM crops. How should isolation distances for commercial planting be determined? Obviously you have differing views that have been submitted to us on this one.
(*Professor Gray*) As I say, I do not think the issue about the organic versus the scientific reasons is straightforward. You can apply science to it but in the end a decision has to be based, as Philip Dale was saying, on questions of choice, and belief about whether the gene is safe or not. Explicit in the consent to place on the market, by all the regulatory committees around Europe who have looked at it—indeed, in those countries where it is grown on a large scale—is the scientific view that, for example, herbicide tolerant genes are not *sui generis* unsafe. However, it is not unsafe if you have these. Of their own right they are not unsafe.

235. *Sui generis*?
(*Professor Gray*) I do apologise. It is in my note. They are not of their own right unsafe. A plant containing that gene, if you eat the seed from it or a product derived from it, it has a low risk or effectively zero risk. What we do in trying to assess the risk is to look at the hazard. What could happen if that gene got somewhere you did not want it? That is so much part of the regulatory process. If it was a gene one was worried about; if it had allergenic properties; if you thought it was a gene that could cause those sorts of problems; if it was a gene that could produce a toxic protein; if it was a gene that, for some reason, you had some anxiety about it being out in the environment; you would not put it into oilseed rape. You would not do that. You would have to grow it under containment. So in the risk assessment—and, indeed, for the consent to place on the market—explicitly is the view that this gene is, in environmental terms and human health terms, safe. Now what has happened, in effect, is that we have gone on to look at other aspects of growing these things in farm-scale trials, so there has been a *de facto* hiatus here between saying things are safe, and saying: what is its impact on the environment? This is a very new process that we are going through. From the point of separating the individual crops that are grown either organically or not, it would very much depend on the crop; and you do have a good chance of isolating, for example, organic sweetcorn from GM corn.

Mr Curry

236. Picking up from Paul, you can see why we are confused. Your own paper is very helpful. First of all, you say you have got to have a regional scale for full segregation. You then quote a French paper which says that at 65 metres you get 0.01 degree of purity, which at 99.9 per cent is, you say, right at the top end. Then we have the Tayside experiment, which says that over time there will be transfers. Are the scientists able to come up with a *Code Napoléon* of all of this, so that we all know what we are talking about for what product? Everybody talks about different distances but when we get into it, it depends whether it is this product or that product or for this purpose or that purpose. We just end up with an incredibly confusing spectrum of conflicting scientific advice. At the end of the day we all wonder whether the numbers are pulled out of the air in any case.
(*Dr Dale*) If I can answer that. The point we are trying to make is that there is an enormous experience of growing high genetic purity seeds, certified seeds that are sold to farmers. There are statutory requirements to follow certain isolation distances, the handling of the seeds and so on, to maintain high purity. I am not saying that this should be the be-all and end-all of this, but this is a useful experience upon which we can draw. There are all kinds of levels of purity which those procedures can provide. That is a useful baseline for debating what is essentially our ideological view about what is acceptable, what levels of tolerance should be accepted.

237. So you could, in fact, produce a *Code Napoléon* so we all knew where we stood pretty well, which would represent best science at the time, which is all we could ever do.
(*Professor Gray*) What we are saying is that this is pretty well there anyway in terms of the practical experience of producing seed. It is a very good guide to help us know what happens on average.

238. You could say—and you will see the relevance of this question—that there is an argument as to whether GM is merely the continuation of science by other means, if you see what I mean. This is just simply doing it in a different way from what has always be done. What is all the fuss about? This is against others who say, "Hang on, this is something really new. This is seriously new and we have to re-think from scratch." Where does your argument lie?
(*Dr Dale*) If you follow the development of plant breeding from the beginning of the century, essentially it started in the 1920s. Then it was just straight pollination, essentially Mendel's procedures. There was the development of mutation breeding where you take a bag of seeds, hit them with a chemical mutagen, and there was wide hybridisation when quite distantly related plant species were hybridised, where various techniques were used to achieve that. There has been a progression. This is part of that progression. Now each one has novel features. We could, 30 years ago, have been debating that mutagenesis was completely unpredictable, with no idea of what kinds of products it would provide. We have developed selection and evaluation procedures. This is a step forward and it is an important one in that we can introduce genes from

[**Mr Curry** *Cont*]
very different kinds of organisms, but we ask the same sort of questions of those as we do of conventionally bred ones. We are concerned about toxins and allergens, they are all there in conventional breedings.

239. The fact that you can change a gene from a fish into a vegetable, that in your view is not something that is different?

(*Dr Dale*) It is different in the sense that we need to ask some different questions. It defines the questions that we ask in that risk assessment.

(*Professor Gray*) This is what most people recognise it as being—and I agree with everything that Philip has said—and this is in many ways an extension of the process of plant breeding if we are applying it to crops. In some ways it is much more precise than shuffling lots of genes, but I think what everybody recognises, and the reason why this technology is regulated around the world, is that it does open the possibility of introducing genes from organisms which would normally not cross-pollinate or hybridise with the organism concerned. That is why it is regulated and that is why it has to be looked at carefully. You can take genes from bacteria and put them into plants, you can take genes from plants that are not compatible and put them into plants and, as you say, if you really wanted to, you could take genes from fish and put them into strawberries. That is why there is concern. That is why scientists have said, "Hang on a minute. Let's think about this. It has to be regulated."

Mr Curry: Thank you, that is helpful. Is it also your view that in a sense we are chasing a red herring here? In talking about how you get complete segregation so you can get the assurance of a product that is absolutely clean, is that not a red herring? Bernie Grant told the House a few weeks ago that we all had black blood in us. In that sense should we be focusing on an acceptable level of tolerances—

Chairman: You are getting into Mr Todd's questions.

Mr Todd: They have already been well-tilled!

Mr Curry: Let me ask it and Mr Todd can have mine, if you like! It is important that we do not go chasing after the wrong thing. We had the traders here saying that 99 per cent was pretty reasonable. We have had 99.7 and 99.9 floating across the firmament.

Chairman: Before you answer Mr Curry, can I bring Mr Todd in.

Mr Curry: Let me finish my question. The question is what is the sensible place to direct our concerns in this area and what is the right question to be seeking to answer? Have we been asking ourselves the wrong question?

Chairman: The right question is the answer to Mr Todd's question.

Mr Todd

240. I would prefer it if they answered that one first.

(*Dr Dale*) I believe the debate is essentially about tolerances. It is completely impractical to guarantee with absolute certainty anything from crops grown outside. That is essentially what we are debating. That, as we have said, is not really a scientific matter. It is an ideological one and it is about what is achievable. How do we accommodate organic and regular agriculture? How do we accommodate the different forms of agriculture? It is about practicalities essentially.

241. It is about hazard rather than choice and the question of what is safe comes up.

(*Professor Gray*) If you agree with the scientific assessment that there is no hazard, then it is about choice, then it is an issue to do with whether you want to eat this foodstuff or not. Wrapped up in that, in my view—and I agree with what Dr Dale says—is a whole set of world views about the way the world should be and the way farming should be and so on. I think what scientists try to do here is say, "This is not hazardous but if you want some scientific rationale to choice, you have to say it has got to be about tolerance." For example, organic farmers may accept a certain amount of pesticide drift or may feed 25 per cent of non-organic foodstuffs to organic animals, whatever rules are laid down. I wonder why it is not possible, apparently, from what I have heard certainly from the representatives of the Soil Association, to come to some similar arrangements with respect to GMOs if it is acceptable that there is not a hazard. This is where the difficulty is, that there is no hazard, but the questions are not to do with that, they are to do with something else.

242. There is a distinction between "hazard" and "risk". Yes?

(*Professor Gray*) Indeed.

243. You say there is no hazard because there is no known hazard?

(*Professor Gray*) Yes.

244. There is always a risk in the sense that there are unknowns which you cannot have tested and cannot be certain of. Yes?

(*Professor Gray*) I accept that fully, yes, with everything, with any food you eat.

245. Very often people confuse the words "hazard" and "risk".

(*Professor Gray*) A hazard is something that might happen and the risk involves the frequency with which it might happen, the probability of exposure to it.

246. I understand the distinction but for the purpose of this discussion for people who might be listening who think the two things are equivalent, you are not saying there is no risk; you are saying there is no hazard?

(*Professor Gray*) Yes.

247. We have clarified that 100 per cent is not possible? It is not possible now and perhaps has not been possible for some considerable time in this particular field. The basis of analysis of acceptable levels from your point of view should be based on the experience that has been there in the breeding of seed over time. We had SCIMAC here last week who indicated that currently in Britain one could achieve a range between 98.5 and 99.7 depending on the varieties that you were seeking to breed.

(*Professor Gray*) Is this rape seed?

248. No, that is spread across the range of crops and that is why the differences were there.

[**Mr Todd** *Cont*]

(*Professor Gray*) I would not average things. The crops are so different, ...

249. I was taking a range from the bottom to the top. Would you have said that is an experience that is reasonable based on the crops that you are aware of?

(*Dr Dale*) Yes, they range from one per cent down to .1 something.

250. That is a little bit tighter than they were saying.

(*Dr Dale*) They were saying 1.5 down to .3.

(*Professor Gray*) Again, it depends on the quality of the seed.

251. Fair enough. They quoted the example of Switzerland which had spent some time developing a response to the suggested one per cent tolerance level in product as opposed to the crop itself at EU level which indicated that to achieve a one per cent tolerance in the product on the shelf you had to at least achieve 99.2 per cent accuracy in your seed. Is that broadly right?

(*Professor Gray*) That does not sound right to me. What you are talking about here is the amount of protein, probably, or DNA in the oil that is mixed from oilseed rape. The relationship between the number of seeds in the mixture and the proportion of that DNA in the mixture of the oil overall is not, I guess, a straight forward one. I do not know what it is, but I do not think that it is a linear relationship. It would depend on the product in a commodity product.

252. I found their answer difficult to accept because it seemed to me, bearing in mind the vagaries of the processing system that a crop might go through to reach the shelf, that it was perhaps unrealistic to have such a tight margin between the origin of the seed and the one per cent tolerance level that would be on the shelf.

(*Professor Gray*) If you took something like sugar you could have enormous cross-pollinations and hybrid sugarbeet plants but the product you are dealing with is basically sucrose. The contaminants of heavy metals would be greater than the DNA. It depends on the commodity.

253. Something that has happened a bit this morning and certainly happened last week is a tendency to say yes, but we really should not be worrying about all these things anyway because there are a lot of other things to worry about.

(*Professor Gray*) What I am saying is with sugar the relationship between the "contamination" of growing on the farm and the commodity you are eating is very different from "flavour saver" tomatoes or something where you are eating the actual transgenic plant. So there are no general rules.

254. So what you are saying is you have to define tolerance levels for individual products?

(*Professor Gray*) Individual commodities.

255. Products in the outcome, because if we are going to accept a regulatory framework which is about the thing you buy in your supermarket as opposed to the item that is cut in the field in Derbyshire, that has to be defined to an individual level, does it not, based on what you have just said?

(*Professor Gray*) I think, yes, there will be ways of knowing how much of the DNA that is of concern finishes up in the thing on the table.

256. And that would vary according to the process, of course?

(*Professor Gray*) That would vary according to how it is processed, whether it is heated, whether it is eaten raw and what part of it is eaten. That will vary tremendously.

257. Taking you back to the crop level, based on what you said earlier, it would seem reasonable that if one were to attempt to assuage fears about contamination, as some would see it, or simply maintain integrity, you would want to ensure that there was a set period in the rotation of crops where you are talking about the use of a GM crop or a non-GM crop because of the risk of "volunteers" over a period of time. Yes?

(*Professor Gray*) Yes. I think you might have to change the rules for GM crops if you were determined to maintain this sort of separation.

258. So you would have to have a protocol on the rotation system you would use to prevent a risk in the future?

(*Professor Gray*) To *reduce* the risk, to take you up on something you said. You gave me a little lecture on risks and hazards!

259. Indeed.

(*Professor Gray*) Yes, to reduce the risk you would possibly have to.

260. Presumably you would also have to have controls on farmer saving of seed as well?

(*Professor Gray*) Yes.

261. Because the risk would be that having released the seed into the farmer's hands, the farmer might choose to grow his own seed from that particular crop and then use it in other ways, so what I am highlighting is there is a range of things where if there is a genuine concern about segregation, there will have to be tight controls and protocols to have an outcome that would be acceptable to those who are concerned about it.

(*Dr Dale*) Which there are already for producing certified seed.

262. I have indicated there would have to be some more.

(*Professor Gray*) They would be of the same order of magnitude for the same crops I would imagine.

263. No, I have highlighted that there would have to be individual controls based on the processes through which that crop went to achieve the outcome that is being suggested for the tolerance level of the item on the shelf. You would have to have an individual set of controls related to that crop and its process if it was going to go through. I have also indicated there would have to be controls on the rotation system which perhaps are not in place now, and also on seed sale.

(*Professor Gray*) But those controls are there for certified seed. You cannot grow oilseed rape for certified seed in a field where you have grown swede, rape or turnip for the last five years. I do not know the detail of the rules but there are rules covering

[**Mr Todd** *Cont*]
these. Apart from the separation distances there are rules to do with the husbandry of the crop and so on which have effectively proved to give us these levels.

264. But the regulatory framework I have touched upon is not in place at the moment for these.

(*Professor Gray*) For the GMs, no.

(*Dr Dale*) Can I just come back to that. I think it is really what has just been said in a way. It is the way the crop is processed. If it is purified sugar then there is no chemical way of distinguishing whether that is GM or not. So if we take the ideological view that sugar from the GM crop is GM and should not be mixed with that from a non-GM crop, it is pretty well impossible to test. Unless you have some way of testing it, you cannot really police it and in the end it will depend very much on policing. You need to have DNA and protein to be able to detect whether you have got a product of GM.

Chairman: We will look at these issues in a little more detail next week. They are important issues. Thank you for your comments. Mr Curry?

Mr Curry

265. This is about the conduct of trials. Oilseed rape seems to be the villain of the piece. An enormous amount of this conversation is about oilseed rape because it pollinates, it blossoms, and, secondly, because it is the first crop of the year for bees as a matter of fact. Out of that comes a practical problem which I posed at the end of the session last week. I have got two labradors. There are public footpaths across all the fields where I live and my wife is Chairman of the Footpaths Committee so we are going to keep them open. If you are in the middle of an oilseed rape trial and I walk across a field and some of that blossom rubs off on my garments, or if my dogs go chasing into the fields after pheasants because that is the time of year when the birds are nesting, and then I take them for a six-mile walk and three or four miles down the road, what does this do to a trial? What does this do to crops where my dogs might subsequently go? Do you have to close off the fields where you are having trials to get valid results? What are the implications of this sort of involuntary spreading? I keep the dogs on a lead but even that will not help.

(*Professor Gray*) I hope you keep your dogs under control.

266. If you knew how reluctant farmers were to keep footpaths open, you would realise.

(*Professor Gray*) It is part of this tail[3]. Your dog is here somewhere, taking this pollen a long way. Whether it is going to make a cross-pollination will depend on how tall your dog is and whether there are receptive female flowers of rape in the field he goes into. It is part of this incredibly rare sequence of events.

267. Are we going to have to produce a whole set of rules, as it were, relating to the conduct of trials in order to make sure we have got the trials as viable as possible?

(*Dr Dale*) I would answer that by saying if in the risk assessment one is concerned about that rare event, then it is telling you something very significant about the gene and it should not go out. It is telling you that that gene is a major hazard. So what I am saying in a round about way is that the ones that are allowed through the regulatory process—

268. It would not matter.

(*Dr Dale*) It would not matter if those rare events happened.

Chairman: It seems you have reassured Mr Curry and certainly his dogs and I am grateful to you for that as I am grateful to you for everything you have said this afternoon. I have found this morning fascinating. We could have gone on much longer. If when you come to read the transcript of today there are things you wish you had said you have not said, or things you have said which you think on reflection you should not have said, we are very open to receive additional memoranda from you highlighting those issues.

Mr Curry: We did not ask the question about wildlife and bio-diversity.

Chairman: We may also take the liberty of looking through things that on reflection we would have liked to ask you about and have additional correspondence. Thank you very much, gentlemen. We are very grateful.

[3] *Note by Witness:* (pointing to the diagram [not printed] appended to the memorandum.)

Memorandum submitted by Friends of the Earth (R11)

Friends of the Earth (FOE) exists to protect and improve the conditions for life on Earth, now and for the future.

Friends of the Earth is one of the largest international environmental networks in the world, with over 50 groups across five continents:

— one of the UK's most influential national environmental pressure groups; and

— a unique network of campaigning local groups, working in 225 communities throughout England, Wales and Northern Ireland.

Friends of the Earth have been campaigning about food and agriculture since the early 1980s. The current Real Food Campaign was launched in May 1997 following increasing concern over the rapid introduction of genetically modified food and crops into the UK. We are supporting the Five Year Freeze Campaign which is calling for a minimum five year moratorium for:

(1) the growing of genetically engineered crops for any commercial purpose;

(2) imports of genetically engineered foods and farm crops;

(3) the patenting of genetic resources for food and farm crops.

During the Five Year Freeze the following must be developed:

— A system which allows people to exercise their right to choose products free of genetic engineering;

— Public involvement in decisions on the need for and the regulation of genetic engineering;

— Prevention of genetic pollution of the environment;

— Strict legal liability for adverse effects on people or the environment from the release and marketing of genetically modified organisms;

— Independent assessment of the implications of patenting genetic resources;

— Independent assessment of the social and economic impact of genetic engineering on farmers.

Friends of the Earth has the following comments relevant to this enquiry:

— Segregation of GM foods is essential for the establishment of a reliable labelling system in which the public have confidence;

— To achieve this it is necessary to put into place a comprehensive auditing system throughout the supply chain. In addition, isolation distances between GM and non GM crops must be large enough to ensure the integrity of non GM crops;

— The costs of the introduction of GM foodstuffs must fall upon the industry which wants to introduce them and which stands to benefit;

— At present, the burden of the costs associated with ensuring that the public has the choice of whether or not to buy GM products has fallen upon the UK and EU food industry. This means that in the end the cost of introducing GM foods will fall upon customers, who do not want them anyway;

— In order to ensure that the cost burden is correctly assigned, a levy on the biotechnology industry should be introduced. This could then be used to fund the segregation and auditing of GM foods. Auditing should include products derived from GM crops, such as vegetable oil and soya lecithin, to ensure choice for people who wish to avoid all such products for whatever reason;

— The current proposal from the EU of a 1 per cent threshold for GM contamination is not sufficient to provide surety for those wishing to avoid GM ingredients. The major retail organisations already work to a lower threshold than this, and its introduction would therefore lead to a weakening of the current standards of integrity for non GM produce. We strongly urge the Committee to discuss what is achievable in terms of a threshold with UK retailers who are currently investigating and establishing GM-free supply chains for soya and maize products.

Friends of the Earth believes that the introduction of GM technology into the food chain represents a very significant change in the quality of food on offer in the UK. The response of all major food retailers and most major food manufacturers to public concern has been to withdraw GM ingredients from their lines. This has provided an opportunity for reassessing if and how GM foods may be introduced into the UK. The US biotech and agricultural industries are currently receiving a hard lesson in market forces and they would do well to remember that the basis of trade is to provide people with what they want rather than what they don't want. The current state of the market offers the chance for the UK government to adopt a strong position on segregation within the EU and subsequently at any World Trade Organisation negotiations. This is necessary to ensure that the choice of GM-free (based on a threshold that can be enforced) is maintained in perpetuity, whatever the final market share achieved by GM crops.

7 October 1999

Examination of Witness

MR PETER RILEY, Senior Campaigner, Friends of the Earth, examined.

Chairman

269. Mr Riley, thank you. This is your second appearance before the Agriculture Committee. You were before us two years ago on food safety. Is that correct?

(*Mr Riley*) Yes.

270. Where we discovered you could have been a constituent of mine if you had stayed in your old business of asparagus growing in the Vale of Evesham.

(*Mr Riley*) That is right.

271. Welcome back. Given that certainly Worcestershire asparagus is a real food, could you tell us what you mean by a "Real Food Campaign"? What is "real" food? What are you for and against?

(*Mr Riley*) We have just started this campaign in October this year and we are trying to highlight the fact that there is a growing demand for food that is free of contamination from genetically modified organisms, from pesticides, from antibiotic use, so that people know when they are buying food at the supermarket or the corner shop exactly what they are getting. The real food campaign goes further than that. It is about fair trade for farmers in this country and in the developing world who supply our food industry and it is also about a fair deal for consumers. And so it takes a broad look at the food chain and tries to eliminate some of the problems which have been all too apparent over the last ten or twenty years really. We think if we followed a strategy to try and achieve that, it would be highly beneficial to United Kingdom agriculture in the long run where we feel the emphasis should be on quality rather than quantity. We feel the public at the moment is very much in a mood to take a closer look at what they are eating and ask questions about what is in it and what has been done to it before they eat it.

272. You have helpfully set out a number of issues that have concerned Friends of the Earth. You will understand that this inquiry predominantly concerns developing a system which allows people to exercise their right to choose products free of genetic engineering so we will try and restrict our questions today to those kinds of issues and not the broader issues that raises because it becomes so unmanageable otherwise. An undertone that comes through from our evidence so far is a degree of resentment from all those involved in the process, that there has been an hysterical campaign whipped up by campaigners like Friends of the Earth which has resulted in a triumph of irrationality over science. That is the accusation that is put against organisations like yours. How do you respond to that accusation?

(*Mr Riley*) Our campaign objectives are based on sound science and are based on the uncertainties of the usage of genetic engineering in food and crops. Our viewpoint is that we simply do not know enough about plant genetics and the technology of genetic engineering and the implications of that for the food chain and the environment to be absolutely sure that we are not going to develop unforeseeable problems in the future. We would like to see a much slower process in which the public is more actively involved than they have been up until recently. It is healthy that the public has come out and voted with their wallets. More than our campaigning and more than anything else, that has caused the debate to be opened up and we hope that that will be opened up even wider now so that we can have a full debate about the need for GMOs in the United Kingdom and also the future direction of farming.

273. You heard our last witnesses say—and I am paraphrasing them slightly and I put my own interpretation on this—that essentially many of the traits engineered in plants through genetic modification have been capable of being engineered in plants through traditional plant breeding technology, so why have you not been lobbying—perhaps you have—against herbicide tolerance or insect resistance engineered by traditional plant breeding techniques?

(*Mr Riley*) We are a relatively small organisation so in the past we had to concentrate on environmental issues that appeared to be crucial at that time. It has to be said that the mutation of seeds was not on the list because we had problems with acid rain, nuclear issues and climate change and we had to concentrate on those issues. I think the significant difference that has emerged now with GM technology is that we are capable of breaking species barriers where we are introducing entirely foreign genes into our food chain, and although much of the work at the moment involves a few genes in the future we can see plants being engineered for a whole variety of traits and we think because of our current knowledge of plant genetics and technology, the outcomes from that can be very unpredictable and that is why we have intervened in this particular campaign on GM. The other reason I think we are keen to get a debate going is because we see GM as a continuation of the intensive farming system which we do not think has served the environment well, we do not think has served consumers particularly well and we do not think has served farmers particularly well as well. We do think we need a complete re-think on farming and the GM issue is an important catalyst in getting that debate going.

Mr Todd

274. You used the words "absolutely sure" earlier. What do you mean by "absolutely sure" about anything?

(*Mr Riley*) Of course, there is no such thing as a risk-free activity, but you can make things a lot less risk-free by adopting certain strategies. We feel the precautionary principle should underpin our approach to all new technology so nothing comes onto the market until there is broad consensus within the scientific community (which I do not think there is at the moment) on GM, and also within the general public that this is acceptable technology to be introduced into our food chain.

275. How do you define an "acceptable" risk?

[**Mr Todd** *Cont*]

(*Mr Riley*) One which is largely predictable, I think, and one where you can assess what the impact of it is likely to be long-term into the future. Our view of GM at the moment is that some of the risks are not really predictable because the random placing of genes into plant cells is not sufficiently precise to make that a predictive science at the moment.

276. So in this technology when would you regard yourself as being as sure as you feel you should be?

(*Mr Riley*) As I said, I think it is when there is a broad consensus throughout the community that something can go ahead.

277. So what is that?

(*Mr Riley*) When we think we know what the risks are and we are able to do a sufficiently robust risk assessment.

278. What I am trying to test here is when you say a "broad consensus", of whom?

(*Mr Riley*) The agricultural community, the scientific community across the wide range of disciplines that would be interested in looking at GM crops. It is not just the genetic engineers; ecologists and agronomists are going to have to have a key say in whether we think these crops are suitable for the United Kingdom. Then I think it is important that farmers also get involved in that debate at a grass-roots level. We feel very strongly that the public, who are often ignored in these debates, should actively participate in the decision-making process.

279. One could argue that when the motor car was invented there probably was not a broad consensus as to the safety of that particular means of transport and certainly no proper analysis of its risk. Would you have taken the same stance on that technology?

(*Mr Riley*) I think if the motor car came along now, given the knowledge that we have got now, we would be saying, "Let's wait a minute before we go rushing into this technology." Back in 1900 with the red flags I do not think our scientific knowledge was up to scratch. That illustrates the point. We were not able to predict the outcome of that invention.

280. If we followed your approach to this we might not have the motor car now?

(*Mr Riley*) I think it would have gone down a different development route, put it that way.

281. You have called for a five-year freeze. Why five years?

(*Mr Riley*) It is a minimum of five years. That is our baseline.

282. Why five?

(*Mr Riley*) Because that seemed to us to give enough time to achieve the things we wanted to achieve which is to have a thorough review of where we were in terms of whether we needed GM crops in this country and needed the imports, and again to address some of the scientific uncertainties as we saw them. If at the end of that period there were still uncertainties the freeze could be extended.

Mr Todd: It is a bit like the statement by one political party that we should not join the euro in this Parliament or the next. It is a defined limit on time but not based on an analysis—

Chairman: I think that is a contentious comment! I will explain the logic of our position on the euro at a later date!

Mr Todd

283. When you set a precise time limit such as that, it does not have a clear relationship to a set of tasks which might be completed within that time or an evaluation of what may have happened at the end of that time. I have always been puzzled as to how the five years came about.

(*Mr Riley*) We could have said six, we could have said seven.

Mr Todd: That is exactly my point.

Chairman

284. It is the highest figure that alliterated.

(*Mr Riley*) Yes, it ran off the tongue nicely.

Mr Todd

285. So it is a slogan rather than a meaningful statement.

(*Mr Riley*) It is a statement that we were going far too fast for this technology and we needed to have a complete break from it and reassess.

286. Someone said five years ago, "That sounds a good statement to make. We will go for that." Okay. What does "freeze" mean?

(*Mr Riley*) We would not want to see any commercial growing of GM crops in the United Kingdom in the period of the freeze.

287. That is largely being complied with. There is no commercial growing of GM crops and the Government has already indicated a variety of steps that will have to be taken before it ever gets to that. It may not have produced a five-year figure but by your own admission five years is a bit of a random statement. So the outcome on that one is broadly as you would have wished.

(*Mr Riley*) It depends whether you think commercial growing is going on or not really.

288. Let's define that one then.

(*Mr Riley*) The Government has made no commitment to block any of the regulatory pathways required for a GM crop before it gets to market and we know that, for instance, Agrevo's fodder maize, which last summer took part in farm-scale trials, has already got a part C marketing consent through the EU and the United Kingdom's opinion, when they were asked by the EU, was that it presented no risk to human health or the UK environment which is rather strange when you consider we are now testing it in large fields to see whether it has an impact on bio-diversity. You have to question the whole voluntary agreement as to what exactly it means.

289. It is not being commercially exploited in this country at the present time?

(*Mr Riley*) It is not being sold in this country at this time but within one or two years it is possible it could be before the farm-size trials are completed.

290. So your definition of what "commercial" is would include farm-scale trials by the sound of it?

[**Mr Todd** *Cont*]

(*Mr Riley*) Indeed, and any other testing that is commercially orientated. You have to remember that the vast majority of the test sites in the United Kingdom have been entirely driven by commercial interests, not by environmental study.

291. So your definition of "commercial" is not that the crop may be sold commercially as most people would see the definition of "commercial" as being, but commercial in the sense that the long-term intent of that particular activity is to sell it commercially? Regardless of what you do with that crop, that is your definition of "commercial", is it?

(*Mr Riley*) Yes.

292. So the freeze would be on any testing of any kind of GM material?

(*Mr Riley*) Outdoor testing.

293. Outdoor testing, so indoor laboratory testing is okay?

(*Mr Riley*) Yes.

294. Right, okay. Why? How are we going to find out answers on these technologies if we are not able to test in an outdoor environment?

(*Mr Riley*) I think the problem there is that we cannot contain these crops within the field where they are being grown because—

295. As we have heard in the earlier evidence.

(*Mr Riley*) As we have heard, and our view is that the escape of genes in pollen into the wider environment and into other people's crops means that it is very difficult to conceive of a system of growing these crops in the UK where we are not going to run into either economic problems with cross-pollination or long-term environmental problems. The long-term environmental problems through cross-pollination of wild species are quite difficult to call.

Chairman: This is not exactly central to our inquiry this afternoon.

Mr Todd: I will let it lie there.

Chairman: Very interesting. Mr Marsden?

Mr Marsden

296. Mr Riley, in your memorandum you state that the "segregation of GM foods is essential for the establishment of a reliable labelling system in which the public have confidence." Do you feel segregation is the same as identity preservation?

(*Mr Riley*) I think there is some confusion over the two terms. Traditionally, identity preservation has been used to describe the process whereby specialist crops have been tracked into a specialist market. One thinks of soya going into the Japanese tofu market for instance where they want a particular type of bean. That is identity preservation, but in the case of GM and non-GM soya where they are both serving the same market, segregation of the crops from the field, and indeed when it is growing, is essential to achieve an accurate labelling system otherwise we will just get a huge mess with cross-contamination at various points along the chain.

297. You say that "isolation distances between GM and non-GM crops must be large enough to ensure the integrity of non-GM crops". Are you satisfied with the limit used in SCIMAC guidelines?

(*Mr Riley*) No, we are not at all satisfied with those. The ones set out for all the crops where they have currently listed separation distances are nowhere near enough to prevent wind pollination and they are certainly nowhere near sufficient to prevent bees coming into the crop. You have to remember that oilseed rape is an extremely favourite source of pollen for honey bees and also fodder maze could be used as a source of pollen by bees late in the summer, and research has shown that an individual honey bee returning from an oilseed rape field can be covered about 60,000 grains of oilseed rape pollen and it will then rub shoulders with its fellow workers and potentially a certain proportion of those pollen grains will be transferred on to another oilseed rape field in the vicinity which is potentially non-GM. At the moment we are not at all convinced that we can operate GM farms in the United Kingdom alongside conventional farming which is servicing the GM-free market which, as you are aware, has grown enormously in the last 12 months, and also the issue of organic farmers comes in as well. In the case of oilseed rape, the issue is between GM farming and conventional farming and those conventional farmers who choose to be GM-free because they think they can sell their products to companies that are selecting GM-free, then that is going to cause real problems without much much much bigger separation distances and we just do not think that is really going to be workable in the United Kingdom countryside.

298. Where do you draw the line then? You heard the previous evidence from Professor Gray and Dr Dale and you have agreed that there is no such thing as 100 per cent risk free, so what is acceptable? Are we saying that if one bee actually allows a cross-pollination that is unacceptable?

(*Mr Riley*) It certainly would not be one bee because thousands of bees would be getting to one field and bringing pollen back and thousands of other bees would be going to another field from the same hive, so there is potential for quite a large amount of pollen to be shifted. We have to look to see what is happening in the market. Only last week there was a conference[4] where Heinz and other companies were talking confidently about achieving 0.1 per cent as their threshold. With the technology there is we can go right down to 0.001 if we want.

Chairman

299. Can I pick you up on that because we have been told by many people that even the one per cent target the European Commission set is optimistic in the extreme. So you do not agree with that?

(*Mr Riley*) I am going on what I have been told by major companies, that they are meeting—

300. You get very different answers from different companies.

(*Mr Riley*) They are meeting their own standard of 0.1 per cent.

301. Those lower targets would be at quite a cost to the consumer, would they not?

[4] *Note by Witness:* Conference on identity preservation and segregation held in London.

[**Chairman** *Cont*]

(*Mr Riley*) I do not think it need be a huge cost, no. The evidence is if a company is buying soya from Brazil, for instance, then the additional costs of GM-free (or detection limit as we could call it) are not all that great and maybe less than ten per cent, and if soya is only a minor constituent of a final processed food then the impact on price is going to be very small and even from America, DuPonts have quoted a 54 cent increase per bushel going into Rotterdam which is a ten per cent increase on the GM. In the end where the cost is borne will be decided on who has the biggest sector of the cake. We could end up with a GM commodity trade and a non-GM commodity trade and both working alongside each other.

302. It is the economics of those issues that are really essential to this inquiry.

(*Mr Riley*) Indeed.

303. You have made an interesting suggestion in your evidence that there should be a levy paid for the segregation and auditing of GM foods. This raised the question of who meets the costs because it looks as if the non-GM consumer and producer are going to bear the cost of introducing GM crops at present. That levy idea is a novel idea. Who should be the collecting authority for that levy?

(*Mr Riley*) I think I would have to say we have not developed that idea very fully, but I think the levy should fall upon the GM industry because it is that industry which has disrupted the market.

304. Who would collect it?

(*Mr Riley*) The states where the crops were grown would have to collect it because the obvious place to put the levy would be on the seed before it goes into the ground.

305. It would require international agreement to get to that kind of position?

(*Mr Riley*) I think it would.

306. The prospect of international agreement is remote. Mind you, you have successfully sabotaged the one in Seattle.

(*Mr Riley*) What we want is sustainable international agreements, not unsustainable ones and that is why the WTO agreement was unacceptable.

Chairman: Mr Riley, I am afraid I am going to have to bring things to a conclusion, which I apologise for. Can I express our deep gratitude to you for coming and giving evidence in the last half an hour. If there are things which you think on reflection, having heard the evidence of previous witnesses, you wished you had said, or things that you had hoped to mention to us today, please let us talk about them in written memoranda and whatever else you can submit in writing at this stage. Thank you very much indeed.

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MMITTEE

SEGREGATION
OF GENETICALLY MODIFIED FOODS

MINUTES OF EVIDENCE

Tuesday 14 December 1999

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HOUSE OF COMMONS SESSION 1999–2000

AGRICULTURE COMMITTEE

THE SEGREGATION OF GENETICALLY MODIFIED FOODS

MINUTES OF EVIDENCE

Tuesday 14 December 1999

MARKS AND SPENCER PLC
Dr Tom Clayton and Mr Robert Mitchell

SOIL ASSOCIATION
Mr Patrick Holden

ADVISORY COMMITTEE ON NOVEL FOODS AND PROCESSES
Professor Janet Bainbridge

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TUESDAY 14 DECEMBER 1999

Members present:

Mr Peter Luff, in the Chair

Mr David Borrow
Mr David Curry
Mr Michael Jack
Mr Paul Marsden
Mr Lembit Öpik
Mr Mark Todd

Memorandum submitted by Marks and Spencer plc (R7)

SUMMARY

1. Marks & Spencer has developed approved sources for a wide range of non-GM food ingredients derived from soya and maize in response to our customers' concerns about this new technology.

2. These sources apply the same principles of segregation which are well-established as an essential element in effective traceability for food safety, quality and authenticity.

3. Segregation needs to be maintained at every stage in the food supply chain until food products reach the final consumer but must be based on practical realities.

4. Common industry standards for effective segregation of non-GM crops are urgently required.

5. Identity Preserved supplies have been established for speciality food ingredients but less costly, commodity-based systems will be needed to meet any future demands for non-GM animal feed.

6. EU legislation needs to resolve GM labelling issues quickly.

1. INTRODUCTION

1.1 Marks & Spencer has a long tradition of applying technology to the development of our food business bringing direct benefits to our customers. In this sense, we regard the emerging science of genetic modification as having a huge potential to impact on the food supply chain bringing the prospect of better quality and safer products.

1.2 Many of our customers have expressed their concern about the speed of arrival of the first applications of genetic modification to foods. They feel uncomfortable at something outside of their control and, in the absence of choice, they asked us to remove these gm ingredients from our foods for the time being. Since July 1999, all St. Michael foods have been made using only non-gm ingredients. More recently, we have announced plans to introduce a range of meat products where genetically modified soya and maize have been excluded from the animal feedstuffs.

1.3 We have reviewed our entire catalogue of 3,500 food products. Over 5,000 individual ingredients made from soya and maize were checked and changes were made to 1,800 recipes. This work caused us to probe to depths and in areas that have not previously been necessary and our knowledge of the practical issues of GM-segregation has expanded as a consequence. We are pleased to contribute from this experience to the on-going debate that surrounds the introduction of genetically modified foods and to echo the views of our customers.

1.4 We urgently need to establish common standards for effective segregation—farmers alone cannot be expected to take the risk arising from the uncertainty that would otherwise exist. In particular, we need to reach consensus on acceptable levels of GM material unintentionally present in otherwise non-GM foods.

2. OUR CUSTOMERS

2.1 The introduction into Europe of food ingredients from gm commodity crops has not been well-managed. The consumer has been left confused by poor quality information, the absence of any perceivable direct benefit and above all, by the lack of choice. GM foods have attracted widespread and largely hostile attention from the media and the actions of pressure groups have added to the feeling of unease expressed by many consumers.

2.2 Against this background, Marks & Spencer took action earlier this year to remove all ingredients from our foods that could have been derived from GM soya or maize. Previous efforts to label products which might contain these ingredients were clearly no longer sufficient. This has taken us to the major producing countries of the world to investigate local conditions for non-GM production and to establish approved

suppliers for a wide range of food ingredients and these are illustrated in Annex I. Subsequently, other retailers and some food manufacturers have adopted similar policies with the result that industry-wide efforts are being made to develop reliable sources of non-GM raw materials.

Tolerances

2.3 This work is hampered by the absence of common standards and, in particular, by the current EU legislation which is still incomplete and creates uncertainty. At the centre of the debate is the question of tolerances to allow for any unintentional mixing with GM varieties.

2.4 In our opinion, this is not a matter of food safety and there is no scientific imperative for a zero tolerance. If the law were to set unrealistic tolerances, then most retailers and manufacturers would abandon attempts to offer the non-GM alternative and return to labelling those products where it is impossible to guarantee complete freedom from traces of GM material. Continual improvements to analytical techniques will ensure these can be detected—PCR techniques of analysis already claim to detect even a few parts per million of GM soya or maize.

2.5 The options are to:

— control the levels of unintentional mixing with GM varieties through good practice by the agricultural trade;

— or move to a non-commodity basis for producing these crops and accept the cost implications that follow.

A key factor in this choice will be the future demand for non-GM animal feeds which account for the main consumption of soya in this country.

2.6 We believe that our customers are not interested in debates about the degree of purity of non-GM ingredients. They want to know that we and our suppliers have made an honest effort to ensure non-GM seeds are planted and that all subsequent handling minimises the chance of these becoming mixed with GM varieties.

2.7 We do not feel justified in making claims that our products are "GM-free" since this implies an absolute guarantee. We are able to assure our customers that all our foods are made using non-GM ingredients based on our experience of managing segregation through the food chain and this is discussed in more detail in the following section.

3. Segregation

3.1 *Traceability*

3.1.1 Segregation is an essential element in effective traceability. For many years, Marks & Spencer has found the benefits of "going back to source" in our efforts to provide consistently safe, good eating-quality foods. Full traceability is an essential element of our select farm schemes applied to UK beef, poultry and milk. Our programme of tree-ripe UK Cox apples depends on monitoring maturity at highly selected orchards. Talking directly to the farmer and the grower helps to ensure that our customers' needs are recognised and it gives the buyer a better chance to understand the practical issues involved. Having made the commitment to meet specific needs, there is a clear commercial incentive to maintain segregation at all stages in the supply chain.

3.1.2 The techniques required to achieve this segregation have grown from experience and reflect the realities of agricultural production as opposed to the enclosed environment that exists further along the food chain. Simple systems that can operate without elaborate management controls are more likely to be successful. Having specified product and source of supply, good segregation demands an assessment of the risks of unintentional mixing with other materials at all subsequent stages of harvest, storage and distribution together with appropriate controls to minimise these occurrences. In fact, the process must continue until the final food product is packed and delivered to our customers.

3.1.3 The numerous food-related health scares of the past 15 years have resulted in a heightened awareness of the complexity of the modern food supply chain. Consumers are demanding new levels of traceability to give assurances of food safety to which food retailers and manufacturers are responding. Recent legislation concerning product liability is a further pressure that is extending traceability beyond the more traditional needs. There is an increasing tendency to require independent auditing and verification of effective segregation to provide transparency in support of claims. It is important to ensure the extra costs to meet these demands are truly adding value for the consumer.

3.1.4 The debate surrounding the segregation of non-gm food ingredients will raise issues of principle that are equally pertinent to the wider calls for enhanced traceability.

3.2 *Averaging*

3.2.1 Natural variation exists in agricultural crops even within the same field, and this becomes more marked according to effects such as the weather and growing region. At times, segregation may not always be maintained throughout the chain.

3.2.2 The practice of blending or mixing together, either in deliberately controlled proportions or at random has the effect of smoothing variations resulting in a more uniform ingredient which is easier to use especially in high-volume food production. This does not condone mixing of good with bad—a temptation that may exist where standards set a numerical upper tolerance level for a particular defect.

3.3 *Standards In Segregation*

3.3.1 The standards demanded in any system of segregation will tend to be a balance of the need to deliver a given level of purity versus the cost to achieve. The traditional approach has required these needs to be quantified and they usually form part of the buying specification.

Food safety

3.3.2 Food safety issues normally set the highest standards for purity, usually in the form of measures to prevent any accidental mixing with potentially hazardous contaminants. For example, many years ago, our specification for air-dried fruits required effective measures to be taken to exclude goats and other animals from the drying beds to avoid an obvious source of faecal contamination.

Similarly, harvest intervals following the application of agro-chemicals must be carefully controlled.

3.3.3 For food safety, tolerances for contamination must be set at the lowest achievable levels.

Food quality

3.3.4 Food quality issues can set less stringent requirements—it may be possible to tolerate a level of unintentional mixing with other non-hazardous materials. The specification will set standards according to the impact of any mixing on final product quality and may take account of the ease with which subsequent processing can reduce these levels in the final product.

3.3.5 Food processing issues may demand levels of segregation that relate to the functionality of an ingredient in food manufacture. For example, the performance of flour in breadmaking depends on the quality and quantity of wheat protein. The presence of proteins from other cereal grains may adversely affect the baking quality and industry has established specifications setting maximum tolerances for these non-species grains in consignments of wheat—typically these levels are around 2 per cent.

3.3.6 For food quality, tolerances are based on a commercial judgement of the costs against what can actually be achieved through good practice with care and attention at each stage in growing, distribution and storage.

Food authenticity

3.3.7 Food authenticity normally raises questions about deliberate or fraudulent adulteration of foodstuffs such as:

— the substitution of orange juice from different geographic regions;

— the use of non-durum wheat in pasta.

3.3.8 Developments in techniques of analysis now provide the means to detect even highly sophisticated attempts at adulteration. These methods can also demonstrate accidental contamination but the authenticity of a product is not usually challenged provided it can be demonstrated that reasonable care was taken to identify and minimise the risks of any non-hazardous contamination.

3.3.9 Organic products do not automatically lose their status if pesticide residues are detected since it is recognised that accidental environmental contamination can occur through spray drift. Similarly, a consignment of organic wheat may not be entirely free from admixtures, possibly of "non-organic" wheat. To our knowledge, there are no numerical tolerances for these kinds of contamination set in legislation or by the Organic Movement other than the security from the system of controls that are available in practice.

3.4 *Facilities And Equipment*

3.4.1 There are often constraints on the equipment available at farm level which may also be used co-operatively by several farmers for different crops. Storage facilities are an integral part of the distribution system taking crops from farm to processors and it is normal to bulk-up supplies in common storage from numerous sources to create commercial volumes. Common transport is likely to be used at many stages in distribution, ranging from farm trucks to river barges and sea-going vessels.

3.4.2 Today's good practice is the culmination of developments in growing crops traded as commodities, often in the world market place. The driving pressures are to maintain a supply of wholesome, good quality product by the most cost effective means. The complex nature of these arrangements coupled with the transfer of ownership at several stages in the chain affect the ease with which segregation can be achieved and maintained.

3.4.3 Any change usually involves additional costs and will be resisted unless there is a realistic prospect of recovery. Demands for segregation may even disrupt commodity supplies to a significant extent where the existing infrastructure is not able to adapt quickly enough to handle segregated flows either through inadequate facilities or lack of management experience.

4. EU Legislation

4.1 The development of legislation, especially concerning labelling, has lagged behind the arrival of GM ingredients. In the UK, a system of voluntary labelling was introduced as part of a wider initiative under the auspices of the Institute of Grocery Distribution. Initially, product labelling was confined to soya or maize ingredients likely to contain GM protein or DNA. Later, Marks & Spencer and some other retailers extended labelling to include any ingredient derived from these GM crops.

4.2 The current regulations require foods to be labelled where genetically modified DNA or proteins from soya or maize can be detected. In its current form, this legislation is widely regarded as unsatisfactory since:

— some highly-refined derivatives escape the requirement for labelling;

— the absence of agreed methods of analysis create an uncertainty for enforcement;

— there are no tolerances to allow for low levels of unintentional inclusion of GM material.

4.3 Amendments to these regulations are under discussion which would establish a "*de minimis*" threshold for the presence of GM material to deal with the problem of unintentional mixing. The presumption is that sufficient evidence can be presented to demonstrate the steps taken throughout the chain to prevent the contamination. The latest proposals from Brussels may add to the confusion by applying the same threshold to soya and maize even though the risks from cross pollination are quite different.

4.4 Within the UK food industry, there is a view that numerical tolerances are not essential since the "due diligence" defence available under the Food Safety Act would be effective. A fixed numerical standard can sometimes act as a disincentive to further improvement once the minimum acceptable level has been achieved.

4.5 However, we realise that this approach is less likely to find acceptance in Europe and that it is more important to end the current uncertainty. In the meantime, industry standards for effective segregation measures are being developed to support the production of non-GM food ingredients.

5. Options for Non-GM Crops

5.1 *GM Production*

5.1.1 The first GM food to reach the British consumer was tomato paste, launched early in 1996 and grown for its distinct quality attributes. There was every incentive to maintain segregation throughout and, as a horticultural crop, this was achieved with comparative ease. In the longer term, effective systems of segregation will be needed for the next generation of GM crops being developed with added-value properties.

5.1.2 At present, the main focus of attention is on soya and maize for use as processed food ingredients or in animal feed. Both crops are grown as commodities world-wide although the main sources for this country are North and South America. Maize for food applications is predominantly sourced from Europe.

5.1.3 Significant proportions of both crops are grown in North America as GM varieties without any attempts at segregation from conventional types on the basis that there are no differences in output traits. These are varying estimates of the proportions of GM, typically a figure of around 50 per cent is quoted for soya and 25-30 per cent for maize. The actual numbers are not important since after mixing through the distribution system, consignments will usually test positive for modified DNA from the GM varieties. This has been observed since 1997 when the GM proportion of the American soya crop was said to be around 15 per cent.

5.2 *Identity Preservation*

5.2.1 Systems of Identity Preservation (IP) have been devised to manage the risks of unintentional mixing where large amounts of GM crops are grown in close proximity to conventional varieties. These are being used to provide reliable supplies of non-GM ingredients such as soya protein and soya flour which are high-value materials with functional properties which are not easily replaced by other ingredients. The costs involved with segregation are often irrelevant due to the low rate of inclusion in the final food product.

5.2.2 These systems have been established in the USA and Canada to maintain a continuity of long-established supply relationships. These experiences have been well-documented in the form of specifications verified by audit. Information about commercial systems such as those from Dupont, the British bread industry and Central Soya are no doubt available to the Committee.

5.2.3 The performance of these programmes is well-established with maximum levels below 0.5 per cent of GM soya. These are no longer commodity crops and this is reflected in production costs.

5.3 *Geographic Segregation*

5.3.1 A second strategy is available at the moment in countries where GM planting is restricted, notably in Brazil and Europe. In most cases we have found that while the product ex-farm is non-GM, care needs to be taken in the distribution system to manage the risks of unintentional mixing with GM material. Port facilities and shipping are obvious critical points.

5.4 *Segregation In Agriculture*

5.4.1 In addition to normal good practice, the various programmes of identity preservation operating in North America have established the potential for cross contamination by GM varieties and effective control measures have been put in place. Most work has been done with soya and it is likely that amendments will be needed to manage other crops especially in relation to cross pollination. The process of risk assessment is analogous to the HACCP approach now firmly established in the food industry and among the factors to be considered are:

- Seed control—even certified seed is not 100 per cent pure and controls need to specify the maximum levels of GM types.
- Contracted growing may be needed in areas with a high penetration of GM—this is not normal in the commodity trade and many are wary of unknown risks.
- On-farm controls including other crops, previous harvests and training.
- Cross-pollination risks especially where wind or insect vectors are used e.g. maize, rape seed.
- Cleaning of equipment in harvesting, storage and local distribution.
- System of controls including appropriate levels of documentation.
- Sampling programmes.
- Independent accredited auditing.

5.5 *Segregation In Processing*

5.5.1 Our experience shows that contamination will occur at any point in the chain where adequate precautions are not taken and this is obviously important in plants processing ingredients from non-IP sources such as oil-seed crushers.

5.5.2 We have also found detectable GM soya contamination even in food products from factories where no soya ingredients are used. In this instance, the cause was traced to cross-contamination at an ingredient supplier using soya raw materials in other products and required a fundamental review of in-factory procedures.

5.5.3 In the most extreme cases, aerial contamination between adjacent production lines is known to be detectable by the most sensitive GM-testing techniques and requires new levels of segregation controls to be considered.

5.6 *Continuous Improvement*

5.6.1 As in any new venture, there is always scope for improvement and the current systems for segregation in the production of non-GM foods are no exception.

5 October 1999

Annex 1

EXAMPLES OF INGREDIENTS DERIVED FROM SOYA AND MAIZE

This list illustrates examples of the wide range of food ingredients that have some association with soya and maize. In most cases, the ingredient forms only a small part of the final food product and is used for specific technical or functional properties that cannot always be easily substituted by other materials.

Soya	*Maize*
	Only one type of maize has been produced in GM varieties but these can easily cross-pollinate with the two other main types of maize widely used in food production
Primary Ingredients:	*Primary Ingredients:*
Flour	Cornflakes
Proteins and isolates	Cornflour
Oils	Oils
Derived Ingredients:	*Derived Ingredients:*
Soy Sauces and similar	Modified Starches
Oriental ingredients	Glucose syrups
Lecithins	High Fructose Corn Syrups
Other Emulsifiers	Maltodextrins Polyols
	Dextrose
	Caramel-flavour
	Caramel-colour
Ingredients Produced by Fermentation Processes using Soya or Maize Substrates	
Spirit Vinegar	Sweetener Aspartame
Ascorbic Acid	Xanthan Gum
Citric Acid	Flavourings & Bouillons

Examination of Witnesses

DR TOM CLAYTON, Head of Food Technology and External Affairs, MR ROBERT MITCHELL, Manager, Food External Affairs, Marks & Spencer plc, examined.

Chairman

307. Gentlemen, thank you very much indeed for coming before the Committee. Marks & Spencer are quite regular visitors to the Committee and we are grateful for the evidence and help you have given us on previous inquiries. I should begin by declaring an interest: rightly or wrongly, wisely or unwisely, I am a shareholder in Marks & Spencer—although quite a modest shareholder—and a long-standing shareholder of some ten years, so I have been with you through all the ups and downs. Can I begin by asking you to introduce yourselves to the Committee?

(*Dr Clayton*) Good morning. My name is Tom Clayton, I am Head of Food Technology with Marks & Spencer.

(*Mr Mitchell*) I am Bob Mitchell, I am a food technologist at Marks & Spencer. My responsibilities are for external affairs, food and technical policy issues and GM has been a major one for us for two or three years.

308. Can I just begin by asking you a general question? How has the debate moved on as far as Marks & Spencer are concerned over the last year or so?

(*Dr Clayton*) We have tracked the introduction of genetic technology—to give it that name—over the last ten years and been fairly remote from it, in the sense of not being involved. We have been aware of what has happened with GM tomatoes and the introduction in the UK of that product, which we were not involved with—we did not sell it. In early 1998 we took a decision to label products which contained genetically modified soya or maize, in the sense of ingredients in which there could be a DNA fraction. As the development moved onwards through 1998 into early this year, we were aware—and we have a very good barometer, or measurement of trend, in terms of customer contacts—that we were receiving on this issue a proportionally vast number of contacts from customers which were negative towards GM technology. So early this year, 1999, we took the view to extend that labelling to all ingredients which could have started from a GM soya or maize crop. Because of the knowledge we have of the products we sell—we have what we view as an advantage of having singularly private labels; we are not selling brands, we have specification control over everything we sell and a high degree of knowledge of the raw materials which go into those foods—we decided to take that step, and in doing that it was very, very quickly realised that we were looking at thousands of changes to many, many products. So, therefore, we decided to not have a labelling policy but to actually remove ourselves from either soya or maize-derived ingredients by replacement (for example, wheat or other things—functional ingredients which were not derived from soya or maize) or to establish non-GM routes for all these various ingredients, many of which are mentioned in Appendix 1 of the evidence we have submitted, using the principle of identity preserved routes. We completed that process in July of this year in terms of food ingredients and for all foods sold since that date at M&S, where there is an ingredient derived from soya or maize, that is from a non-GM source. We have further extended this, on a trial basis, in October this year, to non-GM animal feed, where we have taken a small, select range of free-range livestock—turkeys, chickens, pigs and eggs—and we have established feeding regimes through this summer, resulting in a product now on the shelves of those small ranges—and they are small in comparison to the rest of our business in terms of those major protein ingredients—on non-GM animal rations, and we are assessing that trial. That is, basically, where we are.

309. Am I correct in saying that like many food manufacturers and retailers you are, really, taking this action to keep the options open in future; you are not saying you will never use GM technology in future but you are saying that at present you have had expressions of concern and you have responded to them?

(*Dr Clayton*) Marks & Spencer has consistently, from the beginning, not been against GM technology per se. The action we have taken is a judgment about the perception of this technology with our customers, based on the responses they have given us. We do see a role for bio-technology and GM technology in the future. We believe, however, that to advance that in any way a number of questions and concerns have to be addressed, which I think are quite well-known and well-documented. More importantly, it probably requires bio-technology products in the food chain where there are perceived advantages and benefits for the customer, in terms of a healthier product, a qualitative input or a food safety attribute.

310. How did you hear from the consumers of Marks & Spencer products about their concerns? What were those concerns, particularly bearing in mind that in your evidence to us you say that this is not a matter of food safety? Did your customers agree with that analysis? What were they worried about?

(*Dr Clayton*) In our evidence it is our judgment that this is not a matter of food safety. I think you have to split the science from the perception and the view of customers here. The response of customers was wide and varied. We can read very clearly when there is an issue out there in terms of the weight of questioning and commentary we get back. Even in things like BSE, or salmonella or dioxins—all these kinds of things—we have tens and hundreds, maybe, of questions on a monthly basis—or letters or 'phone calls (contacts in total terms). On this one we had thousands, and they were almost singularly "Why are we doing this?" "It has got to stop." "It has gone too fast". "We have no choice in the matter; we are being rolled over on this one". The words I am using came from customers' letters and 'phone calls through to our business. I think the conclusion we

[Chairman *Cont*]
came to was that there was a concern about the pace of introduction of GM-derived ingredients into the UK.

311. Sainsbury's evidence to us reported a pattern of about 50 calls a week on GM issues back in the summer of 1998, which went up to 900 a week after a *World in Action* programme in August 1998, then went back to about 70 a week; then, after some quite high profile newspaper campaigns and discussion in Prime Minister's Question Time, there were some 2,500 calls in three days, but it then dropped off entirely and, in fact, they get no calls at all and have pretty well closed their GM information line entirely. Is that the kind of pattern you have just been describing, Dr Clayton?

(*Dr Clayton*) Undoubtedly there is a pattern which will follow. The media and publicity does fuel these things—there is no question about that. That is the world we live in. When we have the spikes, which you mentioned there, of activity in the public domain, yes, there will be an increase in it. The interest, however, for us has not dwindled to nothing at all. In fact, when we made it public in March 1999 that we would have no GM soya or maize derived ingredients in our foods by July 1999 the level of interest remained fairly high, and when we had completed that the interest then moved to "When are you going to do it to animal feed". However, the pattern is followed by publicity.

312. When do you expect concerns to be so reduced that you can reintroduce GM ingredients into your products?

(*Dr Clayton*) I think there is a requirement to address the issues which are concerning customers, and not just some of the issues they may have about food safety (which we may not share) but certainly the questions they have about the environment and the movement within agricultural crops, the lands and rivers and water courses, which is part of this debate. I think there are some issues, potentially, of ethics which they wish to ask about. So we believe that there has to be a consideration given and a resolution to those areas, accompanied by some product development, if you like, in the area of research and development which will lead, as I said earlier, to products where they can see a benefit to them or their families in terms of food safety or quality, or attributes such as that, as opposed to what they do see at the moment, which is a benefit simply to agricultural businesses.

Chairman: Dr Clayton, this inquiry is, above all, about choice and how we protect the choice of consumers, the choice of farmers and the choice of all those in the food chain. In that context I think Mr Curry would like to ask a question.

Mr Curry

313. How many people pass through your stores in a year in Great Britain?

(*Dr Clayton*) Fourteen million a week.

314. How many people do you estimate all together have contacted you on the subject of GM?

(*Dr Clayton*) Ten to fifteen thousand.

315. What does that represent as a proportion of the people who shop in Marks & Spencer?

(*Dr Clayton*) Quite small.

316. Less than one per cent?

(*Dr Clayton*) About that, yes.

Chairman: It is actually .1 per cent.

Mr Curry

317. Would it be fair to say you have taken a decision which denies choice to 99.9 per cent who may be entirely at ease in buying GM products?

(*Dr Clayton*) I think our judgment is based on the trends that we see in a business, and the amount of commentary, as I said earlier, that we receive on various issues. It is based on that that we would make that stance. There are one or two other things. There is, undoubtedly, an increased level of interest, even at that small level, that is measurable against the kind of levels of interest we would get on other subjects. So there was a high level of interest, in spite of the statistics you are suggesting. There is a vast majority of people out there, but whether they have no interest is not known. I do not think it necessarily follows that the other 99.9 per cent are pro-GM. I think what you have is .1 per cent who are anti it who have declared their hand, and that is at a high level in relative terms on these subjects.

318. However, you do not know what attitudes to GM the 99.9 per cent take. You said they may be a vast number but you do not know.

(*Dr Clayton*) Again, we have to balance the science against the perception which is out there. That is our judgment and it is a judgment we have taken. I think, in Marks & Spencer's terms, over decades of being involved very closely with our customer base we have developed an ethos of taking some of these hard decisions within the food chain, otherwise we would not have the reputation for leading standards, in terms of foods, which we have. It is not the first time we have taken decisions which are based on similar levels of a small percentage, with positive action being taken. For example, on animal welfare we have been well ahead of the game in certain areas there; on meat and bonemeal and recycled poultry offal, we removed that from diets long before there was an issue ever associated with it in this country; some years before we took a similar stance on irradiation at the time of its introduction, and we took a similar stance on the use of BST as a milk producing hormone—all balanced against a response from customers, which, in total terms, against 15 million, of course, looks very small. However, in reality and in practice, against the normal trends of our business it is significant.

319. Would you accept that there is a danger that in the present response of the major retailers to this issue those of us—and I include myself amongst them—who have no hang-up about GM products whatsoever (in fact, I would be inclined to be rather favourably disposed towards them) are rapidly finding ourselves in a position of being denied choice?

(*Dr Clayton*) Undoubtedly, if all the major retailers in this country, including Marks & Spencer, are introducing labelling or non-GM usage of soya-based ingredients, then, yes, you will have less choice. That is a fact.

[**Mr Curry** *Cont*]

320. So the advice to me would be to organise a 'phone-in to Marks & Spencer. How many do you think I would need to organise in order for you to be able to be influenced by that?

(*Dr Clayton*) We have had two people in the whole group that wrote or 'phoned us—contacted us—who took that view. So I cannot answer the question on how many times you need to 'phone in. We have taken a judgment based on the information available to us.

321. What would have to happen for you to decide that this was no longer a hot issue? Would it be something which influenced the perception of safety? Would it be the development of a product which clearly displayed characteristics which appealed to the consumer? If you were advising the managing director, whoever he or she may be at that time, what would be the factors you would place before them? What weight would you attribute to them?

(*Dr Clayton*) If you look at the pending applications and those which are already granted in the United States, which, in the main, are the large companies—the seed companies and the bio-tech companies—who are involved in this, almost without exception they are directed towards yield and chemical usage-type applications. That is not surprising, because the large commodity crops (the commercial and financial aspects of those and the R&D and the amount of money that has to be spent on developing these things) obviously take it in that direction. However, to answer the question, therefore, we do not see anything which is different to Round up Ready soya and these things at the moment—they are all in a similar vein. What needs to happen, or what would be helpful to see happening, which we believe would allow this debate to move in a new direction? Take, for example, the work that is going on in cracking the genome of the well-known pathogens of food safety. If that could be commercialised into a final product situation where you had, for example, campylobacter or salmonella resistance built into the poultry industry, that would certainly have a company like Marks & Spencer actively sitting round that table to explore what could be done, because there is a real food safety benefit.

322. Last question, Chairman. Let us take something intermediate, let us take the Cox apple, which we all agree is a splendid apple (and it is certainly more than my life is worth to suggest otherwise). However, I think it is fair to say that its storage characteristics are not as good as some other apples. If GM technology could produce a Cox with better storage characteristics—so it has nothing to do with the sort of therapeutic you have been talking about, nor is it simply to do with how much pesticide you put in the orchard—would that be a factor you would regard as important and interesting to you?

(*Dr Clayton*) That would be a quality attribute which could be interesting. I do think you would have to take that to some very, highly focused customer groups and ask them whether they agreed with you that storage characteristics was something they wished bio-technology to move into. That one would be quite interesting. I would just give one practical thought on it, and it does not destroy the principle of what we are talking about in terms of better storage characteristics and better quality characteristics over time for Cox apples, but a sense of the Cox apple crop, however important it is—and I would completely agree with you that it is the best apple you can buy—is in real terms quite small. Therefore, whether the seed money for the R&D would be actually there to do something about that, I am not sure is something we could see in the very near future.

Chairman: We must move on. I would just remind you, in passing, that the average Member of Parliament regards five or six letters a week as a tidal wave!

Mr Jack

323. Chairman, the world has a funny habit of coming full circle, and it is a pleasure for me to be cross-questioning some former colleagues of mine when I had the pleasure of working for Marks & Spencer some 17 years ago. Nonetheless, I have a regard for both our witnesses today and I know their particular expertise. You have told us, Dr Clayton, so far about how Marks & Spencer reacted to the messages that you received from your customers. I think we move, now, into probing, really, how you segregate the raw material. You made it very clear at the beginning that your ability in relation to specification and having total traceability of what goes into your product is a key ingredient of the integrity of the products that Marks & Spencer puts forward. In some evidence that was sent to the Committee by a company called SDI Europe Environmental Products, operating from Alton in Hampshire, they said to us, talking about the feasibility of segregation and identity preservation, "This is true in an area such as Brazil which is, technically, GM free, but" they go on to say, "cross-border flow of commodities from Argentina and Uruguay and illegal planting ensure there is a significant risk of GM material being incorporated into the export from Brazil". I do not know whether Brazil forms one of the sources of GM-free raw material for Marks & Spencer products, but given that sage warning, how do you establish whether raw material is GM-free, particularly when you have that kind of commentary from an area where, supposedly, non-GM crops are grown?

(*Dr Clayton*) Can I just start with a quick definition of "GM-free" and "non-GM", because it is not a play on words; there is a clear distinction between the two. It is, really, a distinction of what is possible through well-managed segregation. We have only ever stated ourselves to be non-GM. Non-GM means that we are starting without a genetically modified crop in the field, and we know that and can prove that, in the sense that we can be asked to prove it and we should be able to prove it. Thereafter, the route through to the customer is by this identity preserved—or IP—approach, which you have just mentioned, and which I will come back to in a second. GM-free to us suggests, and correctly, a much higher standard. It implies a purity, really, tending towards zero tolerance—absolutely free. I think these two phrases have been embraced in some of the decisions that the EU have taken and in some of the proposals they are making. If you are going to

[**Mr Jack** *Cont*]
say "GM-free", and make that claim, then you have got to be free, and it implies a purity standard. Non-GM through the IP route is a practical definition which is very achievable in what is possible today, unfortunately, where you do have significant percentages of GM crop in North America and in certain parts of South America. The practical experience that we have of segregation shows that we can work within some very low ranges of adventitious contamination (as this is known as) in the openness of the agri-world that we live in. To move to your point on segregation and IP routes, I know the company you referred to who have written to you, and they are right in what they say, up to a point. Of course, there are GM crops being grown in the countries you mention, particularly in South America. Argentina has a high percentage of soya crop GM—we think about 70 per cent—and we are sure there is some cross-border black market activity going on into Brazil, which is essentially GM-free, and particularly so in certain regions. We have been down there several times to look at this. You are quite right that Brazil does feature very significantly in the IP routes that we have established for the 20-plus ingredients that we are using, and in non-GM animal feed which we are currently employing. You can have segregation. We have been practising segregation in the food industry for decades—for centuries—it has not just arrived with the advent of GM foods. We segregate different breeds of animals, we segregate different varieties of apples, we segregate authenticity chains, such as semolina for pasta as opposed to cheaper versions. All these things are part and parcel of a well-run, well-managed food chain, and it is there in anything you look at down the raw material chain. It is based on the right partnerships, relationships and trust with the right people, accompanied by modern techniques of management. So assuring you have the right partners on the ground and in the field (in this case) is through visiting by appropriately qualified people at the right times, having excellent and modern traceability systems based on risk assessment and the principles of HACCP which are common-place and apply in the food chain today (these are not new trends to the food industry) accompanied by a chain of paper at every stage from farm to fork—to use that phrase—which will allow you to prove and be held accountable that you have maintained the integrity of a GM crop, or a piece of animal, such as Aberdeen Angus Beef, or a consignment of nut-free breadcrumbs. Whatever it may be, segregation is possible. We have had real practical experience of this as a business with our suppliers, in all of the ingredients that we use. We would suggest very clearly that testing is a means of having confidence in your segregation and your management of segregation; testing should not be used as a means of the only way of ascertaining that something is GM-free. That would be wrong. The testing that we have done shows that in most cases we are operating below the detectable limits of the test we are using, and even in the animal feedstuffs which we are bringing in at the moment we are operating at around .1 per cent adventitious contamination. Of course, sampling—

Chairman: I know you are trying to answer as fully as possible but you are covering a lot of the ground we want to ask you about later. It would be helpful if we could focus in on the answer.

Mr Jack

324. Let us focus down on some of the issues. That is, in a way, the kind of reassuring statement I would expect coming from Marks & Spencer Baker Street, but in paragraph 3.3.1 of your evidence you say "The standards demanded in any system of segregation will tend to be a balance of the need to deliver a given level of purity versus the cost to achieve." We live in highly competitive times in the sale of food in the United Kingdom. What allowance are you giving your suppliers to sustain, maintain and validate the complex chain of reassurance which you have just described to us? There may be a tendency, when people get pushed on price, to start pinching round the corners and not sticking absolutely to the letter of the type of approach which you have just outlined.

(*Dr Clayton*) That, frankly, comes down to the people you are doing business with. We have got our judgments right. Remember, we are heavily involved in this process, we have made 35, if you like, IP walks back down the chain to South America, North America, the Far East, Europe and within the UK for all these ingredients.

325. It has been identified to us, and your evidence says, that there is a cost to achieving this. Are you allowing your suppliers to reflect those additional costs in the price to the customer of the goods which they clearly have demanded?

(*Dr Clayton*) Of the 4,000 products we sell which we have had to review in our entire catalogue, we have changed 1800 of those to IP routes or taken soya and maize out, and we have not reflected the cost of that exercise in the final product costings to our customers. For the small amount of livestock trial that we are carrying out at the moment, there has been an on-cost of between 5 and 10 per cent for the soya and maize fractions of that animal feed, and that has been passed on in the costings. It is part of the trial to assess whether people will actually pay for those things.

326. But for the other products, can you confirm that there is a cost to somebody of the process you describe? Who is bearing it?

(*Dr Clayton*) Initially, there were start-up costs because in some of these chains there was no IP route, and the start-up costs were ones of testing, travel, commitment and resource—that kind of thing. Once established, really, the cost is within the normal way of doing business. Just to take another view of that, in terms of finished food products, the percentage of these ingredients in the main—malt vinegar, modified starch and soya lecithin—is so small in relative terms that the costs are not, actually, very high, but we have not passed them on.

327. What was the reaction of the people in your food chain to your request to take the course of action that you described to us? Were they happy about it, or did they put their hands up and say "No, we cannot do this"?

(*Dr Clayton*) In the main they saw it as a very positive action which they were happy to be part of, in terms of protecting our business against external pressures brought by customers.

[**Mr Jack** *Cont*]

328. Currently, you have no problems, do you, in obtaining GM-free products in the way you described to us?

(*Dr Clayton*) We have had very few problems. I do not want to dismiss it, as it has been the single biggest activity that the food technology team (which is 90 people in Marks & Spencer) has been engaged in ever, particularly in terms of the time frames we set ourselves. There were lots of issues to deal with but issues rather than problems. There was one particular issue that was a problem—to show the extent to which we went in this—where we did have one supplier of one particular range of products who would not agree to sourcing non-GM maize ingredients, and we stopped selling those products.

Chairman: I am sorry, Mr Jack, but to get through everything we must move on. If there is time at the end by all means come back. We are re-ordering the questioning slightly, and going to Mr Todd. You raised definitions, Dr Clayton, and I think we ought to get that issue on the table now.

Mr Todd

329. As I understood that first answer you gave, when you say "non-GM" you basically mean that well-intentioned people have planted a seed which they believe to be non-GM and you have secured the food chain beyond that as best you can to ensure that GM products are not introduced into your source. Is that broadly right?

(*Dr Clayton*) That is correct.

330. Are there any numerical definitions of that achievement in terms of percentage outcomes at the end of the process? Do you have a tolerance level which you expect, or do you really say "We know we have planted a seed"? We have had earlier evidence in this inquiry that seed can only be demonstrated to be pure to the extent of between 98, 99 and 100 per cent, so there is no absolute certainty even at seed level. What is there beyond good intention?

(*Dr Clayton*) Remember that much of this work was initiated in a legal vacuum in terms of any background standards which we were able to apply, so we had to make some judgments about it. We set off with a view that 1 per cent (which, in fact, is what the threshold values from Brussels have been proposed at) would be a reasonable tolerance at the raw material, or seed, level in terms of the raw soya or maize coming out through the process. I do not want to get into too many figures here, but when we worked that back from food products and when we reviewed our entire catalogue earlier this year, we decided that if any product had an ingredient in soya or maize at a level of greater than 0.01 per cent we would change it—either take it out or replace it with an IP soya or maize route. So, on the one hand, we have taken an approach for the crude raw material, if you like, out of the ground. One point to make here is that if you have got a crop which is 100 per cent free we are not asking people to put 1 per cent into it. This is the point which was made earlier about people with good systems, with real honesty and transparency, attempting to grow, to their best belief, a non-GM crop and manage it through to the consumer, whatever form it arrives in, without wilful contamination. The tolerance of 1 per cent is there to allow this development to take place.

331. How do you distinguish between the 1 per cent you are applying to your non-GM products and the GM-free—because you made the distinction from the start that you would not claim GM-free because you felt that implied a higher standard?

(*Dr Clayton*) We are not claiming GM-free because we have had the practical experience of thousands of analyses and having had a good look at this thing. To give you an example, in North America and, particularly, in Canada, they have established over a number of years now, for the bread industry in this country, an IP route for soya flour for bread improvers, which is an important ingredient. We have just been over there recently to see this season's crop and how it is managed, and they are running at .3 per cent. That is what they are achieving with a very, very good quality management system, and that is in the heartland of where GM is being grown. So that is what is achievable there. We have had thousands of results of analysis from all the various people we deal with, raw material people, ingredient people, mainly from this year when the bulk of the work has been done, and the overwhelmingly significant number is that they are coming out at less than 0.1 per cent.

332. So are you really saying that partly because the words "GM-free" may be seen as misleading you do not use them, because as you demonstrated in your answer, to achieve 100 per cent purity is simply beyond our capability?

(*Dr Clayton*) Unfortunately, because of the percentage of GM crop which is now in the open agricultural chain, what you have said is absolutely right. It does not seem to us to be a practical situation to achieve GM-free status, which implies absolute purity, in our book.

333. What is needed is a clearer definition for your customers of exactly what we mean when we say "non-GM" or "GM-free". In your view, using the words "GM-free" is a misleading statement because you cannot achieve that outcome.

(*Dr Clayton*) We view "GM-free" as misleading, yes. We do not use it.

334. So what do you think your customers are thinking when they see the words "non-GM"? Do you think they think there is a 100 per cent certainty of avoiding a GM source?

(*Dr Clayton*) I sense that some of them will do.

335. Have you sought to explain what you mean?

(*Dr Clayton*) We have tried very hard to explain.

336. How?

(*Dr Clayton*) Posters in stores, point-of-sale material.

Mr Todd: I have not seen those posters and I do use Marks & Spencer.

Chairman

337. I was wondering if we might see some of the point-of-sale material.

(*Dr Clayton*) I can send that to you.

Mr Todd

338. Does that explain the difficult fact of achieving total—

(*Dr Clayton*) No, it does not.

339. Last question: when you went back to your suppliers did you find that any one—because I am assuming you are using commodity brokers rather than the original growers of crops, largely. Is that true?

(*Dr Clayton*) Obviously you have to go through that world; you go through brokers but, no, we have been back on the ground.

340. If you go back to the ground and you went to the existing suppliers you had, did you find some who were growing GM crops who actually said "Fine, I will now grow non-GM seed for you"?

(*Dr Clayton*) No. The simple answer is that in the main we have operated in Brazil and in North America with companies who have already established IP routes, such as the soya flour—

341. You do not have anyone who moved from—

(*Dr Clayton*) We have not reached that stage. However, there are pressures around in terms of where this thing goes. There is quite a lot of commentary coming out of North America, in particular, where people are reconsidering their position on growing GM. We do not specifically know of anyone who has done that, that I can recall.

Mr Marsden: As an aside can I just mention that my wife holds a small number of Marks & Spencer shares, but I do not think she is planning to take over just yet.

Chairman

342. Please let us know if she is.

(*Dr Clayton*) Can you let us know as well?

Mr Marsden

343. Can I follow on from the definition that Mr Todd was talking about, in particular organic products. You said in your written evidence that organic products do not automatically lose their status if pesticide residues are detected, and go on to mention GM residues being detected. You say that to your knowledge there are no numerical tolerances for these kinds of contamination set in legislation or by the Organic Movement. Can I ask have you checked with the Soil Association or any of the organic farming or food organisations the contamination limits of organic products?

(*Dr Clayton*) What we are referring to here is that within the organic definitions, which are, as you say, handled by UKROFS and through various other people like the Soil Association, you can have pesticides. You can have them quite openly in the sense of non-artificial pesticides. There is a positive list for that. What we are stating in there is that there could be accidental contamination as well from adjacent fields. This is one of those issues that has to be determined, we think, better in terms of GM crops, but they would not automatically lose their status. We are back to this thing about tracing and people trying to do the right job.

344. Forgive me, but time is pressing here, although I realise you want to give full answers. Do you, then, test, for instance, organic products to check to see if there is contamination—whether it is pesticides or whether it is GM?

(*Dr Clayton*) We test for pesticides; we do not test for GM.

345. You do not? As a matter of course? Mr Mitchell seems to be eager to say something.

(*Mr Mitchell*) I was going to say where we are sourcing organic products not from regions where there is a risk of GM, but the commentary there was specifically in relation to the issue of pesticides rather than GM and trying to put some bones around the issue of segregation and the standards you would apply according to the needs.

346. Can I then ask about animal feed. In your written submission again you say you have recently announced plans to introduce a range of meat products where GM soya and maize have been excluded from the animal feedstuffs. Will you continue to sell meat that is made from GM soya and maize?

(*Dr Clayton*) We are at the moment. The ranges that we have for sale represent a very small percentage of our total sales of fresh poultry, meat etcetera. So that is where we are at the moment. It is very much a trial. The difference between food ingredients and animal feed is one of scale. We are talking enormous differences here. We are talking millions of tonnes of animal ingredients versus some very specialised supply chains of starches etcetera. These are major uses of these crops on a worldwide basis. So the scale of this is much, much greater. What we are trying to do there is learn as much as we can about how possible this is, the costs of it, how the customer views it, etcetera. It is very much at this stage. We have not made a decision about where we go next. We are engaging in debate with all the major agricultural livestock people and we will be dealing with "What if ...?"

347. Does that debate include the consumers and the general public?

(*Dr Clayton*) They have told us they would quite like it.

348. We are back to where we started. Do you survey your customers and ask them for their specific opinions rather than waiting for them to come to you about this issue?

(*Dr Clayton*) Part of this trial is to engage customers in what they think about what we are doing on non-GM animal products.

349. How do you engage them?

(*Dr Clayton*) We have focus groups and we ask them.

Chairman: Mr Marsden being a New Labour MP is very interested!

Mr Marsden

350. I am interested in surveys as well. How do you make sure that your customers are aware of the distinctions between meat products which have animal feedstuffs which are excluded from GM surveys and meat which obviously would contain animal feedstuffs?

(*Dr Clayton*) How would we distinguish it?

351. Yes.

(*Dr Clayton*) The ones which have non-GM animal feed in the stores at the moment are clearly labelled "from animals fed on a non-GM soya maize diet", or words to that effect.

352. Could we have some samples of these labels so we can see them?

(*Dr Clayton*) Yes.

353. Can I then move on. What information are you saying you do include about GM ingredients on the labels of foodstuffs containing maize and soya? I know you are going to supply some samples but just for the record.

(*Dr Clayton*) We do not have anything because we do not have any GM soya or maize ingredients in our products. We have not got any claims like "non-GM" or "GM free". We simply have an ingredient list and it is embraced in a blanket policy statement the business has about having removed itself from GM-derived soya or maize ingredients. We are not labelling positively "This does not contain ..." We do not think that is really the way to go on this.

Mr Marsden: I realise that. Okay, I am happy with that, Chairman.

Chairman

354. I think there are one or two other issues I would like to have explored with you. We ought to ask about EU Directives and the one per cent threshold and what Marks and Spencer's reaction is to that proposal.

(*Mr Mitchell*) Anything is better than nothing. It is much better to have something we can all now work with. We did express in some commentary in the written evidence as to whether or not it would be the valid number to apply to maize where there is much less experience of the risks of contamination at the field level, but in reality the bulk of maize is still being obtained from Europe where there is not the same risk at present, so the proposal, we understand, is that there will be a process of review after some 12 months and obviously the intention is that the standard will be driven downwards. There may be some evidence by that time to support the case that we need different standards for different crops.

(*Dr Clayton*) It is important to retain this principle of threshold. We feel that is very important because, if not, what we see as the incentive to develop IP routes will disappear and the only thing left will be blanket labelling of most food products in this country which will be meaningless and GM in the end would become ubiquitous.

Chairman: Mr Marsden is tempted back into the field.

Mr Marsden

355. I know that you have got the focus groups, and I am interested in them, and I know that you are asking your customers what they want, but you then said all this is for a trial period. If you decide to scrap this policy on banning GM organisms from your foodstuffs, will you then spend as much money on the advertising of that new policy as you did on the shebang with the media and your customers when you originally went GM free?

(*Dr Clayton*) I will have to ask my marketing department that one.

Chairman: I think that is a reasonable answer. I think we can appreciate the rhetorical nature of that question. One last question, a commercial question from Mr Jack.

Mr Jack: I did not want to ask a question. I wanted to ask whether Dr Clayton would be kind enough to send the Committee a little more information about the last sentence in paragraph 4.3 on page 7 of the evidence which in fact I think Mr Mitchell referred to on the problems about different standards for soya and maize. I would be grateful for some fuller explanation of that sentence.

Chairman

356. Not now. It is a helpful point Mr Jack has made and I highlighted that when I read your evidence myself. Perhaps a little bit about the different standards, if that is easy, would be helpful. My last question is simply this—and it may be a commercial question that you cannot answer—when the standards are set and the EU Directive is in place, and it may be negotiated to allow for different crops I understand that, will that settle the matter or will there be commercial pressure from organisations like Iceland, who have led the field here, to drive for complete GM free status and that the threshold setting will prove to be a shallow exercise and commercial considerations will take over?

(*Mr Mitchell*) I do not think the debate about the number will go away and unless the concept of thresholds is maintained there is no future for the non-GM alternative.

Chairman: I think on that very clear note we will conclude our questioning. We are very grateful to you, gentlemen. We have asked for one or two things and our offices will be in touch to sort out exactly what was asked for. Thank you very much indeed. We are very grateful.

Memorandum submitted by The Soil Association (R25)

1. Background

The Soil Association promotes organic farming as the most sustainable of food production that is also well defined, in commercial use and supplies food of the highest health and animal welfare standards. Organic farming is an approach which avoids the use of synthetic chemicals and outside inputs and instead harnesses natural processes to promote the natural health of plants and animals (eg via rotations, fertility building crops, and natural methods of pest control). The best of old and new knowledge is used according to these principles. This approach avoids many of the immediate and long-term problems of conventional agriculture.

The organic movements in Europe are agreed that GM techniques should not be part of agriculture: they are not necessary, the release of GMOs into the environment carries too many risks for all farmers and consumers, and their use is against the principles of organic production systems.

2. Current Regulatory Situation

The Soil Association has various concerns with the current regulatory situation in respect of issues relating to the segregation of GM foods:

- There is a current presumption by the Government and influential parts of the industry that genetic engineering is necessary and can be safe and beneficial. Neither has been subject to adequate independent assessment or a public consultation.
- Decisions to accept the importation of GM foods have been taken without the availability of adequate data relating to testing for environmental impact and food safety, and without adequate infrastructure (such as segregation and labelling) for those who wish to source GM free supplies and to enable consumers to have a genuine GM free choice of foods.
- The likelihood of genetic contamination of GM free crops from GM crops is very high, outside the control of the farmer, and the implications, including economically, are very significant. But, this is not reflected in the current controls on the separation of such crops in the UK, which are voluntary and use distances shown by independent research to be insufficient.
- The above are despite the fact that Government has said it would respect the right (and request) of consumers to have the choice of GM free foods, that it would base its decisions on sound science and that it would ensure a sound regulatory framework.

3. Objectives for the Segregation of GM Foods

There is no doubt that consumers want a genuine choice of GM free foods. This choice depends on access to identifiably GM free foods which depends on segregation and labelling, and also on adequate *supplies* of GM free foods. As long as GM crops are allowed to be grown and GM foods traded, there will be a need for a system for segregating GM foods from non GM foods that is trusted, practically robust and does not significantly hinder the supply of GM free foods (eg through unreasonable costs incurred for the producers of GM free foods).

The organic movement is committed to the prohibition on GMOs in organic systems and to ensuring the integrity of organic foods is maintained in this regard. It is important to the sector that consumers know and can trust that organic foods are produced free of GMOs. This is supported by what most consumers believe the GM status of organic foods is and should be (ie GM free).

To policy makers who are trying to encourage organic food and farming for all the many other benefits it brings to individuals and society (environmentally, to health, to health costs, to securing stronger farming and rural economies etc), it is important that this commitment from both the movement and the consumers of organic food is appreciated and upheld. The GM status of organic foods and therefore the continued growth of the sector must not be jeopardised by Government policy in this area but supported.

Segregation at the retail end clearly depends on segregation at each point in the supply chain including crops on the farm and agricultural supplies such as feed and seed. The Soil Association has researched the issues for the segregation of agricultural crops on farm in depth and this makes up most of this submission.

4. Organic Production Standards

The EU rules for organic production were revised this year to "prohibit" GMOs in organic production. Although the initial avoidance of GM crops and livestock is relatively simple, there is no guidance on how to avoid unintentional cross contamination. The Soil Association was the first body to undertake a detailed analysis (see next section) of how to implement this new requirement in practice and consider to what extent contamination from external sources can be avoided.

Based on the findings of our research, in June this year we produced new Soil Association standards that deal with GM issues (Annex I). These have also been approved in principle as the new UK standards for organic production, with only a couple of minor modifications. Many of the rules in the new standards deal with excluding the use of GMOs in organic systems, including a requirement to ensure that biological inputs (manures, feed etc) do not contain GMOs or their derivatives. There is also a section dealing with cross contamination from external sources that would be outside the control of the farmer, ie transfer of pollen by wind or bees from GMO production sites (2.4.18–2.4.22).

To avoid such contamination, this section requires that a six mile "notification zone" is established around all organic holdings so if GM production is planned in that area a decision on the risk of contamination can be made. We intend to use a common risk assessment procedure to implement this. A table (Annex II) shows how we would to take into account the type of crops being grown and the wind direction. We are awaiting more information from the National Pollen Research Institute before completing this.

Currently, if a risk of contamination is established and the farmer is unable to take steps to avoid it (for example, a neighbour has planted or insists on planting GM crops) the Soil Association would have to decertify the farm.

5. Crop Separation and the Risks Of Cross Contamination

There are two main factors for the cross-contamination of non GM crops: first, the rate of cross pollination from GM pollen, as this would result in a percentage of the harvest and then increasing proportions of the ensuing crops being GM; secondly, the amount of pollen of other species landing on the crop and contaminating an otherwise GM free harvest.

(i) *The Transfer of Pollen by Wind*

Referring to the separation distances required in the UK for GM trials, the government had stated that "at a standard distance of 200 metres between the organic sweetcorn and the GM [forage] maize the likely cross-pollination frequency would result in no greater sweetcorn kernel in every 40,000 being a GM hybrid". The Soil Association commissioned research from the National Pollen Research Institute (NPRI) on this matter. The Report ("The Dispersal of Maize Pollen") showed that actually, in conditions of moderate wind speeds, the cross pollination rate would be one kernel in 93 (1.08 per cent). Assuming that a corn on the cob has something like 1,000 kernels, this would mean that someone eating non GM corn grown at this distance would on average actually eat 10 GM kernels. We clearly felt that this was unacceptable for organic food.

Furthermore, this would equally mean that over one per cent of any farm saved seed and therefore of the following years supposedly GM free crop would then be GM and without any separation distances between the GM and GM free plants. Thus, increasing proportions of the crop each year thereafter would be GM once contamination occurred. Even where the crop is changed to another type, there would be the problems of GM "volunteers" appearing in following years (growth of the previous crop as weeds in the new crop). Thus, there are severe implications of inadequate separation controls.

Following our findings, the government undertook its own research (by the John Innes Centre). This agreed with the NRPI conclusions that the risks had been underestimated.

According to mathematics, we understand that increasing the distance by a factor would reduce by the square of that factor the degree of cross-pollination. Thus, for example, at 10 kilometres, an increase of x50 over 200m, the degree of contamination in these conditions for maize would drop to a 2,500th of 1.08 per cent (0.0004 per cent) ie it seems that the risk of wind pollination can be avoided by consideration of the risks within such distances.

For contamination by non-related species, there is still a risk but the degree of risk would be many orders of magnitude less than that posed by pollen from related species. The pollen would be unable to fertilise the plants and produce a GM crop, so it is just the pollen that landed on the crop that would be GM, as opposed to whole seeds/kernels. Furthermore we understand that pollen degrades within a couple of days (maize pollen, for example, remains viable under normal conditions for approximately 24 hours).

(ii) *The Transfer of Pollen by Bees*

Similarly, our research has considered bees. The relative importance of wind and bees for spreading pollen will vary according to the plant species. Bees regularly visit maize flowers and transport maize pollen. For sugar beet, research in Germany showed that 10 per cent of pollination was caused by insects.

Bees will regularly travel three miles to find sources of nectar and pollen if good sources are not available closer (though they are thought to be able to travel up to 10 miles). On the basis of this information we concluded that there should not be an organic and GM site in the same three mile radius around a bee hive, ie, a six mile separation distance for related species would generally be necessary which fortunately fits well the findings for avoiding wind cross contamination.

The rates of pollination, weight of pollen grains and amounts transferred will vary between species, but this research indicates that the distances that would be required to avoid the risks are not impractical. Thus *adequate minimum separation distances from GM crops must be used* at a UK and preferably EU and international level. This would be greatly assisted by an EU or international register of GM production sites.

The NRPI pollen report can be found on the Soil Association website (*www.Soil*Association.org, under "hotlinks"). We are currently gathering more information from the NPRI.

6. Difficulties

At the moment, the organic sector is having to shoulder on its own the complete problem of cross contamination for the organic sector through its control of the standards to which organic producers operate and its control over which producers are certified. This is already not without difficulty and must be having a negative effect on the sector's attractiveness to conventional farmers considering converting and thus the ability of the sector to grow. For example, it is difficult for farmers to know in advance or be able to influence the siting of trial sites.

This will become a much greater problem should the Government proceed to greatly increase the number of trial sites as it recently announced, or should commercial planting ever be allowed.

7. Proposals

Ideally, the Government would decide not to proceed with its trials programme. But in the absence of such a decision, what is needed from the Government is *positive co-operation* with the organic sector through its licensing procedures. Most basically, we need the Government to inform the organic certifying bodies of the location of intended trial sites sufficiently in advance. But preferably, decisions on trial sites would be made *dependent* on the absence of risks to any organic farms.

We have drawn up proposals to integrate these considerations in the current licensing procedures for GM trials, based on the idea of the notification zone used in our standards. These are set out below, and we ask for the Select Committee's support for these.

Proposed Changes to the Procedures for Licensing GM Trials

1. Application for trial approval (site specific) received by DETR or its licensing agent.

2. UKROFS/organic certifying organisations informed of location of proposed trial site.

3. Research undertaken to identify any certified and in-conversion organic farmland lying within a six mile radius of the proposed trial plot (= "notification zone").

4. Assessment of potential risk of genetic pollution undertaken using agreed protocols, for all holdings within the six mile "notification zone"—see Annex 3.

5. Decision reached about holdings (if any) where pollution risk is established.

6. Information passed back to DETR or licensing agent.

7. Licensing decision on trial granted or withheld according to absence or existence of risks established under 4 and 5.

Notes

A decision will have to be taken on the appropriate organic sector body to undertake the research outlined in 3.

The protocols would need prior approval by DETR and its licensing agents.

Costs associated with procedures 3-5 should be borne by the Government.

(In a scenario of commercial plantings, the procedure might need adaptation, such as a legal requirement for the companies concerned to adopt equivalent procedures and to bear the costs.)

25 November 1999

Annex 1

SOIL ASSOCIATION

Standards for Organic Food and Farming

GENETIC ENGINEERING

SECTION 1—INTRODUCTION

1.4 *Definition of Terms used in the Text*

1.408a) Genetic Engineering

Those molecular biological techniques by which the genetic material of living organisms, cells and other biological units may be altered in ways or with results that could not be obtained by methods of natural reproduction or natural recombination. The techniques include recombinant DNA, cell fusion, micro- and macro-encapsulation, gene deletion and doubling, introducing a foreign gene, changing the positions of genes and animal cloning. The techniques do not include breeding, conjugation, fermentation, hybridization, in-vitro fertilization, and tissue culture.

1.408b) Genetically Modified, Genetically Engineered, or Transgenic Organisms

Organisms that are produced with the aid of genetic engineering techniques.

SECTION 2—PRECAUTIONARY MEASURES

New Section 2.4

2.4 *Exclusion of Genetic Engineering*

2.4.1 This section details the requirements for the exclusion of genetic engineering and genetically modified organisms (GMOs) from the production and processing of organic corps, foods and other products.

General Principles

2.4.2 GMOs are prohibited in organic farming and food processing in view of their incompatibility with the principles of organic agriculture, their unrecallable nature and the pontential risks they pose to the environment and human health.

2.4.3 Organic products must be produced/processed without the use of:

(1) GMOs;

(2) Derivatives of GMOs, including ingredients, additives and processing aids.

2.4.4 Organic products must be free of contamination from GMOs and their derivatives. Accordingly, operators must take all necessary measures to prevent any such contamination of organic products during production, processing, storage and transport.

2.4.5 Organic certification may be withdrawn from land, crops or products where, following an evaluation and, where appropriate, analysis, the Certification Committee considers that there is contamination or a specific risk of contamination from GMOs or their derivatives. Withdrawal periods for contaminated production units will be decided on a case by case basis.

Farm Production Standards

2.4.6 With effect from 1 July 1999, organic production must take place on land that has not been planted with genetically engineered crops for a period of at least five years.

2.4.7 With effect from 1 July 1999, the production of genetically engineered crops on any part of a holding or group of holdings under the same ownership or management that includes a registered organic unit is prohibited. Under exceptional circumstances, the Certification Committee may allow derogations from this requirement on a case by case basis where the non-organic unit producing a genetically engineered crop is completely separated from the organic unit in terms of distance, management and use of machinery.

2.4.8 Seeds, seedlings, plant propagation materials, inoculants, other microbial inputs, biocides and other crop production inputs containing GMOs or their derivatives are prohibited.

2.4.9 With effect from 1 July 1999, fertilisers, composts, manures and other nutrients inputs containing GMOs or their derivatives are prohibited, with the exception of manures from livestock that have consumed feeds containing GMOs or their derivatives. With effect from 1 January 2000, use of manures from animals which have been fed these materials within three months is also prohibited.

2.4.10 Feed grains, forage, concentrates, supplements, vitamins, minerals, feed additives and carriers containing GMOs or their derivatives are prohibited.

2.4.11 The use of genetically engineered semen, embryos and breeding stock is prohibited.

2.4.12 With effect from 1 January 2000, veterinary and health care products contaning GMOs or their derivatives are prohibited in organic livestock production. This includes the use of conventional medicines, hormones, vaccines, bacterial products, amino acids and parasiticides.

Veterinary products that have been derived from GMOs are permitted by derogation only and strictly on a case by case basis, where no effective alternative treatment is available and where the absence of treatment would compromise the health of the stock concerned.

2.4.13 It is recognised that some non-organic materials currently permitted for use in organic systems pose risks of GM contamination to organic production systems. Pending the complete exclusion of such materials from the organic standards, operators using these materials must obtain statements from their suppliers verifying that the relevant products do not contain GMOs or their derivatives, backed up by analysis where appropriate.

Processing Standards

2.4.14 Raw materials, additives, and processing aids containing GMOs or their derivatives are prohibited in the processing of organic foods.

Record Keeping

2.4.15 Adequate records must be kept and be available for inspection to verify that GMOs or their derivatives have not been used in any stage of organic production and processing.

2.4.16 Signed statements or letters must be obtained from all relevant suppliers in order to verify that the products, ingredients or other inputs identified in paragraphs 2.4.8 to 2.4.13 and 2.4.14 that are supplied to the operator do not contain GMOs or their derivatives.

Genetic Testing

2.4.17 The Certification Committee reserves the right to require analyses to be carried out for the presence of genetically modified material in samples of products, ingredients or other inputs, at the operator's expense.

Genetic Pollution from GM Production Sites

2.4.18 Genetically engineered crops being grown in the vicinity of organic holdings may cause unacceptable contamination of organic land or crops by the following means:

(1) Cross pollination of related crop varieties;

(2) Cross pollination or other contamination of soil flora and plants, including weeds;

(3) Physical contamination by pollen or other plant residues.

Research has indicated that such contamination may result from genetically engineered crops being grown at least six miles away and in some cases even further.

2.4.19 Procedure will be established to ensure that the Certification Department is informed about all organic holdings within a six mile radius of intended production sites of genetically engineered crops.

2.4.20 Operators must notify the Certification Department of any possible sources of genetic pollution which they become aware of that may pose a risk to their organic holdings or crops.

2.4.21 The Certification Department will undertake an assessment of all organic farms, both within a six mile radius of intended or actual GM production sites notified to it and, where considered necessary, further afield, making site visits as appropriate, in order to identify the risks posed by each GM crop to the affected farms.

2.4.22 Organic certification may be withdrawn where the Certification Committee considers that there is a risk of contamination from GMOs or their derivatives. The Certification Committee will examine all relevant evidence in order to evaluate the risks to the organic land and crops of genetic contamination from intended or actual GM production sites. The evaluation will take into account all relevant factors, including distance and likelihood of pollen travel, weather conditions and prevailing wind, topography and natural barriers, type of crop and flowering period.

June 1999

Annex 2

SOIL ASSOCIATION CERTIFICATION LTD

GMO Risk Evaluation Matrix—to establish the need for an evaluation visit

GM Crop Pollen travel	*Risk*	*Limit of Risk—according to the prevailing wind direction (PWD)*	*Other factors limiting risk*
Oil Seed Rape 6 miles	Cross pollination with related crop	6 miles within 45 deg ± of PWD 5 miles within 45 deg ± perpendicular to PWD 4 miles within 45 deg ± opposite to PWD	—Reduce by 20%/100ft altitude of obstacles between sites. —Reduce by 30% for each month difference of flowering.
—heavy pollen —carried by bees	Cross pollination with weeds	3 miles within 45 deg ± of PWD 2 miles within 45 deg ± perpendicular to PWD 1 mile within 45 deg ± opposite to PWD	—Check for similar species —Reduce by 30% for each month difference of flowering.
	Contamination from pollen	800 m within 45 deg ± of PWD 500 m within 45 deg ± perpendicular to PWD 200 m within 45 deg ± opposite to PWD	—Reduce by 10%/100ft altitude of obstacles between sites.
Maize 6 miles (+)	Cross pollination with related crop	6 miles within 45 deg ± of PWD 5 miles within 45 deg ± perpendicular to PWD 4 miles within 45 deg ± opposite to PWD	—Reduce by 20%/100ft altitude of obstacles between sites. —Reduce by 30% for each month difference of flowering.
—wind pollinated —collected by bees	Cross pollination with weeds	3 miles within 45 deg ± of PWD 2 miles within 45 deg ± perpendicular to PWD 1 mile within 45 deg ± opposite to PWD	—Check for similar species —Reduce by 30% for each month difference of flowering.
	Contamination by pollen	800 m within 45 deg ± of PWD 500 m within 45 deg ± perpendicular to PWD 200 m within 45 deg ± opposite to PWD	—Reduce by 10%/100ft altitude of obstacles between sites.
Potatoes 1 mile	Cross pollination with related crop	1 mile within 45 deg ± of PWD 1,000 m within 45 deg ± perpendicular to PWD 500 m within 45 deg ± opposite to PWD	—Reduce by 20%/100ft altitude of obstacles between sites. —Reduce by 30% for each month difference of flowering.
—short travel —not collected by bees	Cross pollination with weeds	800 m within 45 deg ± of PWD 500 m within 45 deg ± perpendicular to PWD 200 m within 45 deg ± opposite to PWD	—Check for similar species —Reduce by 30% for each month difference of flowering.
	Contamination by pollen	200 m within 45 deg ± of PWD 150 m within 45 deg ± perpendicular to PWD 100 m within 45 deg ± opposite to PWD	—Reduce by 10%/100ft altitude of obstacles between sites.
Sugar Beet 1 mile	Cross pollination with related crop	1,000 m within 45 deg ± of PWD 800 m within 45 deg ± perpendicular to PWD 500 m within 45 deg ± opposite to PWD	—Reduce by 20%/100ft altitude of obstacles between sites. —Reduce by 30% for each month difference of flowering.
—only bolters flower	Cross pollination with weeds	1,000 m within 45 deg ± of PWD 800 m within 45 deg ± perpendicular to PWD 500 m within 45 deg ± opposite to PWD	—Check for similar species —Reduce by 30% for each month difference of flowering.
	Contamination by pollen	100 m within 45 deg ± of PWD 75 m within 45 deg ± perpendicular to PWD 50 m within 45 deg ± opposite to PWD	—Reduce by 10%/100ft altitude of obstacles between sites.
Wheat 3 miles	Cross pollination with related crop	3 miles within 45 deg ± of PWD 2 miles within 45 deg ± perpendicular to PWD 1 mile within 45 deg ± opposite to PWD	—Reduce by 20%/100ft altitude of obstacles between sites. —Reduce by 30% for each month difference of flowering.
—wind pollinated —not collected by bees	Cross pollination with weeds	1.5 miles within 45 deg ± of PWD 1 mile within 45 deg ± perpendicular to PWD 0.5 mile within 45 deg ± opposite to PWD	—Check for similar species —Reduce by 30% for each month difference of flowering.
	Contamination by pollen	800 m within 45 deg ± of PWD 500 m within 45 deg ± perpendicular to PWD 200 m within 45 deg ± opposite to PWD	—Reduce by 10%/100ft altitude of obstacles between sites.

Annex 3

CRITERIA FOR ASSESSING POLLUTION RISK OF ORGANIC HOLDINGS LYING WITHIN A SIX MILE NOTIFICATION ZONE OF INTENDED GM TRIAL PLOTS

1. Cross Pollination

Likelihood of cross-pollinating same species or closely related agricultural crop.

Criteria

- Presence of same or closely related agricultural crop.
- Data on wind- and insect-borne pollen transfer.
- Timing of flowering of relevant crops.
- Distance of GM trial plot from at risk holding.
- Orientation of holding in relation to prevailing wind.
- Topographical or other barriers reducing likelihood of cross-pollination.
- Data on likelihood of cross-pollination (in case of related species).

2. Outcrossing and Horizontal Transfer

Likelihood of outcrossing into wild plant communities.

Criteria

- Presence of weeds of related species.
- Likelihood and mechanisms for pollen transfer.
- Distance of GM trial plot from at risk plant communities.
- Orientation of holding in relation to prevailing wind.
- Topographical or other barriers reducing likelihood of cross-pollination.
- Timing of flowering of relevant wild plant communities.

3. Pollen Contamination

Possibility of physical contamination by pollen of organic crops being directly consumed during the flowering period.

Criteria

- Existence of crops being harvested during flowering period.
- Distance of GM trial plot from at risk holding.
- Orientation of holding in relation to prevailing wind.
- Topographical or other barriers reducing likelihood of pollen contamination.
- Assess likelihood of pollen deposition (normally by wind transfer).

Examination of Witness

Mr Patrick Holden, Director, Soil Association, examined.

Chairman

357. Mr Holden, welcome. You are an old hand at this so we will go straight into the questions. Thank you for coming and for your very useful and detailed evidence, which the Committee appreciated, and which formed the basis of questioning already in a previous session. One thing that has come across in our oral evidence sessions is the degree of tolerance in organic standards for things like pesticide drift and animal feedstuffs. Perhaps you could run us through some of the principal thresholds that you set when you define what organic food actually is.

(*Mr Holden*) The definition of organic food is built around a set of principles which result in standards which define a system of production some of the characteristics of which are the non-use of certain inputs. The system of production was never defined by the non-use of the inputs *per se*. Rather it was defined by a description of the management of the

[Chairman *Cont*]
system which resulted in the production of high-quality food. Having said that, there are a number of areas obviously where the non-use of inputs has been, in part, responsible for the development of markets. In particular, historically, this is true of the non-used pesticides. The Soil Association standards were developed well after pesticides were in common use in conventional agriculture. Indeed it is well-known that pesticide residues find their way all over the world including into the fat of penguins in the Antarctic, etcetera, and therefore it was certainly not possible for us to describe any product as being "pesticide residue free" for that reason. However, what our standards and our certification procedures are committed to is arriving at as close as possible to a pesticide free status as it is practical to get in an imperfect world which we inherited from when pesticides came into common use. The difference in the approach that we have taken in relation to GM from pesticide residues is that, firstly, our perception is—and I could come back to that if you ask me further questions about how we arrived at that perception—that the public is for GM free foods and the public expectation is for GM free foods, certainly in relation to organic production. I think the public wish would be to have the option of GM free foods in the non-organic sector as well. When we developed our standards in relation to genetic engineering—and again I could come back to that process if you wanted me to—we considered that it was not too late to set standards which were built around the expectation of GM free, and whilst we do not guarantee that organic products are GM free, what we do guarantee is that our standards and inspection systems will go as far as we can to delivering GM free status within the constraints of the actions of government and the introduction of GM crops, either imported or grown in commercial trials or, God forbid, grown commercially in this country. And we are mindful of the fact that a number of Ministers have said very publicly that they recognise the right of consumers to be able to purchase GM free foods if that is their wish.

358. So the bottom line on pesticides is that there is an imperfect world and you cannot undo that, but on the GM issue there is a greater possibility of making the world, or at least the United Kingdom, perfect and that is why the standards are different?

(*Mr Holden*) I would put it slightly differently to that. It seems to us that consumers have a right to expect to be able to purchase products that they perceive to be free of contamination by something they do not want and we think it is incumbent upon the Government to uphold that consumer right of choice. If they are unable to do this because of genetic pollution then they have to take measures not to introduce those crops.

359. I have got two questions about the Soil Association's position. The first is this on livestock: when you sell organic meat I think a certain amount of non-organic foodstuff is allowed in the feed of those animals. Is that correct?

(*Mr Holden*) That is correct.

360. It is quite high, it is about 20 per cent.

(*Mr Holden*) That is correct.

361. Do you not feel that consumers of organic foodstuff would be surprised that organic pig meat has been fed 20 per cent non-organic product?

(*Mr Holden*) No, I do not think so because we have always been very transparent about the standards. In fact, the standards are what we consider to be a contract between consumers and producers. The producers are saying, "Look, we will produce in this way and guarantee that through our inspection system if you wish to buy products which are produced that way." I was involved back in the early 1980s when the livestock standards were set which included the derogation—because that is really what it is—for a non-organic percentage of livestock feed because of the shortage of organic protein sources at that time. The derogation for the non-organic percentage of livestock feed is going to be closed, I think in 2003, by the recently published EU Livestock Regulation. The justification for allowing a non-organic percentage of livestock feed was when the standards were set that the consumer would rather have a product which got as close to as was practically possible to organic status at that time and then for us to tighten that up, than not to have it at all. Our perception is, (and we have consulted with the public) that the difference with GM comes from the fact that genetically modified organisms are living and therefore once released into the environment unrecallable, and also because GMOs have not been properly tested in food products and that is a completely different threshold from allowing non-organic percentages in livestock feed for a limited period.

362. I understand that argument but most of the traits currently being engineered into crops by genetic modification—most, not all, particularly not the trans-genic traits—are capable of being bred in by conventional plant technology, and pesticide resistance and so on can be bred in conventionally. Is it not the traits that ought to worry you and not the technology? Why have you not raised the same concerns about the traits engineered in using conventional plant technology?

(*Mr Holden*) I am not a geneticist but I have heard from a number of geneticists including people working in the medical field that the genetic engineering process involves the implanting of a gene carrying a trait from the species where the trait comes from into the parent species and into the genome of the host species in a random way, and that literally the new gene is fired into the genome of the host species with a gun. As a result it implants on the genome in such a way that there are almost always secondary consequences that cannot be predicted. For that reason alone genetic engineering is not the same as any conventional form of plant or animal breeding.

Mr Jack

363. Can I ask a technical question from that. If as a result of the conventional breeding of an F1 hybrid you had the same characteristics as the variety which had been produced by genetic modification, how would you tell the difference in terms of the seed of one versus the seed of another to guarantee that what members adhering to your standards put into the

[**Mr Jack** *Cont*]
ground was not the subject of genetic manipulation? How would you distinguish between the two if they are the same?

(*Mr Holden*) They are not the same and the difference can be tested in a laboratory. That is the point. Genetically engineered plant material, even if the genetic characteristics were the same, would still show up in a laboratory. That is what I am told.

Chairman

364. You say in your evidence to us that the whole row about GM cross-contamination must be having an adverse impact on the organic sector's ability to grow, yet all we hear is that there is a massive over-subscription to the conversion schemes of the Government. We had a farmer sitting where you are sitting now a few weeks back saying she could not get the help she needed. She was desperate to convert and could not. Are you overstating the case in saying that there is an adverse impact on your own sector?

(*Mr Holden*) Possibly, but I think there is a real concern here that the impact of genetic pollution on existing, and aspiring, organic producers could become a major problem. At the moment we are in negotiation with the DETR and MAFF in relation to notification zones which will hopefully enable us to offer more security to organic producers who may be threatened by genetic pollution particularly from oilseed rape, maize and sugar beet, which we consider to be the most risky crops. But it is a worry for both producers and processors to be aware of the fact that they might be decertified because of genetic pollution which might have happened through no fault of their own. We are looking at possible legal channels for what would happen in terms of liability should such a case arise.

365. Can we turn specifically to the regulatory framework. We are going to ask you about the issue of segregation, but looking particularly at regulation you express concerns about the inadequacy of the regulation of segregation, and you give a helpful memorandum for us. Could you explain how you think your concerns might best be addressed, not the mechanics of regulation but the regulation?

(*Mr Holden*) The labelling directives—I caught the tail end of the previous submission from Marks & Spencer's—are in a way a tacit admission that genetic pollution is inevitable once commercial cropping goes ahead because if you set a threshold, whether it is one per cent or 0.1 per cent, in a sense what you are saying is that one cannot segregate completely and therefore you have to write in the thresholds. We would say that it is incumbent upon regulatory agencies to ensure that genetic pollution is avoided. If that means that through wind and insect-pollinated plants genetic pollution cannot be avoided then those crops should not be grown. It is as simple as that. In a world where genetically modified crops are commercially grown it is very difficult to see any long-term outcome other than what your previous witness described as GM pollution becoming ubiquitous.

366. Okay. I can anticipate your answer to my next question. We heard a seed company saying that it was their ambition to promote GM foods, non-GM foods and organic foods. You would say that is impossible, that the two are incompatible?

(*Mr Holden*) I think if people imagine they will be able to walk down a supermarket aisle in the early part the 21st Century and have a world of choice where half of Britain is growing industrial GM crops and the other half is growing GM free crops or organic crops and that choice can reliably be maintained by the food chain, they are deluding themselves. You only have to look at the threshold regulation legislation which is a recognition, as I have already said, that pollution is already occurring and it is going to get worse. I would argue cynically that the thresholds are a wonderful way of opening the door for commercial cropping and the higher the thresholds are set the easier it will be for government to justify that commercial cropping should go ahead. That is why we have resisted the idea of thresholds because we think it is effectively "lying back and enjoying it" rather than recognising and upholding the rights of consumers to remain GM free.

Chairman: I will move on to Mr Todd.

Mr Todd

367. That is a useful prompt because really the question is do you think 100 per cent GM free is attainable now?

(*Mr Holden*) We are doing our best to offer consumers a 100 per cent GM free choice through the purchase of organic foods. We are not seeking to derive market advantage from that because that was never our intention. Our intention is to get rid of GMOs throughout the food chain because we do not think in the long run it will be easy for us to uphold that choice. We are not going to give up in anticipation of losing that battle.

368. Not quite the answer to my question, however, because you rightly said that you were doing your best and the question was is 100 per cent GM free attainable now?

(*Mr Holden*) Yes, I think that the majority of organic crops that are on sale are GM free or as near to 100 per cent as it is practically possible to get. If one is talking about grains of pollen in the stratosphere which might be landing on an organic crop, that kind of physical contamination, there may be some physical contamination of that kind and it is not impossible that the odd kernel of sweetcorn may be contaminated. All we can do is use all the means at our disposal to uphold the right of choice through the testing procedures and the identity preservation procedures which we have got at our disposal, which is what we are doing.

369. In a sense you have said the same thing as the people from Marks & Spencer's said earlier—I do not know whether you caught that part of their evidence—in that they really said to use the term "GM free", they felt, was inaccurate and unhelpful and that all you could do was use your very best endeavours by choosing the correct seed sources and

[**Mr Todd** *Cont*]
then segregating processes as appropriate to produce something which was non-GM as a deliberate product, but you could not claim GM free.

(*Mr Holden*) No, we are not saying that. We are saying that we do not claim that organic products are GM free, but we do do everything within our power to maintain GM free status in our inspection and certification process. We also recognise the right of licensed producers and processors to market their crops as GM free. That is their decision and their responsibility. We would take the view that there are still, if I can put it that way, crops and processed foods which can legitimately make that claim.

370. Which ones?

(*Mr Holden*) I would say the majority of the crops which are grown in the United Kingdom and many processed foods as well.

371. Could legitimately claim to be 100 per cent GM free?

(*Mr Holden*) Yes, a very large number of them. If you want to ask me specific questions I will try and answer them, but yes.

372. You see the point I am making. You made a considerable point of the slippery slope approach to establishing thresholds. I am trying to establish with you whether the threshold has really gone already.

(*Mr Holden*) I think in North America they are further down the slippery slope than we are by quite a long way but in this country because we have only got a limited number of trial plots, and probably only two of those varieties are pollution risks at the present time, we are only dealing with imports and those two forms of genetic pollution and I think that there are a large number of foods being grown and processed organically that are able to stand right outside those risks.

373. Obviously partly due to the fact that cross-pollination could not occur and that the only risk would be contamination by landing on the product which would then be sold to somebody, presumably?

(*Mr Holden*) Cross-pollination could occur between oilseed rape or maize and sweetcorn produced organically.

Mr Todd: But there are many organic crops where cross-pollination could not occur.

Chairman: You did mention imports—

Mr Todd

374. I was going to make the distinction that obviously quite a number of organic producers from outside this country sell into this country. Indeed, something like 70 per cent of organic produce consumed in this country does come from overseas and is claimed to be organic. Do you feel, firstly, that those claims that those products are GM free are sustainable?

(*Mr Holden*) You are asking in relation to their GM free status?

375. Yes.

(*Mr Holden*) Yes, the majority of them are certainly sustainable because the same conditions apply to the answer I have just given in relation to the United Kingdom, namely that the vast majority of crops being grown globally for organic markets are not threatened by genetic pollution by related varieties because those varieties are neither being grown commercially nor trialled. Where your question becomes more pertinent is in the area of commodity crops like soya or maize where the organic crop might be grown within a region where cross-pollination might occur and in terms of the chain, the identity preservation of the commodity, and the sourcing of that commodity, there is clearly more risk there. All I can tell you is what we are doing on two levels. One is (I think I have already addressed this) that we are doing everything possible to maintain the GM free integrity of crops in the UK. We are also working in the standards area through collaboration with certification bodies in other countries.

Mr Todd: I was going to ask you that question. The other issue of uncertainty is if the certification in other countries differed from your own in this respect on whether they are GM free or not. Is there evidence of significant differences in the approaches taken by the organic sectors in other exporting countries?

Chairman

376. I remember the row about the American standards of course.

(*Mr Holden*) I will mention that. I will just touch on one or two issues. The International Federation of Organic Agricultural Movements took a lead on excluding genetically modified organisms from organic production altogether as early 1992 and so that basic framework, which is used around the world for setting organic standards, excludes GMOs. I understand that there are some Member States whose Article 14 Committee representatives, who are their Ministry officials, are actually lobbying the Committee in favour of thresholds presumably in anticipation of inevitable genetic pollution, which is a worrying development, but that lobbying does not necessarily reflect the positions which are taken by the independent certification organisations in those countries. In respect of North America I expect you know about the consultation that received 276,000 responses. I spoke to Dan Glickman about it and he said it was the largest response that had ever been received to any consultation document in the history of the United States.

377. And mankind, I suspect.

(*Mr Holden*) No doubt. The overwhelming majority of those were opposed to genetic engineering in organic agriculture. In relation to the inspection and certification of North American products, they are facing a nightmare at the moment. They are using identity preservation and testing procedures to try to preserve the GM free status of commodity crops like maize and soya. I have already heard about batches of organic products which have been contaminated and therefore rendered useless for sale in organic markets. I gather there are various liability suits pending on those issues.

Mr Todd

378. So it has highlighted international differences of angle in your sector and also particular differences in some individual countries where organic farmers are having a much tougher time than here?

(*Mr Holden*) Can I just comment on that. I think this highlights the issue that the industry as a whole is facing because there are two possible perspectives you can take on genetic engineering. Either you can say, as I think was said by the last witness, it has got to the point where the environment is irreversibly genetically contaminated, therefore we have got to adopt plan B, as it were, which is thresholds and the thresholds will move depending on how great the pollution comes, or you could take the position (which we believe is the view that most consumers adopt although they have not been properly consulted, certainly not by governments) that most consumers believe it is their right to remain GM free and it is up to their governments to enable them so to do. That leads into a whole chain of events. I would say the food industry, which is in an extremely difficult position, has had to adopt plan B in anticipation of endemic genetic pollution to safeguard their commercial interests as much as anything else. If they say that their products are GM free and then somebody proves they are not, they are in great trouble. We have taken a more difficult position (plan A)and it has caused us enormous difficulty and cost where we have gone as far as excluding derivatives of GMOs and also animal feeds and even animal manures from organic agriculture. We are carrying the costs of producing those standards and their policing which we think is a cost that should by borne by the industry or by government but not by the people who are looking after the interests of the majority of consumers to remain GM free. We think that cost issue should be looked at by your Committee.

379. Can I turn to the specific measures you are seeking to take in the United Kingdom to ensure segregation. We have already had evidence from other bodies on the appropriate distances that one should keep GM crops away from non-GM crops to ensure identity preservation. Your figures, which are very helpfully attached to your evidence, differ substantially from the opinions expressed by others. Could you explain that?

(*Mr Holden*) We have had some research conducted by the National Pollen Research Unit to try to quantify the extent of pollen pollution from the GM crops which are being trialled at the moment. We have already had one submission and just literally in the last few days we have received a draft of the second research phase which indicates, as I said earlier, that with oilseed rapes, maize and sugar beats, the likelihood of pollination occurring far further than the distances which are incorporated in the SCIMAC codes is very high. These need to be quantified. We are in discussion, as I said earlier, with DETR and MAFF on protecting the interests of organic growers and we will incorporate the results of that research into our procedures for assessing the risk of pollution within the six-mile radius that we have set for the notification zone should MAFF and the DETR accept our proposals for prior notification, which is what we have asked them to do. Shall I explain what that means? Prior notification means that we believe it is the responsibility of the Government or its agencies to notify the organic sector before any future trial plots are licensed so that we can do some research based on our research to determine the likelihood of genetic pollution and advise ACRE accordingly so that the licensing of trial plots should in future be made taking into account the interests of organic growers or aspiring organic growers who lie within a six-mile radius of the plots. Actually, we do not think that this process should be confined to organic growers but their interests lie within our regulatory area, as it were.

380. Realistically, bearing in mind we are a small island and organic growers although not nearly as many in this country as we would like, are nevertheless quite numerous, does a six-mile radius effectively mean that you have no GM crop trials at all? Essentially by naming that figure you are achieving your first objective which is stopping GM crop trials altogether?

(*Mr Holden*) The six-mile radius was set based on the assumption that bees could fly three miles, which they regularly do—and I think you may have heard already of the Friends of the Earth/*Newsnight* research which confirmed that pollen from oilseed rape was travelling 4.8 kilometres from the Watlington trial site—then three miles to a hive and three miles in the other direction makes six miles which is the basis of our notification zone limit. We did not say that there should be no GM trial crops within six miles of organic holdings. We said that within six miles we should assess each case according to the risks.

381. That is your prior notification?

(*Mr Holden*) That is the prior notification. I think that partly answers your question in that it is not impossible that trial plots could be grown within a six mile radius of an organic holding and pose no significant threat. If your question is was it a deliberate ploy to try to get rid of trial plots—

382. That was my question!

(*Mr Holden*) No, it is not. It is our stated policy that we believe that there is no case for open air trial plots because it is a form of treating the countryside like an open-air laboratory and the Government have no means of controlling genetic pollution, certainly with the maize and rape that they are licensing the trials for at the moment. If your question is will it still be possible for trials to be licensed even with a six mile notification zone, the answer is yes, at the moment.

383. That is a very helpful explanation of how you have interpreted that distance and its meaning. The evidence that we have heard shows significant degrees of uncertainty as to what appropriate distances there should be, and I think your evidence has made reference to that as well, although you have commissioned some research to seek to establish it. Do you believe that a great deal more research is desirable in this particular aspect?

(*Mr Holden*) In relation to environmental pollution?

384. Yes.

[**Mr Todd** *Cont*]

(*Mr Holden*) Absolutely. We would say that the current parameters of the research which is being undertaken on the licensed trial plots is largely misdirected because it is concentrating on bio-diversity impact under two different herbicide regimes, one of which is more selective than the other and, frankly, I think that is of little interest to the public who are desperately worried about the possible contamination of either the trial site or the wider environment both in terms of agricultural crops and wild crops. We would say that if you look carefully through the current research objectives of the trial plots, you will find that they are very badly designed and unlikely to lead to any useful outcomes.

385. Would you accept that if you do believe that more research is required, the only way that that research can demonstrate any outcome on policy would be if we had trial sites which were properly policed and showed a consensual scientific background so that the various dimensions of the scientific issue were tested, and that trial sites are essential to achieve that degree of knowledge and uncertainty?

(*Mr Holden*) No, because firstly we do not think that there is any necessity for genetically engineered crops because we believe that genetic engineering is opposed to the principles of sustainable agriculture in a fundamental way—which I could explain if I had the time, but clearly we do not—and no again because we do not think that it is the right of government or any other section of the community to impose pollution on another sector, and therefore until such time as there is more definitive proof of safety, we believe that all trials should be conducted on the same basis as medical research which is with a policy of containment and not allowing viable organisms to be released into the environment.

386. But you recognise that would not provide scientific knowledge on the issue of crop distances that we have been discussing?

(*Mr Holden*) That can be easily determined by conventional research, as we have found with our research with the National Pollen Research Unit, because these are mechanical factors. What needs to be found out is the risk of horizontal transfer of soil bacteria which is desperately worrying and I understand already occurring in North America, and more about the intimate impact of genetically engineered crops on the soil environment around the plants and the biological diversity. Both of those activities could be undertaken in a contained environment.

Chairman: Some of my questions and Mr Holden's answers may have overtaken some of Mr Marsden's questions.

Mr Marsden: Can I declare an interest. I shop regularly at the Pimhill organic farm shop and cafe, a wonderful organic farm in my constituency.

Chairman

387. The Clerk says that is not an interest, that is an advert!

(*Mr Holden*) But you are not about to take them over?

Mr Marsden

388. Absolutely not. Perhaps you could supply a separate list with some data on the sales or marketing share size of organic food products and how much it is increasing at the present time and whether you think that because of the issue of GMOs that has had an adverse effect on organic food product sales? Perhaps you could supply that separately.

(*Mr Holden*) We have a report called the Organic Food and Farming Report which we publish annually which covers all that information. On the question I was asked earlier by the Chairman about the adverse effect on sales, I think it would be honest to say that at the moment the reverse is true (which is really what I think you were getting at) that the fear of GMOs is prompting more people to buy organic foods. I think there may be some farmers who are already extremely worried about genetic contamination and indeed some companies so there is a friction there.

389. How does your current monitoring of processed organic products ensure that those organic products are what they actually claim?

(*Mr Holden*) You mean in relation to GMO free specifically?

390. Yes.

(*Mr Holden*) I have already made mention of our standards which exclude GMOs pretty comprehensively.

Mr Marsden: I appreciate the standards but what is the specific test.

Chairman

391. Are you saying there are no tests, you rely on identity preservation?

(*Mr Holden*) No, we are using a laboratory for testing and we are currently undertaking some tests and we use and will continue to use tests as appropriate where we feel that there is a risk of contamination and we think it is useful in the certification process to use testing. Firstly, we are aware of the deficiencies of testing because obviously they all operate to thresholds. We are opposed to thresholds for the reasons I explained earlier. Secondly, we think the best way to preserve GMO free status is through auditing and preserving the identity in the audit trail, but we are already using testing and will continue to do so.

Mr Marsden

392. What happens, though, if there was some accidental contamination to organic crops with GM material? Would you then make changes to your monitoring process in order to double check, if you like?

(*Mr Holden*) Yes. If we encounter any form of genetic pollution, if there are lessons to be learned from a failure in our audit and certification process, we will immediately learn those lessons and tighten up on our standards and certification procedures. If there is genetic pollution at a very low level, for instance—and this relates again to the earlier question—our policy is that we will look at each incident on a case-by-case basis. Our policy, again as

[**Mr Marsden** *Cont*]
I stated earlier, is to get as close as is practically possible in an imperfect world to GM free. When it comes to molecular levels of contamination, that is not the right term because obviously it would be cellular, if the day comes to pass—and I hope that it does not—where our certification committee is confronted with irreversible pollution, using the pesticides precedent we may be forced to reappraise the way in which we certificate, but we will cross that bridge when we come to it.

393. Do you think then that the labelling is clear enough? We have submersed ourselves in this evidence for a number of weeks and we have started to get to the bottom of GMO, GMO products, non-GM products and organic products, but to the consumer it is quite bewildering. You cannot walk into a supermarket and immediately be able to at a glance differentiate between those products. If I may say so, I think the previous witnesses were a little bit confusing in the way they were describing their labels because I do not think that a lot consumers understand the way the labelling system works. Would you agree with that and what sort of proposals would you have for clarifying labels?

(*Mr Holden*) I would agree. I think that retailers and processors are in an extremely invidious position because it is perfectly clear that because of genetic pollution, which is arising from soya and maize which may be grown in North America, this is starting to pervade the food chain and they are having to hold a line based on current Directives. The Directives are, I hesitate to say useless, but certainly not clarifying anything for the consumer and in some cases they are adding to the nightmare that processors and retailers face as to what line they are going to draw. I think the whole situation is immensely confusing. The fact that these regulators are having to write in such high thresholds just reinforces the point that you cannot have a world of choice, you cannot have GM and GM free. This is a major threshold for global agriculture. We should really, really think hard before we cross it irreversibly.

Chairman

394. I am reminded of what I was told by a friend of mine in one of the major television stations, that when the GM scare was at its height earlier this year, they received a telephone call from a woman who said she thought all this GM stuff was absolutely dreadful and she was not touching any of those "awful organic foods" again as a result, which goes to show how confused people actually get. If there are things that you wish you had said to us or things you would like to clarify, as always, we are very open to further written memoranda but quite speedily because we have Ministers on the 18th January.

(*Mr Holden*) I did promise to supply the Organic Food and Farming Report.

395. We have a copy of that in the Office already.

(*Mr Holden*) If anybody wanted to find out more information, we are working internationally and I am visiting the US in January and speaking to some members of Congress. There is a lot going on, so if anybody has any feedback—

Chairman: I must buy some more beef from Bridget Young quite soon so I will discuss it then. Thank you, Mr Holden.

Memorandum submitted by Professor Janet Bainbridge, Chairman of the Advisory Committee on Novel Foods and Processes (ACNFP) (R29)

1. There is a statutory requirement that all novel foods including genetically modified (GM) foods are assessed for safety before being allowed to be sold in the European Community. This came into force in May 1997. The requirement is contained in the EC Novel Foods and Novel Food Ingredients Regulation (258/97) which applies to all Member States.

2. The UK approval system for novel foods dates back to a system based on a voluntary arrangement with the food industry in 1980. Under this companies submitted applications for assessment by an independent advisory committee. Initally the Advisory Committee on Irradiation and Novel Foods was responsible for carrying out such assessments, in 1988 this committee was reconstituted into the Advisory Committee on Novel Foods and Processes (ANCFP).

3. The safety of GM foods is assessed in comparison with the foods that they will replace. This concept of substantial equivalence developed by the World Health Organisation and the Organisation for Economic Co-operation and Development is used extensively as a tool in the process of the assessment of the safety of GM foods by expert assessment bodies world-wide. The fact that a GM food may be substantially equivalent does not remove the need for a thorough safety assessment to be carried out. The GM food is compared to its conventional counterpart and consideration is given to both the intentional effects of the modification and also to any possible unintended secondary effects. This comparison involves the assessment of a wide range of information including agronomic data derived over a number of generations (such as crop height, yield, flowering pattern, disease resistance and climatic tolerance) and detailed compositional information on nutrients (proteins, fats carbohydrates, vitamins and minerals) and possible toxicants in both the plant and any derived food product. This comparison can have three possible conclusions:

— the GM food or food ingredient is substantially equivalent to the conventional counterpart in all agronomic, compositional and toxicological respects;

— the GM food or food ingredient is substantially equivalent to the conventional counterpart except for a few clearly defined differences; or the GM food or food ingredient is not substantially equivalent because the differences cannot be defined or because no counterpart exists.

In the first and second categories above particular attention is focused on any differences between the GM food or food ingredient and its conventional counterpart however small. However, where a food is not substantially equivalent, it does not mean that the food is unsafe but extensive data would need to be provided to demonstrate its safety.

SPECIFIC QUESTIONS

(a) *Brief descriptions of the work of both the ACNFP and the sub-group looking at the practicality of post-market surveillance of novel foods, including genetically modified foods and the openness of the system.*

4. The terms of reference of the ACNFP are to "advise Health and Agriculture Ministers, the Scottish Executive, the Welsh Assembly Secretaries for Agriculture and Health and the Agriculture and Health Ministers of the Northern Ireland Executive, on any matters relating to the irradiation of food or to the manufacture of novel foods produced by novel processes having regard where appropriate to the views of relevant expert bodies".

5. In fulfilling this role, the Committee carries out safety assessments of individual novel foods including genetically modified foods as part of the pre-market approval procedure laid down under the EC Novel Food and Novel Food Ingredient Regulations. To assist companies identify the type of data that would be required to demonstrate that a novel food was safe, the European Commission published guidelines to accompany the EC novel foods regulation. These guidelines, based on a structured decision tree developed by the ACNFP in 1991 and further refined in 1994, use a series of linked questions which are designed to fully characterise the potential hazard of a novel food.

6. The ACNFP is able to call on the expertise of other scientific committees as necessary including the Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment (COT), the Committee on the Medical Aspects of Food and Nutritional Policy (COMA), the Advisory Committee on the Microbiological Safety of Food and the Advisory Committee on Releases to the Environment (ACRE). It also seeks the advice of the Food Advisory Committee on the labelling of genetically modified foods (labelling is a legal requirement under the EC Novel Food Regulation) and any issues of a non technical nature arising from its assessment of applications.

7. The ACNFP consists of 14 members with scientific and technical expertise (including the chairperson), plus an ethicist and a consumer representative. The Committee operates in an open and transparent manner. All agendas and minutes of meetings are published on the Internet and the discussion papers are made available on request. The Committee also publishes its assessment reports as well as annual reports which draws all these together. More recently Ministers have announced legislation requiring companies submitting a novel food application to the UK to permit the routine disclosure of all non-confidential information that they provide in support of such an application. Guidance Notes set out the criteria for deciding what information can legitimately be claimed to be confidential. The intention is to keep this to a minimum. The data to be released will be made available electronically on the ACNFP webpage and will offer anyone who is interested, including members of the public, the opportunity to submit comments that the ACNFP can take into account as part of their deliberations. The ACNFP's draft conclusions will also be offered for comment before being finalised.

8. Last year Ministers requested that the ACNFP investigated the practicality of a post-market surveillance system for novel foods. The ACNFP set up a sub-group which has met three times to discuss the issue. All three meetings were open to invited observers, and again the minutes of these meetings are available on the ACNFP website. Intially the sub-group saw merit in using data on purchase patterns at a regional level obtained from supermarket loyalty cards. Unfortunately subsequent adverse press coverage concerning the use of loyalty cards for this purpose prevented this possibility from being investigated further. Earlier this year the sub-group considered alternative approaches using commercially available data on food purchase patterns. The Committee concluded that before setting up a full scale monitoring system it was essential to test whether there was a realistic way of taking post market surveillance forward and to test the robustness of data collection procedures through a small-scale feasibility study. Ministers are currently considering a recommendation to this effect.

(b) *Whether the process of genetic modification is a food safety issue.*

9. The ACNFP is concerned with the safety of products intended for sale to the final consumer. Although we pay particular attention to the way a GM food has been produced, including the genetic construct used, this is to inform our overall assessment of the product's safety. We fully endorse the recent report by the Government's Chief Medical Officer and the Chief Scientific Adviser on the health implications of GM foods and their conclusion that there is no current evidence to suggest that the GM technologies used to produce food are inherently harmful.

(c) *Consumer implications of segregation including costs.*

10. In general there are no food safety reasons to require segregation as a condition of approval, consequently issues associated with crop segregation particularly the cost implications are outside the ACNFP's remit. There may be situations in future, for example where a GM crop is used to produce non-food products such as plastics, where it will clearly be necessary to require the segregation of such a crop. This issue would be considered by the Advisory Committee on Releases to the Environment if a company submitted an application under Directive 90/220 to release such a crop in the UK or to grow it commercially in Europe. Chair of ACNFP has been co-opted on to the newly formed ACRE.

(d) *Concerns raised by the issues of labelling and verification of claims of GM content.*

11. This issue falls outside the remit of the ACNFP. The Food Advisory Committee is responsible for advising Ministers on food labelling matters. The verification of claims as to GM content is a matter for local authorities.

(e) *The differences between GM-free and non-GM (and organic), and whether 100 per cent GM-free would be attainable or enforceable.*

12. This issue is also outside the remit of my Committee. The principal requirements for the labelling of foodstuffs are contained in Directive 79/112/EEC. The main provisions of this directive are to ensure that labelling does not mislead the consumer to a material degree as to the characteristics of the foodstuff, or by attributing properties to it which it does not have, or by suggesting that it has special characteristics when in fact all similar foods also possess such characteristics. Again the Food Advisory Committee is responsible for advising Ministers on Food Labelling Matters.

6 December 1999

Examination of Witness

PROFESSOR JANET BAINBRIDGE, Director of the School of Science and Technology, University of Teesside, and Chairman of the Advisory Committee on Novel Foods and Processes (ACNFP), examined.

Chairman

396. Professor Bainbridge, welcome. We have kept you waiting for seven minutes but that is not too bad by our standards. I apologise nonetheless. Thank you very much indeed for coming before us. Thank you also for your very helpful written memorandum which I certainly read with great interest. As you know, we had Dr Philip Dale in front of us last week and we were grateful to him. He was talking in a slightly different capacity. I understand that you may want to wear different hats during this next half or three quarters of an hour and that sometimes you may wish to speak as Chairman of the Advisory Committee and sometimes as a scientist in your own right. There may be issues where you feel you want to make it clear. We are very relaxed.

(*Professor Bainbridge*) I believe that many of the issues that you may want to raise are outside of the remit of the Committee, but nevertheless I have an opinion on them which you may want to hear.

397. That is certainly a theme of your evidence to us. I hope we can explore some of these other issues when you will wear your different hat. First, a question about the Advisory Committee on Novel Foods and Processes, how much of its work is related now to GM technology?

(*Professor Bainbridge*) In terms of the number of applications that we look at, the GM novel food applications are in the minority I would say still, probably something like 20 to 30 per cent of the applications. In terms of the total work, not so much in Committee but outside the Committee, attending this sort of thing, conferences, etc., clearly the public interest is almost exclusively focused on GM, I would say.

398. In other words, the consumer reaction over the last year or 18 months has had a very profound effect on the overall workload of members of the Committee, even if not on the processes of the Committee itself?

(*Professor Bainbridge*) Absolutely and when I am asked questions about generic issues I try and remind people that I am answering in terms of all novel

[**Chairman** *Cont*]
foods, not just GM. In a sense there is nothing special about GM. We work according to the Novel Food Regulation which makes the same specification for all novel foods.

399. Tell me, is that the point put down by the Soil Association about the fact that you can breed in the same traits by conventional farm breeding technology, for example, and therefore those matters also come before you?
(*Professor Bainbridge*) Indeed many traits have been developed in our agricultural crops conventionally over generations.

400. Including insect resistance and herbicide tolerance?
(*Professor Bainbridge*) Absolutely. I think the difference is we understand enforced gene manipulation is a deliberate insertion over a rapid time period via human intervention, if you like, through GM technology. We understand a great deal more about the genome of the GM so-called modified crops, than we do about those agricultural crops that have been bred for a particular expression.

401. That is an interesting point. Can I just check that, what you are saying is actually contrary to what we have just been told by the Soil Association, that actually we know more about the molecular biology of GM crops than we do about conventional crops?
(*Professor Bainbridge*) Absolutely, yes.

402. The argument that there is an uncertainty in the GM press is one you dismiss?
(*Professor Bainbridge*) No. I think there are various arguments. I think the argument which is made and that we would refute in terms of the regulatory process is the uncertainty of what has happened, how the gene is expressed. I think there are many issues around that that obviously we look at before we ever give approval. It might interest the Committee to know that we have not given an approval, licence to market for a GM crop in the UK since I became chair of the Committee, which was September 1997.
Chairman: I think perhaps I should point out you said you had a cold. We are very grateful to you for coming because you have that cold. It does mean, I think, Members of the Committee need to speak clearly when addressing you.

Mr Jack

403. As a point of definition, Professor Bainbridge, could you refresh my memory on what is a novel food?
(*Professor Bainbridge*) Yes. A novel food is any food that has not been a substantial part of the food consumption of any Member State prior to 1997. Although we accept kiwis as a common every day food, before the first kiwi was imported and indeed at the point that was imported into Europe, that would have been a novel food.

Chairman

404. When Walter Raleigh imported the first potato, that was a novel food?
(*Professor Bainbridge*) Absolutely.

405. And a dangerous food too.
(*Professor Bainbridge*) Yes.

Mr Todd

406. One of our difficulties is trying to gain a route map of the regulatory framework for GM technology.
(*Professor Bainbridge*) Yes.

407. That is obviously a problem shared by a lot of people. There does not seem to be an overarching body which examines all the issues relating to GM technology, maybe such a body could not exist. There is an ethical issue, there are a variety of scientific issues relating to the environment of the product itself, that obviously has impacts on biodiversity, a range of things that could be considered. Can you explain which parts of the route map are covered by your Committee?
(*Professor Bainbridge*) Yes, certainly. We would look at novel foods, as I said before, under the terms of the Novel Food Regulation in terms of their safety for human consumption.

408. The issue of their impact on the environment or ethical concerns?
(*Professor Bainbridge*) Environmental impact would be dealt with by ACRE, the Advisory Committee on Releases to the Environment. One of the issues that I face in dealing with the media and with public concern is there is a great deal of confusion between food safety issues and what you might call environmental safety issues. I have been co-opted on to ACRE, which is very useful, to enable me to see that connection and, Dr Dale, who you mentioned you have had evidence from, is also a member of both committees. There is that continuity.

409. There is some overlap.
(*Professor Bainbridge*) There is overlap, yes.

410. Which to some extent recognises this problem, some parts of it?
(*Professor Bainbridge*) Indeed there are other food committees that we also interact with. Recently we had a meeting with the Advisory Committee on Animal Feeds. A member of ACNFP is chair of the Committee on Toxicity. We have had a joint meeting with the Committee on Medical Aspects of Nutrition. There are other food committees. Obviously there is the Food Advisory Committee that is the committee that deals primarily with the labelling issues, the generic labelling issues, although obviously we would make a recommendation to them in terms of GM.

411. From your experience in the sector, are there any aspects of development of GM technology not covered by an advisory framework at all?
(*Professor Bainbridge*) No, I do not believe there are. I believe that we are very, very careful. If there was such a new aspect with the new technology there could always be a new issue that was raised. We are both empowered to make recommendations to

[**Mr Todd** *Cont*]
Ministers in terms of suggesting that research is undertaken in order to answer questions that are particularly pertinent and we would make recommendations and also about issues where we feel it is not clear where these are going to be raised, but there have been none. I believe there is a very comprehensive cover. Indeed the list of committees that I gave to you is not an exhaustive list, there are other committees which deal with aspects of food hygiene and food safety.

412. Will the establishment of the Agriculture and Environment Biotechnology Commission address the need for an overarching body which takes in all the aspects of the development of GM technology?
(*Professor Bainbridge*) I believe it will. In terms of ACNFP though we are much more concerned about the Food Standards Agency because we will be responsible to the Food Standards Agency. That is actually made clear in the White Paper.

413. One of the weaknesses that I have always perceived in the way we organise these things in this country is we are tremendously good at setting up large numbers of expert committees containing very expert people.
(*Professor Bainbridge*) Yes.

414. But sometimes lose the big picture in the process.
(*Professor Bainbridge*) Yes.

415. Do you feel we have perhaps lost the big picture on GM technology?
(*Professor Bainbridge*) I do not think we have. Given the composition, there are some 14 members of ACNFP and those represent a very wide breadth of different scientific, ethical and medical expertise. That is necessary just to look at these food safety issues relating to novel foods. With the cross membership of other committees and research that individuals on the committee are involved in, I do not think, as Committee members, any of us have lost the big picture. I think the difficulty is explaining the big picture to the public because there are so many facets. Indeed, some of the misunderstandings that we see reported in the press are due to what we as scientists would say is an over-simplification of the issues.

416. We do not think the scientists have lost the big picture but those who present their findings they have not fully understood.
(*Professor Bainbridge*) I believe it is very difficult to understand—

417.—or have found it too challenging to explain what is inevitably a very complicated process in a way which is holistic and can be understood.
(*Professor Bainbridge*) That is right. It is difficult to understand the big picture without that depth, breadth and rigour of scientific knowledge. It is also very, very difficult for the scientists to put over some of these issues in lay terms without being patronising but again without over simplification of these very pertinent issues.

Mr Marsden: If I can turn to the approval system. How many GM food stuffs have your Committee considered and how many have been approved for sale in the UK?

Chairman: In total.

Mr Marsden

418. Yes, in total?
(*Professor Bainbridge*) In total, prior to the Novel Food Regulation under the voluntary scheme, again it is a very difficult question to answer. You could say the products are soya, maize, tomato; but different genetic inserts, different traits have been subject to different approvals so we are talking about nine or ten. These are all available and in our own annual report there is a running list of those which have been approved. This is prior to my chairing the Committee. This is under the voluntary scheme, not under the Novel Food Regulation.

419. As you say, it is a very complex issue but commonly I thought it was four or five so obviously that is incorrect in terms of the wider picture. Perhaps you could highlight to us at a later date exactly where it is in the report? Last week we were told that ACRE has to comment on proposals for the release of GMOs into the environment, which have been made to other EU member states in the first instance. Can GM foods approved in the EU be released in the UK without recourse to your Committee?
(*Professor Bainbridge*) No. The system is that when a company wants to submit a novel application it will submit it to one of the competent authorities, that could be any competent authority in Europe[1]. That competent authority does a complete investigation, there is a 90 day rule. But the application and the deliberations of that competent authority are copied to all the other Member States who then have 60 days to comment.

420. That comes to you?

(*Professor Bainbridge*) In the case of food, yes. Things have come to us from a competent authority in Holland for instance fairly recently.

421. If you have concerns they are fed back through the EU system.
(*Professor Bainbridge*) That is right.

422. Have you fed back concerns in terms of GM?
(*Professor Bainbridge*) If there are concerns, those issues would then go to a European Committee, the Scientific Committee for Food.

423. Sorry, my question was have you had any concerns to date over GM?
(*Professor Bainbridge*) Yes, certainly, yes we have. I said at the beginning of my evidence that we had not approved any GM products since the Novel Food Regulation came into place but we have looked at a great deal of different submissions, some of which have gone back to the company and we have said "We need more information", some of which we have made various recommendations and passed them on through the European Scientific Committee.

424. Do you have a veto in order to be able to stop in effect the release?
(*Professor Bainbridge*) In theory any Member State does. Obviously this is something outside the remit of the Committee. We would look simply at the information, we would look at the Novel Food Regulation and advise Ministers accordingly.

[1] *Note by Witness:* ie, where it will be marketed first.

Chairman

425. We are not debating here the merits of the GM, we are looking at how we protect choice for the consumer. It is very difficult, you get drawn to the bigger issue. It might just help the Committee if we knew some of the reasons why you have been expressing concerns about individual products which have come before you?

(*Professor Bainbridge*) Yes. In one case, for instance, it came through as substantially equivalent, we believed it was not substantially equivalent therefore we asked for a large amount of extra data. In some cases there is some ambiguity about the science that is presented to us. It might be something very simple like we are shown some detailed gels and some detailed sequences, it is not clear what is the end of the sequences or the gels are not clear. In some cases we might go back and ask for data over a much longer period. It is that sort of thing. It is generally either a lack of scientific data or data that members with expertise in the Committee decide could be ambiguous and we ask for clarification.

Mr Marsden

426. In regard then to this specific inquiry, the segregation of GM foods, would it be possible for you then—if you have not already, and I may have missed it—to submit more written evidence to summarise where your Committee has found inconsistencies, disagreements, whatever, which have been passed back through the EU system, as I say with regard to this inquiry?

(*Professor Bainbridge*) Indeed, I can do that, and as the Committee is becoming increasingly more transparent, that data is available on the web site as well.

427. Sure.

(*Professor Bainbridge*) I could write certainly.

Chairman

428. Give us the web site references, Professor.

(*Professor Bainbridge*) Certainly I could write a summary and submit that to the Committee if that was deemed to be helpful.

Mr Marsden

429. That would be very kind, thank you. Turning to animal feeds that contain GMO. Do you have any concerns about that issue and their implications for human food products?

430. Again, strictly speaking animal foods are outside the remit of the ACNFP. There is an Advisory Committee on Animal Feeds which has now met twice, I think. Indeed after its second meeting last week the members stayed behind and we had a joint ACNFP/ACAF meeting to look at how we would deal with issues which were pertinent to both Committees. Indeed the chair of that committee and I and members have agreed that we will from time to time come together and look at issues. We are coming from different points, obviously we (the ACNFP) are looking at the point at which the animal enter the human food chain but there are issues quite clearly which would be pertinent to both.

431. Do you think, just as an aside, that there is sufficient co-operation and exchange of communications and information and data and so on between this plethora of committees: COT, COMA, ACRE, the Food Advisory Committee, you are saying there is one on animal feed and nutrition and so on. In this very complex area, I appreciate that there needs to be a specialised approach but do you think conversely there is enough—the old cliché—joined up thinking?

(*Professor Bainbridge*) I believe that the information is there in the various web sites, in annual reports and things for those people that are prepared to seek it out. I believe that the Food Standards Agency will have a very, very important role because it will be looking at the whole host of generic food issues. As I said before, I can understand why members of the public might feel the scientific system is not best serving their needs. However, speaking as chair of ACNFP, it would become almost impossible to have a robust and rigorous regulatory process and make very robust recommendations to Ministers if we do not have a fairly tight remit. You know, science is never finished, we never have all the answers and you can always push out at the boundaries. It is absolutely essential to bear in mind our remit and our role and make recommendations around the Novel Food Regulation in that way.

Chairman: On this particular subject there are a couple of questions which my colleagues want to ask; Mr Jack first and then Mr Todd.

Mr Jack

432. Professor Bainbridge, could you again just refresh my memory as to what are the risks that your Committee has to satisfy themselves on to declare a novel food or a process as safe?

(*Professor Bainbridge*) Yes. We would look certainly at risks, any possible risks to human health. So we would look at nutritional effects, whether a product could cause nutritional imbalances, whether there is any toxicological effect, that has to be on all sectors of the population, not just on the average adult healthy individual. We would look at issues relating to allergenicity, that sort of issue. Indeed, in the Novel Food Regulation there are 16 categories of information and depending on the particular type of submission, we would look for information within those categories.

433. In terms of the novel food or process, one of the issues which witnesses up to now have made clear is that when it comes to raw materials, unprocessed, they can identify the presence of genetically modified substances down to very low levels.

(*Professor Bainbridge*) Yes.

434. But when processed foods take over, in other words those ingredients become diluted with others, can you just give us a flavour of how you identify whether a processed item has a genetically modified substance in it? Is there a point at which it becomes lost?

[**Mr Jack** *Cont*]

(*Professor Bainbridge*) One of the categories of data that we look at is the intended use of the particular product. Obviously it is a very different ball park if you are looking at something that is going to be consumed fresh compared with something where its intended use is some way down the line after it has been processed. If I could give you a simple example perhaps of the tomato puree, the modified tomato puree. The tomato puree was approved and it was on the supermarket shelves and was outstripping the conventional in terms of sales by three to one. Currently we are looking at tinned chopped tomatoes. We have not got to the stage which is many stages down the road, and this relates back if you like, if we were to look at a fresh tomato then not only would ACNFP look at the food safety implications for that but there would be implications in terms of release as tomato seeds could be going to the environment. The intended use is a very important category, having to look at a different set of data. Refined sugar, for instance, very highly purified refined oil from a GM soya. We have different data to look at than, say, soya meal that was going to be consumed as a major component of the processed food.

Mr Todd

435. You mentioned that eight or nine foods have been authorised and released but none since the time when you become Chairman.

(*Professor Bainbridge*) Yes.

436. And none since the new regulations came into force are governed by your Committee, is that right?

(*Professor Bainbridge*) Yes.

437. A difficult question for you to answer but would any of those eight or nine that are on the market have had difficulty passing your Committee's approval under the new framework established in May 1997?

(*Professor Bainbridge*) In preparation for becoming chair obviously I read some of the dossiers of past submissions under the voluntary scheme but I have to say that I would not have the scientific facts at the tip of my fingers, as I would for the things we have been considering in some detail. I believe that the voluntary scheme was very stringent and very rigorous and indeed that informed the discussions that were held in Europe, informed the Novel Food Regulation. It was based on a decision tree approach as is the Novel Food Regulation. I believe really there is very little change and therefore I believe that those things which are on the market would have been approved under the current scheme as well.

438. What were the differences in practical terms?

(*Professor Bainbridge*) The differences were not in terms of the process, the difficulties were in terms of the legality, if you like, of the European statutory framework around it. In other words, there was not a Novel Food Regulation, therefore companies submitted under a voluntary scheme. That voluntary scheme had been developed by my predecessor and Members of the Committee over a decade or so. As I say, it was almost a seamless change in terms of the Novel Food Regulation.

439. It seems perhaps a coincidence, perhaps the way science has worked in the period, that eight or nine products were released under voluntary processes and none since in a period of two and a half years. It seems to a lay person odd.

(*Professor Bainbridge*) I cannot comment as current Chair of the Committee over something like that. I think it has got a lot to do with what I referred to before, unless all competent authorities in Europe reach exactly the same opinion then effectively the submission has to go to the Scientific Committee for Food. To my knowledge, again I am not involved in European affairs to that extent, there is nothing where there has been an objection from one of the Member States that has emerged from a scientific committee. I believe it is a big issue—this is me speaking as a lay person—how the whole issue of food regulatory processes are going to be dealt with in Europe.

440. Essentially reaching a consensus between the various countries is the major problem—

(*Professor Bainbridge*) Yes.

441.—in ensuring future releases.

(*Professor Bainbridge*) I do not believe it is a problem with the science. With respect, it is not my area, I suggest it could be a political issue.

Mr Marsden

442. I want to turn to labelling and segregation. Again it is not an area the ACNFP actually cover.

(*Professor Bainbridge*) No.

443. You take advice from the Food Advisory Committee because labelling is a legal requirement under the EC Novel Food Regulation.

(*Professor Bainbridge*) Yes.

444. Can I ask what are your personal views on the information consumers want to see on labelling?

(*Professor Bainbridge*) Yes, certainly. As I say, my personal views are that the technology will not actually be accepted until the consumer feels that they have very clear labelling and that they can make their choice. We know now that there is an adventitious level, a *de minimis* value, if you like. I think that is very, very important. The reason for that needs to be explained clearly to the consumer. We need some clarification of the negative list, that is very, very important. I think only when we have clear labelling will the consumers actually be able to take their choice. Another area that remains to be clarified is the testing, if you like, the validation of what is on the label. There are some very, very major issues there—they are outside the remit of my Committee—but when do you test? You can start with the seed, go through the crop, bulk if it is a commodity crop, after it has been milled and before it has been milled and right down the processing. Quite clearly there is not one appropriate testing mechanism that would serve for that entire audit trail. However I do believe that if the consumer wants something that is identity preserved and is prepared to pay the high price premium then it may be that price will support segregation and the auditing and the scientific testing.

[**Mr Marsden** *Cont*]

445. When you say the increased cost, do you mean the increased cost inherent in IP, whether it is for GM, non-GM or organic food products or do you mean all costs will fall more on non-GM and organic products essentially because you have to test more?

(*Professor Bainbridge*) Perhaps I could answer this in a different way. If I was asked through a crystal ball my own personal view, I would say in a decade or so you would be able to go to the supermarket and there will be three lines of products. There will be the conventional, if you can call it conventional, what is generally accepted as the run of the mill, that will contain GM, I believe. I believe the technology will eventually be accepted. There will be organic, as is defined by the organic movement. Then there will be the identity preserved, the non-GM. I think the price premium, it will go up in those steps. We already see a price premium for organic that some people are prepared to pay. I think there will be an even greater price premium on the stream of processed foods which are labelled and are identity preserved. That will be supported by validation right through the audit trail.

Mr Todd

446. I do not know whether you caught the evidence from the Soil Association before you came in?

(*Professor Bainbridge*) Part of it.

447. That exact scenario was presented as not feasible by the Soil Association in which you would have going into a supermarket organic produce, non-organic produce and non-GM and GM produce all stacked up and people having a genuine choice. That was not seen as a feasible outcome.

(*Professor Bainbridge*) If you are talking about 100 per cent GM free, I understand it is not feasible. If you are talking about a one per cent threshold, or whatever value is attached to it at whatever point on the food chain as being acceptable to the general public, as indeed we know with the labelling regulation there is that *de minimis* threshold, then I believe it would be achievable but at a very, very high price premium. Now whether public opinion would accept that price premium or not is a commercial issue which obviously I could not comment on.

Mr Jack

448. The labelling exercise, as I see it, is designed to deal with information, to convey information about risk and to deal with uncertainty. If your Committee says something is safe by virtue of its approval process, do you think it would be helpful for example if there were notices either on the product or adjacent to it saying "This has been approved as safe by the Advisory Committee on Novel Foods and Processes"?

(*Professor Bainbridge*) It would be helpful in some cases I suppose. Some people would actually believe that. I think the situation is too complex. I think what people want is "This is GM free", that is what we are hearing that people want so that they can make their choice.

449. Can I just pick you up on that. You gave us a very comprehensive list in summary of the risks by which you adjudge whether something is safe or not. Is there not a potential danger in having a good that is on sale, adjudged to be safe and then you provide the consumer with a lot of information that may raise in their minds a series of questions. In other words it raises more doubts than it solves. In other words, is it not a question of having a simple statement "This food is safe" as opposed to giving a lot of information that may cause more doubt?

(*Professor Bainbridge*) The issue there in a scientific sense is the general public has a very low understanding of risk and hazard. I quite frequently say when I am public speaking that nothing is 100 per cent safe. I cannot guarantee the ceiling will not fall down.

Chairman

450. Certainly I cannot guarantee that.

(*Professor Bainbridge*) I think it is the same with food, you can never say any one food is 100 per cent safe. I believe that if we said "This GM product is safer than its conventional counterpart" people might understand that but then what do you mean by "safer than" and how can you compare it? Again I have been in trouble several times by saying things in the media like "Coffee is not safe because it contains caffeine and X cups of coffee would exceed the lethal dose of caffeine". I could give you many, many examples of foods like that. Something like that would never be given regulatory approval through the Committee. I think what we have to do, we have to work by increased transparency which will lead up to totally open meetings to try and get over to the consumer the depth of the scientific rigour and the amount of information that we ask for. We always operate according to the precautionary principle and if we are not sure, if there is any doubt at all, we would say "no, we need more information, we need to clarify that doubt" and then I think the consumer might understand.

Chairman

451. To be clear, for my own interest—and I do not want you to get into any more trouble, if you do not want to answer the question please do not—if coffee were to come to your Committee now it probably would not be approved?

(*Professor Bainbridge*) If it was to come as a novel food, if it was approved it would come with a recommendation for a suggested intake.

452. Very helpful. I am a tea man.

(*Professor Bainbridge*) The difference in the public perception, there is a difference in voluntary risk and involuntary risk. People drink alcohol, they consume coffee, they eat far too many sweet things because they like the taste, that is a voluntary risk. I think the worry is with GM foods, because of the lack of clarity that there has been over labelling and because of the vast amount of media coverage and indeed scientists disagreeing in some cases, sometimes very vociferously, the public is generally confused and so you get into this "what if" syndrome.

Mr Jack

453. Can I just ask you, this must be a very personal question, and again do not answer if you feel embarrassed by it, I get a different flavour from you, what you are saying is that perhaps some of the wider debate on these issues has not been couched in helpful terms. One of the points raised by Marks & Spencer and in fact the Soil Association and others is the numbers of people who have so-called spontaneously made representations about GM food but one does ask the question "What prompted them to do it?".

(*Professor Bainbridge*) Yes.

454. Turning it positively, what do you think we ought to be doing in terms of getting ourselves better educated as a public on these matters?

(*Professor Bainbridge*) I think we have to really put across the very, very positive benefits of the technology. No technology is beneficial or harmful *per se*, it is the application of the technology and the fact that the applications potentially are scrutinised with a great deal of rigour until we are as sure as we can absolutely be, as clear as you can absolutely be about their safety. Indeed I think we have to constantly battle away and say "GM products which have been through the approval process are as safe if not safer than conventional counterparts." We know much, much more about them. I do not know of any conventional food where we have looked at great details of gene sequences, of protein sequences, where we have tested for allergenicity, masses and masses of trials of all sorts.

Chairman

455. Can I invite you to even more dangerous territory, prior to bringing Mr Marsden back in. My family are eating more and more organic products at home, that is the choice we make. Is it not possible—for example, this is an all about choices inquiry, the whole issue—that organic products where pesticides have not been applied could in theory at least be more "dangerous" than products with a pesticide residue which has removed some potential pollutants, some organism from that product that will be more dangerous? Sometimes an organic product can be more dangerous than a conventional product.

(*Professor Bainbridge*) I do not want to get into details of that argument. As someone who does the shopping and the cooking and feeds their family, I take my choice and I would far rather give them something that is GM, that has been through the approval process, than something that is contaminated with a persistent organophosphate derivative in the form of a pesticide or whatever but that is a choice I take. What I do find tragic in a way is the fact, as I said before, the tomato puree was outselling the GM, it was outselling the conventional food by three to one but because of public opinion, as a result of a great deal of emotive media pressure and on the back of other concerns about food that were nothing to do with GM, many supermarkets for purely sound commercial reasons have withdrawn GM from the shelf. Now if I want to make my choice and if I want to seek it out in the UK it is not there.

456. Of course the reason it was outselling was because it was cheaper.

(*Professor Bainbridge*) It was cheaper but it was also far superior in flavouring. It had very, very positive environmental benefits as well. It contained less water so it needed less water removing as it was condensed which obviously was very beneficial environmentally. It was very beneficial because requiring less water it required less irrigation, it was a Californian tomato. There was a whole host of products which people were not always very clear about but they were still buying them.

Mr Marsden

457. Are we therefore saying, Professor Bainbridge, that the status of organic foods and the standards to contain that status are too lax? They do not give you enough confidence?

(*Professor Bainbridge*) I am not making any comment at all about this.

458. Very wise.

(*Professor Bainbridge*) It is not within the remit of the Committee. It is not something that is my own personal choice. It is not something that I would seek out so as an educated shopper I have never gone into details about organic status.

459. You prefer GM foods because you think they are safer?

(*Professor Bainbridge*) I am saying the GM foods which have been through the approval process I would have no hesitation in purchasing.

460. An important distinction for the record. In terms of toxicity within certain foods, I will take my choice with chocolate. Turning to segregation, would we be right in thinking that in your view segregation is a matter for the market and not a food safety issue?

(*Professor Bainbridge*) Absolutely, yes. I do not believe that segregation is a food safety issue. It is not within the remit of my Committee but it is a matter for the market. I think we have to be very, very clear about the problems inherent in segregation because of the complexity right through the food chain.

461. You have probably pre-empted my last question which is are there any implications then with segregation in terms of the work that you do with the ACNFP? I presume not.

(*Professor Bainbridge*) No, I do not think it is our responsibility to look at segregation, that is a market led thing. It is our responsibility to work within the remit of the Novel Food Regulation.

Chairman

462. Can I finish off, Professor Bainbridge, unless there is anything you wish we had asked you which we have not. This concept of post-market surveillance, now that sounds very anodyne, in fact it is about scrutinising loyalty cards, purchase tax, it was the subject of a huge furore not so very long ago. Would you like to share some of your thinking on that subject?

[**Chairman** *Cont*]

(*Professor Bainbridge*) I think one of the ways in addition to clarity in terms of the labelling issue of trying to win back consumer confidence is to have some form of post market monitoring, some form of surveillance system for all novel foods.

463. That is an epidemiological study effectively.

(*Professor Bainbridge*) Yes. I think it is belt and braces. It is not to replace the regulatory process but it is to answer critics who say "Ah, but you have not got a crystal ball" and quite clearly scientists do not have a crystal ball but if we can put in some form of long term surveillance then it might help address some of the public concern issues.

464. Health issues?

(*Professor Bainbridge*) Help address some of these issues.

465. Health issues.

(*Professor Bainbridge*) I believe if we are going to have monitoring we have to monitor for effects which are related to novel foods. They may be beneficial effects. We have done quite a bit of work about the phytosterolesters, these low fat spreads that contain plant ingredients that actually have been found to reduce cholesterol, that is a novel food. I think we should monitor those just as we monitor other novel foods. To monitor for a positive effect is very, very difficult in a scientific sense. What do we look for? To my knowledge in America where they have been consuming GM foods, probably trillions of doses in a year, if you think of it in those terms, in the American population over the best part of a decade—not quite that long—people have not turned green or they have not developed a sixth digit or whatever so what do you actually monitor for? What we decided was we would take advice and we would look at what databases were available already in terms of health, chronic and non chronic health effects and then we would try and look at food consumption patterns and see if there was anything that could be done in terms of monitoring. We have had three open meetings now and we finished off the third meeting at a stage where we were in the position to recommend to Ministers where we could at least pilot something in one region to see if the proposed monitoring system made any sense. One of the issues is with science you can always do things, you can always collect data, it is what the data means. Does it really mean anything and is it robust and is it helpful? Some of those decisions obviously have to be made by Ministers. We have sent a paper to Ministers who are looking at that and deciding whether to implement this pilot. It is not in any way in any sense at all an indication that we do not have complete trust in the regulatory process. We do. I believe it is simply a belt and braces approach and something we might be able to carry forward into the future.

466. Professor Bainbridge, I think that concludes our questioning unless there is anything you would like to say before we draw this session to a conclusion?

(*Professor Bainbridge*) No, I think I have gone way outside the remit of the Committee. I tried to indicate when I did.

467. You made it perfectly clear and for that we are extremely grateful, Professor Bainbridge. This is our last session with outside witnesses, our next one is with Ministers in the new Millennium.

(*Professor Bainbridge*) If you need any written evidence, I will produce it.

Chairman: We are enormously grateful to you and your cold did not get in the way at all. Thank you very much.

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AGRICULTURE COMMITTEE

THE SEGREGATION OF GENETICALLY MODIFIED FOODS

MINUTES OF EVIDENCE

Tuesday 18 January 2000

MINISTRY OF AGRICULTURE, FISHERIES AND FOOD
Baroness Hayman

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TUESDAY 18 JANUARY 2000

Members present:

Mr Peter Luff, in the Chair

Mr David Borrow
Mr David Curry
Mr Alan Hurst
Mr Michael Jack
Mr Austin Mitchell
Mr Mark Todd

Memorandum submitted by the Minister of Agriculture, Fisheries and Food and the Secretary of State for Health (R 19)

INTRODUCTION

1. This Memorandum describes the current approach in the UK to the regulation of genetically modified foods (GM). In particular it addresses the way in which GM foods are assessed for safety and labelled as part of a legally required pre-approval process designed to prevent products entering the food chain which might pose a threat to public health or mislead consumers. It also addresses the issue of segregation of GM and non-GM food ingredients in the supply chain. The Ministry of Agriculture, Fisheries and Food and the Department of Health currently lead on behalf of the United Kingdom in evaluating the safety of all new GM foods but this role, together with responsibility for future labelling requirements, will be taken over by the Food Standards Agency once it is established. Applications are received directly from the companies concerned or via the relevant authorities in other member states.

2. In respect of food, the Government's highest priority is to protect public health by promoting and enforcing high standards of safety at all stages of its production, processing and supply. A detailed system for assessing the safety of novel foods, including those that have been produced using genetic modification technology, has been in place for a number of years. The first material for use in food production that was produced using genetic modification technology, a bakers yeast, was approved in 1990. There are however very few genetically-modified food products currently on sale in this country. These are a form of soya and a form of maize and, until recently, a tomato paste. Although the genetically-modified soya and maize are used in quite a wide range of processed foods, it is the same two products that are used in each of these. Some cheeses and other products are made with materials, such as enzymes, which have been produced using genetic modification technology but these enzymes do not themselves contain any genetically modified material.

SAFETY ASSESSMENT PROCEDURES

3. Up until May 1997, the UK operated a voluntary approval system for GM foods. Since that time the requirement that all such foods should be assessed for safety before being allowed onto the market has been enshrined in the EC Novel Foods and Novel Food Ingredients Regulation (258–97) which applies to all member states. This requires companies who wish to market new GM products to apply to the member state in whose territory they first intend to sell the material for a safety assessment to be carried out. That member state then has 90 days in which to reach a conclusion on this after which its report is circulated to all other member states via the EC Commission for their consideration. Each member state then has 60 days in which to study this and raise any concerns that it might have. If these are scientific or technical and cannot be readily resolved, the Commission will refer the application to the EC Scientific Committee for Food for a futher assessment. The outcome of that assessment then forms the basis for the final decision as to whether the product should be allowed onto the market or not. This is reached by the member states acting together under the qualified majority voting system. In this way, a new product is not only assessed by the tenchical experts in the lead member state but also those in other member states and where necessary, an EC expert committee.

4. Many of the products will also have been assessed beforehand by other countries, such as the USA and Canada, from where most GM foods coming into Europe currently originate. In all cases regulatory authorities base their safety assessment on the concept of substantial equivalence developed by the World Health Organisation. Substantial equivalence is a tool to aid the safety assessment of novel foods whereby a novel food is compared with a conventional counterpart and the safety assessment is then focussed on any differences, including unintentional effects. However, this comparison is only part of the safety assessment process. All novel foods are scrutinised in great detail, far more so than has been done for conventional foods. Toxicology studies are required where they are likely to yield meaningful information, they are required. The approach to the safety assessment of GM foods was recently reviewed in detail by the Government Chief Medical Officer, Prof Liam Donaldson, and the Chief Scientific Adviser, Sir Robert May, who declared

themselves satisfied with the rigour of the procedures being followed whilst recognising the fact that genetic modification is still a comparatively young science so that there is a need for continued funding of research to improve scientific understanding. A copy of their report is at Annex 1 [not printed].

Labelling

5. The Government is determined to ensure that all foods containing genetically modified (GM) material (whether protein or DNA) are clearly labelled to enable consumers to be able to make informed decisions about the foods that they eat. The EC Novel Foods Regulation (258–97) requires specific labelling of all foods which consist of genetically modified organisms, contain material which has health implications for some population groups, or gives rise to ethical concerns. Labelling is also required where a novel food is judged, on the basis of a scientific assessment, not to be equivalent to an existing food.

6. Detailed rules (EC Regulation 1139–98) for the labelling of ingredients obtained from GM soya and maize came into force on 1 September 1998. These are seen as setting a precedent for all future novel foods. The regulation, which was unanimously agreed by all member states and the European Parliament, requires clear labelling where genetically modified material is present in the final foodstuff as sold to consumers. In the case of highly refined products such as soya and maize oils, which contain no genetic material, and are indistinguishable from the oils obtained from conventional soya and maize, the European Community considered that labelling would not convey any meaningful information about the composition of the final food. In addition a labelling requirement under such circumstances would be unenforceable. Where there is any reason to believe that GM material may be present the food must be labelled as GM.

7. In a move in which the UK leads the way in Europe, the controls also apply to restaurants, cafes, bakers and delicatessens. The UK has in this respect chosen not to take advantage of the flexibility contained in the Food Labelling Directive 79/112/EEC which gives member states the ability to exempt catering establishments from food labelling requirements. However, in recognition of the fact that it is not always possible to provide labelling for foods which are non-pre-packed or which have been pre-packed for direct sale eg. food sold in restaurants, bakeries, delicatessens etc., the GB Regulations allow businesses the alternative of providing information to consumers about the presence of GM material via their staff. Although the labelling requirements do not extend to catering suppliers at present the Commission has recently issued a proposal to amend the EC regulation making it a legal requirement for all catering suppliers to have to label their products where they contain GM material.

8. The Government is currently consulting on the European Commission's proposals for the labelling of GM food additives and a *de minimis* threshold to allow for the adventitious contamination of non-GM supplies with low level of GM material. The Commision intends to put both proposals to a vote at the Standing Committee for Foodstuffs meeting on 21 October. The threshold proposal makes clear that such a limit, below which labelling will not be required, will only apply to ingredients obtained from non-GM sources. There will be no threshold for supplies obtained from sources of unknown origin. To be able to make use of this limit companies will need to be able to demonstrate to the satisfaction of enforcement authorities that their ingredients are of non-GM origin. It is possible that the use of clearly documented and appropriately audited identity preservation systems could satisfy this requirement. The proposal also makes it clear that all steps should be taken to keep the level of adventitious contamination in non-GM supplies to a minimum. The level proposed for such a threshold is 1 per cent, although in practice the need to provide proof that ingredients are of non-GM origin should ensure that actual levels are kept well below this figure. The Government is also pressing the Commision to develop detailed labelling rules for animal feed as a matter of urgency and to publish proposals for a negative list of materials that do not require labelling as they do not contain GM materials and rules for GM free labelling. The labelling of animal feed should enable farmers to meet the needs of their customers for information about the use of GM materials. There is no suggestion that the use of GM animal feed gives rise to any safety concerns or affects the compositon of meat or other animal products.

Segregation

9. Many growers of commodity crops such as soya and maize do not segregate GM from conventional varieties at harvest. Although the Government appreciates the difficulties associated with obtaining the complete segregation of GM and non-GM crops on a large scale, this does not alter its view that segregation would have been a better way of introducing GM crops onto the UK market.

10. WTO rules allow trade restrictions to be applied only where this is necessary to protect human, animal or plant health. Measures must be based on sound science and must not discriminate against particular trading partners. All the GM materials currently allowed onto the European market have been thoroughly assessed for safety. For governments to require segregation of GM from non-GM crops or products as a condition of import would be considered a restriction on trade.

11. This said, the labelling regime which is now being introduced will help to ensure the identity of products

as many suppliers will choose to keep GM and non-GM materials separate in order to be able to satisfy the demands of their customers for information to pass onto consumers about the content of the final food. The European Commission's Joint Research Centre at Ispra has developed test methods for reliably detecting GM material in foods at levels down to 1 per cent. In addition MAFF is organising a proficiency scheme for organisations in the UK offering a commercial detection service. With effective labelling, the ability of enforcement authorities to be able to test label claims, and the availability of non-GM alternatives, consumers will be in a position to purchase products which best suit their needs. Indeed as indicated below there is already ample evidence that the market is responding strongly to consumer demand for non-GM alternatives.

12. The Government recognised shortly after coming into office that to facilitate consumer choice there was a need to encourage the development of an alternative market in non-GM ingredients. With the co-operation of the Canadian and US authorities, a list of suppliers and distributors of non-GM soya was therefore published and placed on the Internet by MAFF in 1998. More recently US grain handlers have indicated that they would be prepared to offer segregation of non-GM varieties at a premium (10–20 per cent).

13. In practice, segregation has become a commercial decision for food retailers and food manufacturers responding to market forces. Indeed a number of UK retailers and manufacturers have now put in place procedures for obtaining non-GM supplies from South America where little GM soya is currently being grown. Many of these arrangements are being underpinned by detailed audit procedures commissioned by the companies concerned. In addition there are clear signs that the market-led segregation of GM and non-GM varieties is becoming more common in response to consumer demand. We welcome such developments where they are designed to increase consumer choice. Companies will nevertheless need to ensure that whatever arrangemnts they have in place to preserve the identity of the non-GM materials that they are using, all foods made with these ingredients comply with the labelling rules. The responsibility for checking products on sale to the consumer to ensure that this is so rests with Local Authorities.

12 October 1999

Supplementary Memorandum submitted by the Ministry of Agriculture, Fisheries and Food (R43)

INTRODUCTION: DEPARTMENTAL RESPONSIBILITIES

1. This Supplementary Memorandum responds to the Committee's request for evidence on "the issues raised by segregation of genetically modified crops" which are within the competence of the Ministry of Agriculture, Fisheries and Food (MAFF). It complements the original Memorandum submitted by the Minister of Agriculture, Fisheries and Food and the Secretary of State for Health and the separate Memorandum submitted by the Department of the Environment, Transport and the Regions (DETR).

2. MAFF's agricultural interest in GM crops lies in their potential to contribute positively to agricultural production, and in their potential impact on other crops and the agricultural environment. This includes questions such as the risk of GM plants becoming agricultural weeds, the impact of the use of GM crops on farming practice, and wider questions about the food supply chain.

3. The Food Standards Agency will shortly take over most of the existing functions of MAFF and the Department of Health in relation to food safety and standards. It will be responsible for all aspects of the food safety of GM foods and feedingstuffs and will be advised by the Advisory Committee on Novel Foods and Processes and the Advisory Committee on Animal Feedingstuffs.

4. This Memorandum sets out steps which MAFF has been taking in encouraging the industry to address the supply chain issues arising in growing GM crops on the farm, including identity preservation. It reviews action taken to address cross-pollination and to tackle the concerns of the organic sector. It also explains the strategic role to be played by the new Agricultural and Environmental Biotechnology Commission (AEBC).

MAFF ENCOURAGEMENT FOR GUIDELINES ON GROWING OF GM CROPS

5. MAFF believes that biotechnology can make a significant contribution to agriculture and to the environment. MAFF's policy is that UK industry should not be denied access to the potential benefits of GM technology, but that all justified concerns about it should be fully addressed. MAFF remains firmly committed to science as the basis of its decision-making.

6. In July 1997 MAFF issued a discussion paper on the management of GM crops on the farm. This provoked widespread coment and there was a general view that the use of these crops should be controlled in some way, at least for a period of time. However, it was clear that powers for statutory regulation of the growing of the crops did not exist. MAFF therefore encouraged the industry to develop voluntary measures. The Supply Chain Initiative on Modified Agricultural Crops (SCIMAC) was subsequently set up and produced proposals in consultation with MAFF, interested statutory bodies and Non-Governmental Organisations.

7. SCIMAC is a formal grouping of industry organisations representing biotechnology companies, plant breeders, the seed and distribution trades and farmers with the declared aim of "open, responsible and effective introduction of genetically modified crops" into the UK.

8. SCIMAC launched its Stewardship Programme on 21 May 1999 with the aim of ensuring that GM crops are carefully controlled when they are grown on the farm. The Programme includes a Code of Practice on the introduction of GM crops, which includes steps to ensure identity preservation throughout the supply chain, and Guidelines for growing herbicide tolerant crops. The Guidelines are aimed at best practice in the growing of crops and include provisions for:

— planning of rotations;

— record keeping of plantings; and

— specified separation distances between the new and conventional or organic crops.

The rules will be underpinned by a system of legally binding contracts, independent enforcement and audit. SCIMAC has made a commitment to review the controls in the light of experience.

9. The Government has given its endorsement to the SCIMAC guidelines. It believes further that they could form the basis of legislation in the future, and is exploring, at EU level, the scope for achieving this.

10. The DETR has also been working with SCIMAC in setting up the farm scale evaluations on GM crops and has covered these arrangements in its memorandum.

Separation Distances and Pollen Transfer

11. The SCIMAC Guidelines address the possibility of cross-pollination between GM and conventional or organic crops by laying down separation distances and specifying practical safeguards to minimise spread of tolerance. The separation distances are based on long-standing agricultural practice and scientific advice in the production of high-quality seed crops, where genetic purity is crucial. These separation distances have been shown to work in many years of farming practice and the production of seed, and their incorporation in the Guidelines will help ensure that problems with cross-pollination are minimised.

12. There has been considerable publicity recently following publication of research which shows that pollen can be transported over several kilometres, particularly by bees. This followed last year's announcement of Government-funded research results indicating, from work at IACR Rothamsted, that bees deposit most pollen on the next flower visited and that deposition declines rapidly after this. Other MAFF-funded work at SCRI Invergowrie found that insects could carry pollen over long distances (four kilometres). MAFF has also funded a study on separation distances by the John Innes Centre which reviewed scientifically-based practices. All the evidence to date indicates that there is a rapid decrease in possibility for cross-pollination over distance, and it is therefore likely that there will only be very low levels of long-distance pollination under normal farming conditions. The possible need for further research and scope for review of the existing literature is however accepted.

13. The Advisory Committee on Releases to the Environment considers the issue of cross-pollination in deciding whether to recommend approval of GMOs. The Committee takes into account the possibility of gene transfer to other crops and wild relatives, and the likely effects on other organisms.

14. There is concern from the organic sector that organic crops may be affected if GM crops are grown nearby, given that the standard for organic production rules out completely the use of GMOs. Ministers accept that reasonable safeguards are needed for organic production. MAFF has set up a dialogue involving the GM and organic sectors to review the interface between GM crops and organic farming, and discussions are continuing with a view to identifying mutally acceptable safeguards.

Agriculture and Environment Biotechnology Commission

15. The report of the Government's review of the Advisory and Regulatory Framework for Biotechnology, published on last May, announced two new strategic Commissions. One of these—the Agriculture and Environment Biotechnology Commission (AEBC)—has a remit to advise the Government on the "big picture" on agricultural biotechnology, including questions of ethics and public acceptability. The Commission is expected to start work shortly and it seems likely that it will take an interest in the continuing work on the segregation of GM crops.

14 January 2000

Examination of Witness

BARONESS HAYMAN, a Member of the House of Lords, attending by leave of that House, Minster of State, Ministry of Agriculture, Fisheries and Food, examined.

Chairman

468. Baroness Hayman, thank you very much indeed for coming before us in this Committee in our last evidence session on our inquiry into the segregation of GM foods. I hope you will understand that we have taken a very narrow and specific area in the GM debate to try to produce some worthwhile conclusions. Other committees have covered a wider range of issues and there was a very helpful debate in Westminster Hall last week which was attended by Michael Meacher. You are the first Lords Minister who has appeared before this Committee although you told me you think your predecessor was Mr Rooker and we have certainly had him before us regularly. You are very welcome indeed. Can I ask you first of all a general question and perhaps, without being too partisan, express a view. The question is what do you think the limits are of government responsibility generally in relation to GM foods and GM crops? From my point of view the Government is sometimes seen as a very articulate advocate of GM crops rather than a neutral referee. What do you think the role of government is?

(*Baroness Hayman*) I do not think it is our role to be an advocate. I do think it is our role to be a protector, a protector of public health and a protector of the environment. So I think there is a responsibility to safeguard public health, which is of course predominantly around food and food safety, and to make sure that the regulatory processes ensure that for GM food, for any novel foods, and indeed for food in general that that which is offered to the consumer is safe to eat. So I think that is the prime responsibility and I am Food Safety Minister which is why I saw myself as Jeff's successor rather than Bernard Donoughue's in terms of portfolio. I think that is one responsibility. Equally, we have a responsibility towards the environment and to assess very carefully what the effects of the introduction of specific GM crops with specific properties might be on the environment. Over and above that, I believe that we have a responsibility as a government for providing informed consumer choice and that takes us into areas not necessarily of regulatory processes but certainly areas such as labelling, whether it is compulsory, or labelling in the sense of monitoring the claims that are made for foods or products and ensuring that they are not deceptive in any way.

Chairman: Thank you. Mr Jack has a supplementary early on.

Mr Jack

469. You mentioned your role, Baroness Hayman, as the Food Safety Minister. Could you sketch in briefly for my benefit the relationship that you have on these matters with the Department of the Environment. Is there some kind of co-ordinating structure upon which you and Michael Meacher sit? Where is the boundary drawn between your responsibilities on issues which are the subject of this inquiry?

(*Baroness Hayman*) There is an interface, you are absolutely right to say so, but not so much on the food issues. For example the Advisory Committee on Novel Foods and Processes, which is the regulatory body for assessing the safety of new foods, reports at the moment to me as Food Safety Minister into MAFF. When the Food Standards Agency is set up on April 1 and takes over that responsibility, it will take responsibility for that. The Committee on Releases into the Environment (ACRE) feeds into both MAFF and to DETR and that is more around MAFF's responsibilities in terms of agriculture looking at the potential effects of GM releases on the agricultural environment and on other crops than perhaps the wider bio-diversity and environmental responsibilities of DETR so, yes, there is a lot of close working on GM issues in general across government but particularly a lot of close working at both official and ministerial level between Michael Meacher and myself.

470. Is there normally one Minister who would deem themselves to be in charge of the GM area?

(*Baroness Hayman*) The GM area goes enormously wide, of course, it goes into medicine and health. I suppose in terms of the Cabinet co-ordinating responsibility that Dr Mowlam has, she has a responsibility for co-ordinating government response on GM issues.

Mr Curry

471. Can I just pursue that a little further because in the past when we have had inquiries into this matter we have had a MAFF and a DETR Minister and Mr Meacher has been unaccustomedly bashful today as far as I can see. Either he has been bashful or been brushed off, I am not quite sure which is the right one. Now we have had Mo Mowlam introduced into the conversation. This is pretty incoherent, is it not?

(*Baroness Hayman*) I do not think it is incoherent. I think it is a recognition that GM issues can affect and do affect a variety of government departments. I have not mentioned the DTI so far but obviously the application of GM technology in industry and bio-sciences is very important. I think Mo Mowlam's responsibilities are for ensuring that the different strands of ministerial activity are co-ordinated and I think the need to recognise some of those broader issues is reflected in the Government setting up of the two broad strategic Commissions on biotechnology, again looking more broadly across the piece, while there are specific responsibilities, for example the regulatory responsibilities that have to be focused in one department or with one Minister who may be the licensing or statutory authority for instance.

472. Do you see different departments, as it were, taking up the cudgels for different interests. Jack Cunningham, when he was the co-ordinater or

[**Mr Curry** *Cont*]
enforcer, repeatedly said, "We have got to realise that Britain is a major leader in the field of biotechnology and if we look as if we are inhospitable to this we are going to be threatened as a base for these very high-tech industries." I do not think that is unfair. He did say that repeatedly. Michael Meacher appears to have been the chap who has flown the flag of consumer interest. Sometimes it is quite difficult to decide what flag MAFF has been flying at all. Would you accept that it has looked a little as if different Ministers have been flying different flags and it is very difficult to find out where the admiral is in all this?

(*Baroness Hayman*) I am not sure I can put myself into your mind to see your perspective of where different Ministers may stand. I can only answer for myself. My title within MAFF is Food Safety Minister so I see myself as having overwhelming responsibilities in that area and I think that is a quite clear responsibility for someone with my portfolio within MAFF as long as MAFF retains those responsibilities. Equally, I think the Government overall has to make sure that we do not have different strands of government pulling in different directions. I was trying to articulate earlier on that we do see ourselves having prime responsibilities in the protection of public health and the protection of the environment. Equally, I think it is true to say that there are opportunities or potential opportunities over a range of bio-technology issues including GM which it would be irresponsible for any government simply to ignore or rule out of court, whether they are advances in medicine, whether they are industrial opportunities or whether they are opportunities that some in agriculture see for limiting the use of agri-chemicals and getting higher yields and better and cheaper food to the consumer.

473. You made the distinction a few minutes ago in response to Mr Jack and said, "I deal with the agricultural environment and other crops but if it is not a crop then it is DETR." It is difficult to enforce it. You cannot walk round the edge of a field saying, "That is a bit of agriculture, that is my responsibility. That is a weed, that is DETR's."

(*Baroness Hayman*) I think weeds are absolutely crucial to agriculture.

474. So you do have a wider responsibility.

(*Baroness Hayman*) The margins of fields are of great interest within the agriculture environment, as you well know. Neat little boxes are not always available. Biodiversity issues are in the main of course the responsibility of DETR. Agricultural issues are the responsibility of MAFF. Because there are overlap implications we do ensure that there is a great deal of conversation between Ministers in the appropriate cases, that submissions come to the two Ministers, and that officials keep up the dialogue.

Mr Mitchell

475. Can I take you back to before that detour. You said that Government is not an advocate of GM technology. You could have fooled me because my reading of the situation is that the Government did indeed begin as something of an advocate of something that was considered technologically beneficial to British science, and in the face of a clamour produced outside by the opponents of GM food we resiled from that position. Would that not be an accurate reading of the situation?

(*Baroness Hayman*) I am looking into your perception of what government's attitudes have been in the past. I think that the Government has always recognised that there is a great potential in GM technology and that there is a great potential because of the sort of science-based industry that we want to create and the expertise that we have in this country for exploiting that. We have to recognise as a country those potentials and I do not think we should inappropriately bar them. Equally, I do not believe it is Government's job to tell people what they should eat or make them buy things that they do not want to buy. I do believe it is Government's job to ensure that appropriate regulatory processes are in place and I think, yes, you are absolutely right, there has been a growing public concern manifested particularly in the media but also through individuals about the need for a proper exploration of the implications of the use of these technologies particularly in the environmentalist setting and in food so that people can be assured as to their safety and I think that is perfectly appropriate and the Government has responded to that.

476. The Government should be an advocate of something that could well be a scientific advance bringing plentitude and cheaper food and not be deterred by the clamour of the forces of conservatism.

(*Baroness Hayman*) I think we have to recognise that role and why I went back to the referee role is I think the role of Government is to make sure that the scientific evidence and the regulatory structure are there and that they are transparent so that people can make their own choices. Of course, you cannot always follow what is going on. People do change their minds. If you think back to tomato paste, the first GM food introduced in this country, it was not introduced by sleight-of-hand. It was very clearly marked, there were leaflets about it and it sold very well in supermarkets at that time. Equally, there has been since then a change perceived in consumer attitudes and many supermarkets now choose deliberately to make a marketing ploy of not selling GM products. I do not think government should be up and down on the peaks of what is out there in the market place. That is for the market-place to determine. Equally, I do think government should hold fast to its principles and I come back to those principles about safety in both the environmental and health sense.

Chairman

477. Without labouring the point, I would echo some of what Mr Curry has said. We had a great deal of trouble getting evidence even from DETR in this inquiry. We eventually received a memorandum which has been extremely helpful and deals with some of the issues which go to the heart of this inquiry. It surprised me, however, that we only got that memorandum last week and it would have been helpful to have had it months sooner when this inquiry was announced in the summer. There is a

[Chairman *Cont*]
suspicion in my mind that there is a lack of co-ordination between the two government departments of state. I put it no higher than that.

(*Baroness Hayman*) I apologise if anything reflects on either MAFF or myself. As far as I was concerned, I was invited and came along. I did not understand it was a joint invitation and that I had to bring Mr Meacher with me.

478. We have had some debate over a lot of these inquiries and it has conveyed an impression, let us put it like that. Let's look at MAFF specifically. What about your role now the Food Standards Agency is up and running in relation to GM foods, can you define that for us factually.

(*Baroness Hayman*) I think the vast majority of my role in relation to GM foods will pass over to the Food Standards Agency, that is in relation to both food for human consumption and for animal feed. The responsibilities that will stay with MAFF are the responsibilities that relate to what I was talking about earlier, the agricultural implications of GM technology, new plants, seed listing, those sorts of issues, but as far as food safety is concerned that will transfer over on 1 April to the Food Standards Agency.

479. Thank you. Let us look at some more factual stuff. We have discussed already briefly Dr Cunningham's announcement about the establishment of the Agriculture and Environment Biotechnology Commission and of course the Human Genetics Commission although that is not relevant to this Committee. In its response to the Environmental Audit Committee's Report the Government said that the Commission was being set up. In the most recent memorandum we have had from MAFF there are further hints. I think it says at the end of the report that the Commission "is expected to start work shortly". So what is the current position?

(*Baroness Hayman*) You need a Civil Service lexicon to know what "shortly" means.

480. Exactly!

(*Baroness Hayman*) There are three bodies with overarching responsibilities on GM issues because the Food Standards Agency will have responsibility on GM food. The Human Genetics Commission, which is starting its work, and I believe the Chairmanship of that has been announced, will work around the implications for human health in particular. We have not appointed a chairman to the Agriculture and Environment Commission which is why that body has not started its work. I understand that that appointment is to be re-advertised later this week.

481. Re-advertised?

(*Baroness Hayman*) Yes.

482. So "shortly" in that lexicon is likely to mean?

(*Baroness Hayman*) In the spring.

483. And the spring, Minister, the spring? June, July, August, that sort of spring?

(*Baroness Hayman*) I do not want to weasel my way out of this but the appointment is being made through the Cabinet Office rather than MAFF appointment therefore I do not want to give a commitment about a timing that I cannot discharge myself.

484. We will keep an eye on that. Apart from the Chairman who is going to be on it? There are some hints in the memorandum as well about ethicists and so on. Will it be seed producers, farmers? Who is going to be on it?

(*Baroness Hayman*) My own understanding of this is that the desire is to have on these Commissions a broad range of interests that do reflect the fact that these will not be the expert scientific committees to go through a regulatory process or application.

485. That will be done elsewhere?

(*Baroness Hayman*) That will be done elsewhere.— That they should be broader therefore they should not be dominated by scientists with an interest or a knowledge of the subject, if I can put it in fairly crude terms, and that they should reflect a range of people. That should not rule out people who have some knowledge of the subject. I think that would be quite counter-productive but it certainly should have the ability to reflect the views of consumers, the views of people who have ethical interests, the views of people who are in farming, for example, rather than simply come from a narrow field.

486. It is an issue that this Committee has wrestled with in the past. How do you get the views of consumers represented on these Commissions?

(*Baroness Hayman*) I think it is a difficult challenge and you have difficulty either way. You have difficulty if you go for the "professional consumer", someone who works full time in the consumer movement because people feel that is not representative of people who do their shopping twice a week and do not take a specialised interest. Equally, and I have done this myself in the past and I know, the problems of having heaped on your shoulders the responsibility of representing vast numbers of other people that you have no network or way of finding out their position just because you are plucked off the street as an ordinary consumer is difficult. I think that the process of open application, the process of trying to persuade people to come into this and not only taking people who are on the list of usual suspects, if I can put it that way, does give them opportunities and I think we have to make sure that they then have feedback from consumer organisations and other groups so they are not only representing their own interests.

487. I have to say when Janet Bainbridge came to this Committee as Chairman of the Advisory Committee on Novel Foods and Processes she struck me as a pretty well-informed consumer as well. We are, after all, all consumers.

(*Baroness Hayman*) I think that is right. After this meeting I am going to chair the last meeting of the Consumer Panel at MAFF which brought together individuals and I know that the Food Standards Agency are thinking about how they could best structure their consumer advisory grouping for the future.

488. I do not want to labour these organisational points for to long but they are important and there have been concerns expressed for example by

[**Chairman** *Cont*]
Consumers in Europe that there are gaps in the process. What you are saying is that the three bodies being established, including the Food Standards Agency as one of those three, means that there will be no gaps. They are the overarching organisations that will take care of everything between them.

(*Baroness Hayman*) I think that was the intent of the Government when responding to the Select Committee report about oversight of technology, yes, that there should not be any gaps.

Chairman: Minister, thank you very much. Mr Mitchell?

Mr Mitchell

489. On the consumer choice issue, do you think there is a genuine hostility to GM foods on the part of consumers or alternatively there are doubts whipped up by a machinery of panic mongering and fear creation?

(*Baroness Hayman*) I would not go for either generalisation, if I may say so. Undoubtedly, there are people who have a genuine hostility to GM produce and who want to be able not to buy it. Equally, I think that there are many people who do not see any advantages at the moment in the GM products that they are being offered and therefore decide to take a very precautionary approach. And there are equally, I am certain, people who are not particularly worried either way and make their purchases on completely different issues. I believe one of the challenges in labelling and information for consumers is the range of interests that consumers have. Saying consumers with a capital C is answering for the whole of the population of this country because we are all consumers and there is a vast variety of issues that interest people. Some people are interested in the food they eat because of religious scruples. Some people are interested because of ethical issues about animal welfare. Some people are interested because they have a health problem themselves around an allergic reaction to a particular food. Some people are interested because they particularly want to buy on country of origin. There is a whole range of issues and for some people undoubtedly GM is an important issue. I think we should be facilitating choice around that range of issues and I would not under-estimate the strength of feeling of some people about GM food and protecting their right not to buy it. Equally, I would not generalise from that strength of feeling to say that it is across the board.

490. But inherently consumers' main preoccupation is price and quality, is it not? It is useful to create fear amongst consumers as a means of combating GM because that is the Achilles' heel of GM production. What is basically a scientific issue is being turned into a consumer issue because that is the best and easiest way of attacking GM.

(*Baroness Hayman*) You can read this two ways. You can either read it, as you are suggesting, that consumers just do not understand the science—

491. I was not saying that.

(*Baroness Hayman*)—Or else they would not be taken along this scare route. I think it was implicit in what you were saying actually. Or you can take it, and I think this is what is there, that predominantly consumers do their own risk benefit analysis when they are shopping about what is important to them and the benefits of what is being offered at the moment do not seem to them to outweigh what may be in their mind very remote but possible risk and therefore they take a very precautionary approach, or some of them choose to. I am sure you are right that all the evidence points at base to the fact that most people go on price and quality and our responsibility, coming back, is around the quality issue and the safety of a product that is GM.

492. But this is the consideration for consumers, to repeat the Asda advert. You yourself said that the tomato puree that Zeneca put out was of high quality and sold well and was competitive.

(*Baroness Hayman*) And, equally, it has now been withdrawn, not on any safety grounds—

493. Because of the panic.

(*Baroness Hayman*) I think what I am trying not to do is say, "Consumers believe this ..." or, "Consumers want that ... " because I think there is a range of opinion there and I think markets do ebb and flow and popularity ebbs and flows and different products will get different responses.

494. If you are taking that position it follows that government responsibility is to guarantee the continuation of non-GM supplies to the consumer.

(*Baroness Hayman*) I am not sure that is the Government's responsibility to guarantee. If I think about people who are vegetarian for example, is it the Government's responsibility to guarantee the supply of vegetarian food? I think it is very important that the Government makes sure that people do not label food as vegetarian and we then find out that they are doing so misleadingly so consumers are misled. The market will decide whether vegetarian food or organic food or halal food is actually produced and I am not sure it is for the Government to guarantee that. I think it is for the Government to guarantee there is an appropriate regulatory process that ensures that safety considerations are to the forefront and it is the Government's responsibility to ensure that appropriate labelling is on produce and it is the government's responsibility to ensure that consumers are not misled. After that I think then you have to let the market and individuals decide.

495. If we lie back and leave it to the market given international trade agreements is it not going to be very difficult for the market to continue to provide in the way you are saying it should?

(*Baroness Hayman*) Are you thinking particularly in terms of identity preservation?

496. What is exportable and importable under international trade agreements and the difficulty of classifying it.

(*Baroness Hayman*) But I think that a lot of the identity preservation issues throughout the food chain will actually be led by market forces rather than regulatory forces.

497. Okay, but again another problem with the market if you are going to create those distinctions is the cost of segregation. Who is going to carry those costs?

[**Mr Mitchell** *Cont*]

(*Baroness Hayman*) I think within the food chain that will be sorted out amongst the individual people at stages of that chain depending on where and who can bear it, but there will be costs inherent in segregation.

498. Which in the end will be borne by the consumer?

(*Baroness Hayman*) And in the end those will be borne by the consumer, I think that is right.

499. The result of this concern/fear that is being created is that consumers will have to pay higher prices?

(*Baroness Hayman*) Consumers who want to guarantee the identity of preservation and the separation, yes.

500. Which you say the Government does.

(*Baroness Hayman*) I said the Government has responsibility for ensuring that people have information about the food that they buy.

501. When it comes to labelling do you think the consumer appreciates and understands the difference between GM free and non-GM ingredients?

(*Baroness Hayman*) No, I think it is very confusing and I think we are in a difficult position here on this labelling as we are on a whole lot of other labelling issues. I think there is a difference between what has to be compulsorily labelled, and that is food that has GM material in it, and that is EU-wide and there is competence there and that has been decided, and what people choose to use often as a marketing tool which is around categorising something as GM free and using that as a claim. We do not at the moment have a satisfactory and universally accepted definition of "GM free" and we are pressing within Europe to get that definition so that people understand better and can be assured of the implications of that and indeed that it can be policed by local authority trading standards officers, or whoever it is.

502. That will be the basis of the Government's labelling approach?

(*Baroness Hayman*) Yes. I want to go much wider on labelling and talk more widely about what is useful for consumers on labelling, the format of labels, how we can make sure people can understand the information that is there. There is a whole range of issues about labelling that are very important.

503. If consumers want GM free food, either because they have read all the scientific literature and think that is best for them or because they have been panicked into that attitude, if all the traders and producers and marketing people can guarantee is that it is non-GM, does that mean that the market is working or not?

(*Baroness Hayman*) The definition of what has to be labelled as GM has now been extended to cover additives and flavourings. That is one of the things that has happened since my memorandum was sent in and those regulations have now been adopted and will come in on April 8 or April 10. People who therefore do not want to buy GM material can be assured that they are doing that by buying anything that does not say "This is GM" on it.

504. You are being driven back stage by stage to a narrower and narrower definition.

(*Baroness Hayman*) I think you have to have a definition that is testable and a definition that is universally accepted. There is no point in having a definition where if you are a trading standards officer or you are going to analyse the food you do not know whether there has been any GM process at any time further back in the production of this food because that is a meaningless thing. It has been accepted worldwide and certainly within Europe that the definition of "containing GM material" or "GM food" is something that has something that is tangibly and testably in the finished product. I think anything else would lead to the most terrible confusion.

Mr Jack

505. Could I just return to your observations about the tomato paste because a lot of the questioning has been about how you can define things that do not have GM in. Here was an example of a clearly segregated product which was the product of GM technology. It was clearly labelled and, as you said, there was a lot of information available to consumers enabling them to make what one might have thought by the sales success of that product was an informed choice but all of a sudden it disappeared from the supermarket shelves and it seemed that the users of that product were not consulted. Did you or anybody else in Government attempt to objectively evaluate why all of a sudden what had been deemed by quite a large number of people to be a wholly wholesome and safe product suddenly lost confidence and was rejected wholesale by those consumers or was it a question that the pro-tomato paste lobby simply had its product taken away without any consultation?

(*Baroness Hayman*) You are trying to put me in the position of being a food manufacturer or retailer.

506. The question I want to know is at a very important moment when there was choice and then there was not seemingly because the public lost confidence in the product what did MAFF or any other part of Government do to find out why there was this change in appreciation because if people are to believe in future messages about the safety and integrity of GM I want to know about those thought processes because here we have a situation where a product which was deemed to be safe and okay suddenly lost confidence and I want to know why.

(*Baroness Hayman*) I will find out, if I may, what happened in that because I was not the Minister responsible at that time. I would guess that nothing very different may have happened from a whole range of products that come and go off the supermarket shelves. I am often irritated when I go shopping to find that a particular manufacturer no longer makes something that I really liked that obviously a lot of other people did not and therefore on commercial grounds they have taken it off the shelves.

507. I used to work for Marks & Spencer and I have made those decisions about when you take a line out of the catalogue because it is not selling and there is a difference between that and responding here to a loss in consumer confidence to a product that was clearly labelled and clearly explained to the

[**Mr Jack** *Cont*]
consumer. Because the reverse is we are talking about explanations and labelling for those who do not want a product with GM in it. I want to know what establishes the boundaries of consumer confidence when they are presented with the type of messages that at one time convinced a lot of people to buy the tomato paste?

(*Baroness Hayman*) I still think that some of those answers are for those who are involved in the commercial business of producing and selling those products. I take your point, however, and I would say that it was not Government regulatory action that took that product off the shelf. I think that one of the ways we do have to respond in the wake of a great deal of public comment and a loss of public confidence (and I think in the broader issues around GM technology that then comes back to your tin of tomato paste on the supermarket shelf) is by having very open and transparent processes for regulation and scrutiny of new products to ensure that people's confidence is built up again. I know you saw Janet Bainbridge and the way in which the Advisory Committee on Novel Foods and Processes is working, the way it is trying to take out even further into the public arena the details of applications as they are made and giving people the opportunity to comment on them, the overarching Commissions that we are setting up, that broad public participation in the debate and the creation of robust structures which are not dominated by those with the vested interests will over time create confidence. From that confidence whether something then is commercially successful or not is for the commercial world but, equally, I accept that there is a responsibility within government which I think is best discharged by having very robust processes to make sure that people can have confidence in the regulatory processes. I think one of the reasons for the withdrawal of enthusiasm, if you like, was a lack of understanding and public knowledge of the very detailed work that does go into the regulation of these products but I do not think it was widely known or appreciated and there was concern that it might not be thorough enough.

508. But a lot of people had confidence to buy the product in the first place.

(*Baroness Hayman*) Yes, public debate about issues sparks people off into thinking about things or changing their purchasing habits and that happens on a range of issues.

Chairman: I suspect this argument is not getting very far so I will call a halt. Mr Mitchell has a couple of points to raise.

Mr Mitchell

509. Is the Government concerned that non-GM foodstuffs are going to become beyond the economic reach of the mass of consumers or certainly the poorer consumers?

(*Baroness Hayman*) I think that is a debate that is had equally about organic produce. At the moment there is not a big price differential. There is very little GM produce in supermarkets and it is GM ingredients of other produce rather than individual items. The supermarkets that have chosen not to stock GM produce have chosen to do so without passing on vast costs or any price differences to the consumer. I think there are issues further down the line. I think there certainly would be issues on animal feed, for example, where we are talking about much greater use of GM product at the moment, but as things stand we have very few GM foods, they are a very small proportion of food and the costs that have been, as I understand it, incurred by supermarkets in offering the range of non-GM foods have not been passed on to the consumer. So I do not think it is an issue at the moment.

510. You mentioned the role of trading standards officers and tests that would be verifiable that they could do. Is there any danger given that Richard North has written at some length about the thought(?) police that we are going to get on their part the same kind of hostility to GM foods that they have shown for instance to non-pasteurized/unpasteurized milk in cheeses and there will a witch-hunt against GM foods if that kind of panic-mongering goes on?

(*Baroness Hayman*) I do not see that myself. I think that local authority officers have shown a proportionate response on a variety of issues. Of course, there are two sides to every argument and for all the people who want stricter controls, monitoring and testing there are people who feel that this is an unwarranted intrusion into people's opportunity to buy what they want to buy and to consume things in a fairly robust nature without worrying too much. I think it will be for individual local authorities to ensure that the response is proportionate and sensible and the Food Standards Agency does have very clearly in its framework the responsibility to look at the costs and benefits of enforcement action and to strike a sensible balance between them. What that balance is can only be determined by the circumstances.

Chairman: We will be watchful. Mr Curry?

Mr Curry

511. Let's go back to the food chain, much closer to your parish. How important are the field trials?

(*Baroness Hayman*) I believe that they are extremely important in terms of an assessment of the environmental consequences of growing these crops in this country. I think that there is a widespread desire to know exactly what the effects of new crops are on bio-diversity, on the agricultural environment. As far as food safety assessment is concerned, I do not think there is a great deal of relevance because that has to be done through assessing the product that is consumed rather than issues about growing. So I can envisage a situation where it is perfectly possible to say that a food is safe to market whereas we might not wish it to be grown in this country because of our particular environmental consequences.

512. Your answer then is that they are very important in the argument about the wider ecological impact, not on the food safety impact?

(*Baroness Hayman*) Yes, although I do not think that you can totally separate the public confidence issue.

[**Mr Curry** *Cont*]

513. That is not the thrust of what I am going to be getting at. Could you come to valid conclusions without field trials?

(*Baroness Hayman*) On the environmental and agricultural?

514. Where you have defined them as important?

(*Baroness Hayman*) I believe that the field trials are essential to a proper assessment of the implications of the properties of particular GM crops.

515. So what happens if Greenpeace trash them?

(*Baroness Hayman*) These trials are being legally carried out under very carefully agreed protocols that we have agreed with SCIMAC. We firmly believe that there is an obligation on everyone who participates in this debate from whatever side to allow those trials to go ahead so that all of us can have the evidence on which to take appropriate decisions about the way forward.

516. But the leader of Greenpeace does not agree with that. He is a Member of your House.

(*Baroness Hayman*) I think he is on leave of absence.

517. I know but his people trashed the trials last summer and then he complained that he was not given bail to go to Kenya for his holidays.

(*Baroness Hayman*) I do not believe it is for me—

518. I am sorry, this is a serious point. You are sponsoring these trials, you are paying people to do these trials, you determine what happens to the product of those trials, and yet we have seen clear evidence that certain organisations appear determined to prevent their taking place. The trials are widely advertised, they are identified by very close topographical references which are available on the Internet and you have said that they are very important, but they are at risk of being trashed. Do you think you have a responsibility to stop them being trashed?

(*Baroness Hayman*) I think we have a responsibility to ensure that the appropriate level of safeguards is there. Equally, I do not believe going away from our fundamental belief in transparency over time as being the way in which to build up confidence, that we should anticipate a trashing or a destruction of those trials before it happens. I think we should see how we go.

519. But, hang on, you cannot anticipate it after it has happened, can you?

(*Baroness Hayman*) No.

520. You said there should be safeguards. What do you mean by that?

(*Baroness Hayman*) I think it is important, for example, that the local police force in an area where there is a trial are aware that that trial is going ahead and that a farmer who is participating who felt he needed support should know where he could go for that support. What I am saying when I say I do not think one should anticipate or answer hypothetical questions is that we are not in a position at the moment of knowing what will happen. I think that the agreement that Michael Meacher took forward with SCIMAC about the conduct of the trials has been extremely important. It has assuaged the concerns of many of the environmental groups and I hope that those trials will go forward successfully and I am not going to be drawn into what would happen if they did not.

521. We all hope that that is going to be the case, do we not, but the fact is that in the past there have been deliberate attempts to trash them and as a result of that some farmers have withdrawn from them. You need farmers to volunteer for this. You want them to be participants, we all want that, but if they feel when something happens the Government throws up its hands and says, "Oh dear, we cannot do anything about it", they will not want to carry on with it. Here is something you have defined as being very important that is at risk from freelance activity. The point of my question is merely to know whether you felt the precautions or safeguards as you have called them which are now in place are adequate or whether you think having sponsored them that you have some sort of duty to make sure they take place peaceably.

(*Baroness Hayman*) I think we have a responsibility to keep a very close eye and assess what is happening in terms of disruption if it does occur. Equally, the Government has not just sat back and washed its hands. It has been absolutely clear that people should obey the law and there is no justification whatever for illegal action.

522. We agree on that.

(*Baroness Hayman*) Prosecutions are a matter for the prosecutions service rather than for Government.

523. Let's look at another way round this. If a product or a crop were approved elsewhere in the European Union, and, after all, under the rules an approval in one Member State is supposed to run through the whole European Union, could it be planted in the United Kingdom without having gone through a field trial?

(*Baroness Hayman*) We have at the moment a voluntary system to which all the participants have signed up that it could not under those voluntary rules be planted here.

524. Yes, but do you think that if it went through its trials, leaving aside the voluntary rules, that you would be satisfied sufficiently about the ecological and for that matter the food safety impact that it should be capable of being planted in the United Kingdom?

(*Baroness Hayman*) I think we have made it clear that we do want to know the environmental impact and the biodiversity impact within the United Kingdom. That is why we have set up the farm scale evaluations and why we want to see crops being introduced here to go through that process.

525. So the notion of a European approval system with one Member State being nominated, as it were, to do the trials and once that trial has been completed that clearance coming via Brussels with a rather elaborate mechanism is dead?

(*Baroness Hayman*) I do not think it is dead. We are all looking at the WTO level and at the Biodiversity Protocol level at the particular ways in which individual States' environmental concerns and the scientific evidence that is necessary at WTO level, for example, on plant, animal or human health grounds for not participating in Single Market or

[**Mr Curry** *Cont*]
normal trade considerations can be properly discharged. I think here we have made it absolutely clear that we do believe we want to know the environmental impact within the United Kingdom so that we can see whether there are any scientific grounds for not participating in the Community approval process.

526. So you would say that this is a case where the normal Single Market rules are inappropriate?

(*Baroness Hayman*) I am saying that the Single Market rules always allow for individual action for the protection of human health, for example, and that we want to see the ability to look at environmental issues and biodiversity issues. I do not think that is simply a United Kingdom phenomenon. There are other countries both within Europe and internationally that are equally interested in those issues.

527. Let's say a crop has come through a field trial and that you are satisfied as a result of that that it does not have any pernicious environmental effects and, as you have said, a field trial would not be the area where you would see food safety issues, you are satisfied with food safety, are there any other tests, research, trials it would have to go through before you were ready to approve it for commercial planting having come out successfully of the field trial cycle?

(*Baroness Hayman*) I do not think so. May I double check that and let you know if that is an incorrect answer?

Chairman

528. Can we move on in the same area to the SCIMAC guidelines? The government welcome the SCIMAC initiatives. You said in your response to another select committee that you were seeking to persuade the European Commission to use these as the basis for legislative proposals on a statutory footing. Have you had a response from the European Commission to that suggestion?

(*Baroness Hayman*) That is something that I believe we are still pursuing within Europe. I think there is an interest in these issues amongst other countries as well as our own and we do believe that we are something of a pathfinder here. It may be that we can help in terms of the Commission's deliberations.

529. There must be some concern among some circles that SCIMAC is an industry initiative. It is owned by farmers; it is owned by plant breeders. It is not owned in any sense by the government at present. Do you feel that putting the SCIMAC guidelines on a statutory footing would address the concern some people have expressed that the guidelines are owned by those who benefit from the planting of the crops?

(*Baroness Hayman*) Yes. Certainly we would like to see them on a statutory footing. What I was not quite certain about was where we are within the European process of pushing that through. We have a number of initiatives in Europe at the moment.

530. We will have to settle for a later note on that. The issue really is whether the SCIMAC guidelines are the right ones. We have had evidence in the past from the Soil Association calling for six mile notification zones and that contrasts with the SCIMAC guidelines which are very modest distances. The largest is 600 metres, so they are asking for something eight or ten times the distance. Last week, we had a very interesting report prepared by the National Pollen Research Unit at University College, Worcester. I do not think I have to declare an interest but I live in Worcester. I have a full copy of the report here. It is desk research conducted by two academics into pollen dispersal in specific crops. It is a very thorough piece of work. In some areas, it makes it clear there is no cause for concern at all but I am concerned about the very sharp difference of view expressed between SCIMAC and this report about oil seed rape. I will read the summary: "Oil seed rape presents a high risk for cross-pollination between source and recipient fields. It is interfertile with a number of wild relatives found in the UK and introgression of transgenes seems likely. Pollen dispersal has been recorded at up to 4km by insects (some 20 fold higher than the recommended isolation distances), and to 3km by the air flow. Notable potential exists for cross pollination with feral populations which are common in the UK, giving rise to well distributed further sources of possible contamination." I will not go through the whole report; it is 60-something pages long. It deals with each species in turn. It says something similar about sugar beet which also expresses concerns of a similar kind but of a lower order of magnitude. It says there are particular concerns about wheat and potato and on maize one needs to look carefully at what it says but on oil seed rape there seems to be a good scientific basis for worrying whether the SCIMAC guidelines are right or not. Have you had a chance to reflect on what the Soil Association's new report, conducted by these independent academics, actually says?

(*Baroness Hayman*) Yes, we have, because I think some of the evidence from it was brought out earlier, although it was only published last week. The issues about cross-pollination are of course ones that ACRE looks at in determining releases into the environment. Within the SCIMAC agreement, there are different separation distances for different crops which reflects what you were talking about, that oil seed rape can cross-pollinate more easily and over greater distances than other crops. The SCIMAC guidelines do include separation distances that have been widely used in the past to protect crop integrity in commercial agriculture. While pollen can travel several kilometres, the issue is the likelihood of cross-pollination and that reduces very much over distance. This is an area obviously of great concern, particularly to the organic movement. They have been talking about separation distances much larger than the SCIMAC distances. We had a meeting last week when we brought together the organic sector and SCIMAC to consider how the guidelines might be developed to address the issue of detectable GM material being found in organic crops which is obviously a major issue for them. We are drawing up together a research specification which will be discussed in March so that we can look at whether there is the need for further research. MAFF does have a programme which addresses the risk assessment of GMOs in the agricultural environment which includes already studies which are intended to quantify the extent of pollen transfer. The Farmscale Evaluation Programme will allow us to have research

[**Chairman** *Cont*]
with crops grown on a field scale. I am not saying that we do not need more research on this but the Farmscale Evaluations will allow that. Equally, I think we need to look at whether we need to develop those separation distances in the light of the concerns of the organic sector and that is what we are going ahead with.

531. I want to return later to the organic sector. This report, although it is commissioned by the Soil Association, does not specifically address the organic sector. It addresses those farmers who want for whatever reason to grow non-GM crops. Oil seed rape distances under SCIMAC, which you are currently urging the European Union to put on a statutory footing, are the smallest for oil seed rape of any of the crops, 200 metres. It is 600 for sugar beet, 600 for fodder beet and 200 for forage maize. Yet here we have this new report which says that data suggests that transgene movement to non-GM fields and/or feral populations is highly likely following commercial scale release. "Transgenic individuals have been identified in feral populations." They are implicitly recommending a much higher separation distance. Are you going to put on hold your recommendations to the European Union about putting these SCIMAC presentations on a statutory basis until you have reviewed what seems from very powerful evidence here to suggest that oil seed rape in particular needs much, much higher distances than had previously been thought?

(*Baroness Hayman*) I will write to you about the European thing. The important thing is there to have a statutory basis. The content has to be the right content. One is not putting in tablets of stone what may need to be developed or changed. If I can go back to the separation distances, these are internationally recognised. There is about 50 years of experience in terms of providing seed purity across the world. Over time, they have given a seed purity in excess of 99.5 per cent. These are not figures plucked from the air or that we have no experience of in the past. Equally, we have to look at whether there is new evidence or whether there are particular issues that mean that we need to change things. I am not suggesting that we necessarily have got it 100 per cent right now.

Mr Jack

532. I would appreciate a note from MAFF to help me understand a bit more about the real risk factors which can occur when pollen drift happens. I could see that if you had crops at different stages, one where pollen was produced, one which was not at that stage, pollen drift might have some effect on the plants growing where pollen had not yet occurred, but if you have two plants at an equivalent stage in their development and pollen from one lands on another I am struggling to understand what then happens to the cross-pollination under those circumstances. In other words, where are the risks that suddenly by mutation new things happen so that a non-GM crop could be corrupted by virtue of the pollen from a GM crop landing on it? The Chairman has put forward a very interesting finding but what I would like to know is what actually happens in the real world? Is there a real risk or is this just an interesting scientific finding and we should say, "Yes, there it is but does it have any relevance?"?

(*Baroness Hayman*) I would be delighted to respond to that request in writing because it is not my area of particular expertise. I think you are right. It is the effect of this that is important, just as it is the property of a new crop, whether it is herbicide tolerance, rather than the process that is the issue that we ought to address.

Chairman: Far be it from me to put in a commercial for the National Pollen Research Unit but you will find those issues addressed in this report. It does vary from plant to plant.

Mr Jack: But it is different, with respect Chairman, to pollen drifting around and the effect it has and how it arrives.

Chairman: It is dealt with in this report.

Mr Hurst

533. To those of us without any great scientific background, some of these things are a mystery. One cannot help but go to ancient woodlands and be told by the woodman that if the wood is restored to its more natural location all sorts of plants not seen for decades will start flowering again, which suggests species lie in the ground and, if conditions change, will come back up again. It is only yesterday that all of us were being briefed, were we not, on air quality and the pureness or otherwise of air? They convinced me at least when I was so told that one of the risks of poor air quality in the past summer was the winds coming from the continent of Europe diminishing our air quality. That is quite a long distance away. What I am a little concerned at is do we have yet enough research to make judgments about distances and indeed about periods of time that the plants can reproduce themselves after they have changed from one form of production to another?

(*Baroness Hayman*) As I said earlier, I think that these are all important issues to explore. We do have a great deal of experience in conventional agriculture in terms of introductions of new crops, plant breeding for different qualities, things like separation distances that provide seed purity. That does not mean that knowledge stops there. There is a research programme that is going on, funded by MAFF, to look into some of these areas. Equally, we are talking with the organic movement in particular to see whether there are very precise questions to which they need the answer. These things are of interest generally about new crops or environmental effects—you were talking about air pollution—far more broadly than simply around the issue of a GM problem.

534. Narrowing it to GM crops, we have received evidence from the Royal Institution of Chartered Surveyors that the growth of GM crops may well affect the value of that land and the neighbouring land. Do you believe that a notification system should be instituted as to the intention to grow GM crops on particular parcels of land?

(*Baroness Hayman*) I believe it is important that we maintain the transparency of the regulatory system as it is at the moment, which means that we do have to be very clear about where crops are grown on an

[**Mr Hurst** *Cont*]
experimental basis. If a crop has gone through all its regulatory processes, I am not certain what the justification would be for singling out a GM crop rather than any other crop for compulsory notification.

535. Does it not touch upon the distances question that our Chairman was raising just now? If I am a farmer who is farming however many yards away from a GM crop on that parcel of land, is it not right that I should have a register that I could check to see if my neighbours were growing GM crops rather than not?

(*Baroness Hayman*) The SCIMAC guidelines put the onus on farmers growing GM crops to notify their neighbours of their intentions by specific dates and to reach agreement on planting strategies. There is a penalty in the case of non-compliance as part of the measures that have been drawn up by SCIMAC. That would allow the good neighbour information going across in the way that you suggest and that is in the guidelines. That would hopefully, in time, have statutory force.

536. If I am the neighbour so affected—in other words, I am not growing but my neighbour is—and I do not think it is going to be terribly good either as to the health of my own crops or indeed the value of my land, what mechanism is there for me to object?

(*Baroness Hayman*) One has to say what is the danger that is perceived. That is difficult to see if the regulatory process has gone through. If, for example, you have organic and non-organic conventional crops next to each other, exactly the same issues arise. People will want to farm in different ways. We have to have appropriate separation distances that do not allow for contamination over and above what is acceptable, but equally one cannot have huge walls between different areas. You have to have a system by which neighbours can co-exist with different forms of farming. You cannot have a 100 per cent total purity because we do not have the sorts of barriers that will do that on any issue. We have to devise what are appropriate levels of adventitious contamination to allow people to continue to safeguard the purity of what they are doing.

537. There is the economic factor. If I may use one of the most over-used words these days, transparency—which, as I understand it, means that you understand what the position is—if I am a purchaser of land, is it not right that that is one of the elements that my solicitor would look into, so that I know what is being grown on certain land around me, so that I can make a judgment about the potential value of that land?

(*Baroness Hayman*) I am not quite sure how the notification under the SCIMAC agreement would apply to disclosure of information from the person currently farming to someone they were selling onto. Perhaps I could find that out for you and let you know.

538. I am thinking of an updated version, I suppose, of the Domesday Book. That is not meant in any sense other than a book which is a book of record. It would be relatively easy to see which parcels of land were growing what kind of crops if a central register was kept because there may well be a perception, rightly or wrongly, that land values will rise or fall depending on, firstly, whether that land is growing GM crops and, secondly, whether it is adjacent to land that does.

(*Baroness Hayman*) I am just asking myself, in having the dialogue, what is the justification for making GM crops special in that area, rather than crops that have had heavy pesticide use. There may be a range of other issues that equally could affect the value of land or neighbours. I am asking myself why one takes GM out particularly in that area. Obviously, in terms of the trials of the SCIMAC agreement, we are looking at ways to make sure that this is transparent. I think we have to be careful about assuming that GM crops are completely qualitatively different from anything else and that different rules have to apply in all aspects of the way in which they are handled post introduction, after very careful scrutiny and regulation.

539. I accept that. It may be premature until we see the effect it will have on land values but if there is clear evidence subsequently in time that there is an effect on land value then I would submit there is a case for having a register to show particular parcels of land and their agricultural history in that regard.

(*Baroness Hayman*) I think it is an interesting issue. Certainly the issue about information for vendors I will chase up and let you have, if I may.

Chairman

540. Let me return now to the question of GMs. You said that a meeting Joyce Quin hinted was going to happen has now happened between organic farmers and SCIMAC.

(*Baroness Hayman*) Yes.

541. Were they able to find any areas of agreement?

(*Baroness Hayman*) I was not at the meeting myself. I understand it was a constructive meeting. There was a conversation about how we can bridge the gap because, as you said earlier, the organic movement has talked about very long separation distances, has been very concerned about every organic farmer within a wide range being notified about what was going on, rather than simply neighbours. I think it was a constructive meeting that started talking about the things that Mr Jack was talking about: what the results would be, why this information is important. Therefore, what is the relevance and what should be the appropriate distances. They did not reach a conclusion about that but they are going to meet again to talk about it. Equally, the research issues that people wanted to focus on.

542. Are they meeting again under the auspices of MAFF, the government or independently?

(*Baroness Hayman*) Under the auspices of MAFF, yes.

543. Clearly, these talks have important implications for putting separation distances on a statutory footing.

(*Baroness Hayman*) They do and they have important implications for the organic sector which is one that MAFF has supported.

[Chairman *Cont*]

544. All the evidence is really that the organic sector regards GMs as the work of the devil and they cannot be tolerated at all. There is an absolutism here, rightly or wrongly—I do not pass judgment on that—and they feel that GM contamination, even at very low levels, renders their organic produce non-organic. Can the government credibly encourage both GM and organic sectors? Is it possible to have a policy which actually meets the concerns of both sides?

(*Baroness Hayman*) I was heartened by the report of that meeting in that there was a willingness to try and recognise the need for co-existence. There are very strong feelings within the organic movement but equally a recognition I think that it is not appropriate for government to outlaw the technology simply because someone else does not believe in it and without a proper basis for so doing in terms of protection of public health or the environment. I hope that over time a *modus vivendi* will be possible to work out.

545. If I am right, the European Union rules, we are told by the Soil Association, for organic production were revised last year to prohibit GMOs in organic production. I do not quite know what that means in terms of thresholds or what the definition of prohibition is but is there not a question here ultimately—maybe your last answer suggests there is not—that there are two incompatible crops here. Whose right should take precedence?

(*Baroness Hayman*) I think we have to find a way of a proper recognition of the interests of both sectors. There is an issue of whether GM is different from other non-organic production. The organic movement has to recognise and find a way of living with adventitious contamination from conventional crops. It has to find a way of dealing with spray drift; it has to find a way of dealing with non-organic material in animal feed, of laying down tolerances and working out what the criterion for calling something organic is. They have taken a very clear view about GM technology as being a very particular and more worrying form of conventional agriculture than the norm, but we have to find, as a society, a way of marrying up and determining what are the legitimate aspirations of the different areas. I do not think it is legitimate for government—whether that is because of international obligations on trade; whether it is in terms of simply dealing fairly with British agriculture or British industry—to take action against a sector which is not based on scientific evidence. We have to get that evidence and that is what the government is trying to do, but you cannot simply ban something, to put it crudely, because some people are very ideologically opposed to it.

546. That is a very clear message to the organic sector that they will have to be like Dr Strangelove and learn to stop worrying and love GM.

(*Baroness Hayman*) Those are your words, not mine.

547. That is what you just said. The organic sector must stop worrying. You will find a way of containing GM and they can carry on and co-exist. That is not how most of my organic friends see it.

(*Baroness Hayman*) I do not think I said that they must learn to stop worrying. They want their concerns recognised and I think government has to provide a forum in which this technology, if it is developed, recognises and meets legitimate concerns. Equally, they recognise that they do not have a veto over other agricultural methods, whether GM or non-GM, just because they are not the methods that they choose to adopt.

548. For whatever reason, the presence of a GM crop or a GM foodstuff could have an impact on values; it could lead to civil actions; there could be a question of liability for financial loss. That question does exist. This question was raised during the debate in Westminster Hall last week which your colleague, Mr Meacher, answered, by Brian Iddon. He asked, "Will liability lie with the companies that sell the products, the farmers who grow the crops or with government who license the crops to be grown?" Do you have an answer to that question? It may even require legislation. Do you intend legislation to carry forward liability lines?

(*Baroness Hayman*) It may involve legislation and it may involve legislation at an EU level rather than a United Kingdom level. It is one of the areas where we would want the Commission to bring forward proposals so that that can be determined on an EU basis, because we might have a situation where the approval, for example, or the regulatory body was in another country. It is not something that you can simply do on a United Kingdom basis. It is one of the areas where we are pressing the Commission to take action.

Mr Jack

549. In your evidence in paragraph 12, you talk about, "With the cooperation of the Canadian and US authorities, a list of suppliers and distributors of non-GM soya was therefore published and placed on the Internet by MAFF in 1998", and you then go on to comment about what US grain handlers have offered. Has anybody from MAFF or another government department been through the chain of supply which is reported by this Internet site to examine its methodology for achieving separation and the integrity of its results?

(*Baroness Hayman*) I know that there have been visits to, for example, South America, looking at sources of supply of non-GM material. The precise nature of the evaluation of the supplies that were put on that website—I think it is clear on the website that there is a need to check the integrity and for individual suppliers, people who are using the supplies, to assure themselves. I think it is an information base, rather than a verified source of supply.

550. The reason I ask that question is that we have had evidence from the Royal Institution of Chartered Surveyors, who consider that the whole matter of segregation should be a seamless protocol, as they describe it, from plough to plate. On the other hand, SCIMAC have a different view. They have a baton approach where one person in the chain passes the responsibility to another. I wondered whether MAFF, in looking at perhaps two different

[**Mr Jack** *Cont*]
approaches, had from an objective and scientific point of view evaluated whether they both worked. Could one say with confidence that if you follow that route A or B it would maintain the integrity of segregation whatever the methodology or were there any watch points, because people will often turn to government as an independent source and say, "If we are going to have systems of segregation, have you studied them? Are there potential breaches or are you happy that if you follow methodological approach A"—either the chartered surveyors' or the SCIMAC approach—"you have an evens chance of getting a segregated crop from the beginning of the process to the end".

(*Baroness Hayman*) I think this is part of the work that needs to be done in the definition of "GM free" because obviously it is at points throughout the supply chain where there is risk of contamination and there are a large number of points between farm and fork, where you need to look at the hazards of identity preservation. I do not think we have come down on one method or another but within the European context of defining "GM free" that is where the debate about the appropriate methods of identity preservation has to be. In terms of what has to be labelled as containing GM and the one per cent threshold, that applies only to things that have been sourced as representing themselves as non-GM. It is not something where there has not been any attempt to verify whether this is GM or non-GM.

551. The reason I am probing this is that there was a hint in some of the oral evidence we had that people may not always stick to the rules. There may be people who would cheat and say, "This is a segregated, GM free crop" within the terminology you have just described, but it turns out that it is not. I can imagine that if that occurs one of the partners who will be brought in to help adjudicate and deal with such matters is the government. You talked about SCIMAC's approach as one—and there are others—almost saying, "It is up to the commercial market place to sort out a system that will work and the customer should have confidence in what the supplier is sending; it is not a role for us." Do you have a view as to who should determine what these protocols should be, the baton approach or the all-encompassing? Do you think that MAFF has a role in putting some basic ground rules in that people should observe, good practice, or are you strictly in the stands, watching the game on the pitch?

(*Baroness Hayman*) I think there is an issue and it is the issue between what it is essential and statutory for people to label which is containing GM. Government has a responsibility for a definition of that—that has been done now at the EU level—so that that can be verified; so that it can be tested by a Trading Standards Officer. Equally, I drew a distinction about the claims that may be made. The claims for GM free will take you through the supply chain and identity preservation issues. No one has to claim something is GM free or label it as GM free. If they do, it will be covered by the general rules of not being misleading and then it will be again for Trading Standards Officers to look at whether the particular product fulfils the definition of GM free. That is why I come back to the importance of the EU having a level playing field here so we all know what we are testing against if someone makes that claim.

552. You are quite content that the various points at which you objectively establish something that can be measured and defined are sufficient checks for you to be happy that there will be a diversity of approaches employed by commercial suppliers and buyers when it comes to them getting their GM free crops from wheresoever they get them?

(*Baroness Hayman*) My responsibility and in future the Food Standards Agency responsibility will be to ensure that there is a definition that is verifiable and that consumers are not misled. I am not sure whether it would be our responsibility to say the actual process in which someone who makes a claim ensures that it is appropriate. We have to make sure that it is testable.

Mr Todd

553. Could I refer you to paragraph five of your Department's submission on the issue of the Novel Foods Regulation, particularly the reference to the requirement for specific labelling where a food may give rise to ethical concerns? What do you think that means?

(*Baroness Hayman*) This comes from the Novel Food Regulation.

Chairman

554. I am giving a lecture in Evesham in April on the ethics of genetic modification so I am very anxious to have a good response to this, Minister.

(*Baroness Hayman*) It is based largely on the Polkinghorne Report of 1993, which refers to genes from animals of religious significance, animal genes in plants or human genes in food. I think it is dealing with potential for the future, not with what is happening at the moment, that is the possibility suggested to transfer such genes between species by genetic modification.

Mr Todd

555. That was the origin of it. What do you think it means? In other words, that is where that particular item stemmed from but when one introduces the concept of an ethical concern about food obviously that opens up far more than just the narrow report as being the origin of it.

(*Baroness Hayman*) This is about an ethical concern in a GM food, so that is very specific. It is not, for example, about animal welfare, issues that might be characterised as ethical.

556. I was not seeking to spread it from that. What I was suggesting was that the use of GM technology to produce a food in which GM components are absent but the process involved the use of GM might be seen as an ethical matter to many consumers. Would you agree with that?

(*Baroness Hayman*) I think that is stretching what this is about. I recognise that some people are interested in the use of a GM process as well as whether there is GM material in the finished food.

[**Mr Todd** *Cont*]
That comes into how we define whether something uses the phrase "GM free" rather than how we demand that something is labelled as containing GM material. This was very specific around concerns that were expressed that, for example, some people might have no worries at all about a form of maize that was herbicide resistant. They would see that as an advance on conventional plant breeding and not of concern. If at some point in the future—and this is not happening now—someone wanted to take a gene from one species, an animal species, and put it into a plant, there were people who would have ethical concerns about that and who would want to know. That should be appropriately labelled.

557. As is my wont, I look at this in a slightly different way. A lot of this debate is about science, but when you introduce the issue of ethics into it that becomes a matter of individual judgment and morality, does it not? If the EC and this government wishes to recognise the right of an individual to have their own moral choice over both the process of the food production and the food that they eat, is that the intent of the government, to provide that choice within a labelling regime? At the moment, as I think we have conceded, you are saying that takes it a bit too far. It does not do that. Someone who has an ethical concern about the GM process *per se* would not be satisfied with the current labelling regime because it would not indicate that that process was used.

(*Baroness Hayman*) There are two levels of decision making that have to be taken. We cannot cover on labelling physically all the concerns that a wide variety of consumers might have about a food because those are many and various. The whole of the packet would be taken up with them. There has to be a decision statutorily about what does have to be included and what there is no choice about. Equally, because there is a range of things people are interested in, there are lots of possibilities opened up by technology, for example, of finding out a great deal more about what a food contains, what processes have been used, so that the enquiring consumer with a particular interest can find out more about a particular product. One of the things I think is interesting in food labelling for the future is the possibility that you will be able to take something, take its bar code, take it to a scanner in a supermarket and find out a lot more about it, which is much more tailor made to your particular concerns.

558. It will show you the beast that it came from.

(*Baroness Hayman*) Realistically, because we are all individuals and have different concerns, you cannot provide that for everybody on everything.

559. I understand that but the point I am trying to draw out is perhaps it was rather incautious to introduce this concept of ethical concerns into what has otherwise been a debate about the scientific safety and environmental impact of the product, because it does introduce a wider potential agenda of concerns on the labelling front. You are conceding that the government at the moment sees no reason to respond to one particular ethical concern about the process of GM technology.

(*Baroness Hayman*) This was obviously in the minds of European legislators at the time, probably sparked off by the Polkinghorne Report, and by particular concerns on the potential of transgenic. A hazard of legislators the world over is that they will take an issue of particular concern and we all know that that can happen and it may not be comprehensive. I have not looked at the debates on why it was included, I am afraid.

560. Returning to the issue of numerical counts and science, how far has the issue of adventitious contamination or addition to a food at European level now got in defining that matter?

(*Baroness Hayman*) It has got to the point where it has been agreed, the acceptance, with a product that has been sourced as GM and non-GM and can have one per cent of an ingredient with adventitious contamination and still not need to be labelled as GM. It is one per cent of an ingredient, not necessarily one per cent of a finished product. Because the processed soya or maize is in most foods a very small component, you are actually talking about a lot less in terms of the finished product that is bought off the supermarket shelf. That one per cent was taken as what was testable and reasonable in current circumstances and looking at the issues of sourcing. Of course, that takes us back into the issues of potential contamination throughout the sourcing process. That comes in in April. There will have to be a surveillance programme around that and that will be something the Food Standards Agency takes responsibility for through local authorities. What we did press for within Europe was a review of that level, whether one per cent was the right level, because there was a debate about that, whether it should have been lower or higher. We think it is quite possible if identity preservation sources are developed over time and if across Europe we have assessment methods that are sufficiently sensitive to bring that level down.

561. How is the use of GM ingredients by caterers being approached?

(*Baroness Hayman*) That was the other area on which progress has been made within Europe because we did extend the GM labelling requirements to catering establishments. There was some concern because, although that responsibility was put on the eventual supplier to the consumer, there was an exception for catering suppliers from the GM labelling regime. Also, agreement was reached within Europe equally so that catering supplies have to be labelled so that restaurateurs can know what they are doing. That has equally been adopted and will come in in April.

562. Have any checks been made?

(*Baroness Hayman*) I think local authorities have the responsibility for enforcement.

563. Do you have any knowledge of whether any checks have been made?

(*Baroness Hayman*) Not at the moment. I believe that there are annual returns that will be able to monitor. Some of it is sparked off by consumer complaint or asking people to investigate.

Mr Borrow

564. In your responses to Mr Jack a few minutes ago, you touched on the issue of testing in general. This Committee has heard from a number of witnesses concerns about the accuracy of testing and the extent to which testing is to a common level within the United Kingdom and across the EU. What moves are there towards development of common testing standards across the EU?

(*Baroness Hayman*) There are quite a lot of moves. We have an evaluation programme in this country, a proficiency scheme to determine the availability of labs to offer a reliable detection service and to ensure that the required standard is achieved. The EC Joint Research Centre in Italy has organised a series of trials with labs across Europe to ensure that methods currently available are sufficient to detect GMOs at that one per cent threshold level in line with the current legislation. We are fairly confident that across Europe there are those detection facilities available that can be quality assured. Obviously, it may be that different techniques become available to allow better sensitivity and different product may need different testing techniques.

565. We are moving to a situation where the testing techniques for each particular product will be common across the EU and we will not have different testing techniques operating in different EU Member States?

(*Baroness Hayman*) What is important is that we have equal quality and reliability in all European states. I am not sure that we have to be didactic about there only being one mechanism. We have to look at the output here and if the output is the same quality assurance of the testing, but that is really what the trials that are going on at the Research Centre are about.

566. The aim is that whatever the actual technique of testing that is used, whether in Frankfurt or in Edinburgh, the consumer can be assured that the standards of each of those tests are identical?

(*Baroness Hayman*) Yes.

567. Even if the techniques are slightly different?

(*Baroness Hayman*) I think that has to be the important issue, rather than the process issue.

568. Again touching on something you mentioned in your replies to Mr Jack, the issue of labelling, I got the impression from your reply that you saw that the question of whether labelling was accurate was a matter for the consumer to make a complaint on, rather than for the government to monitor the accuracy of. Could you clarify that?

(*Baroness Hayman*) No. I was talking very much in the context of restaurants and the work that was going on with Trading Standards Officers for seeing whether labelling was being correctly carried out there. Obviously, some of that work may be sparked off by complaints by individuals that a restaurant is not complying with the regulation of showing on its menu whether it has GM materials. That was one possible way. The government obviously has a regulatory role to ensure that legal requirements are carried out so that things that should be labelled "GM" are labelled "GM". That is an ongoing responsibility. Equally, there is a general responsibility about misleading advertising and misleading claims that have to be carried out. One of the difficulties at the moment for a local authority Trading Standards Officer, if something claims to be GM free, is assessing whether that claim is true or not, because we do not have an agreed definition against which you can test the product. We need to do some work there to allow the surveillance to be carried out effectively.

569. It links back into the question of testing. If we have common standards of testing, we need to make sure that we have common standards on labelling and that both the testing and monitoring are two sides of the same coin.

(*Baroness Hayman*) That was why it was important to get a level agreed so that wherever you were it was the same regime as to whether something needed to be labelled "GM" or not.

570. Related to testing, one of the issues that has been raised with the Committee is the extent to which testing is appropriate simply for the final product or whether there should be a common approach throughout the EU to testing of ingredients and of the process itself and of the final product. What is your thinking on that?

(*Baroness Hayman*) I very much agree with the EU and international view which I think has been that testing has to be meaningful. Therefore, there has to be some GM material that can be tested for that makes the final product different from a non-GM final product for there to be a realistic regime of labelling and supervision and monitoring of that labelling. Equally, I do think it is important that, when we get on to voluntary claims that are made, there should again be an understanding of what a claim implies so that that claim can be tested to protect the consumer from being misled. That is level playing field stuff again and the same quality again.

571. Is it your view that the area where voluntary claims are being made about products and verification of testing standards is the area where more progress needs to be made?

(*Baroness Hayman*) That is the area that we hope the European Commission will move on to next and make progress with quickly, because I think that is the next important area—that and animal feed labelling.

Mr Jack

572. Mr Borrow raised the principal issue which I wanted to know about. As I understand it, in some manufactured items, it is impossible to identify GM material because the manufacturing process homogenises everything to a point where you cannot test for it. If I have followed your logic carefully, what you are saying is that within the realms of our consumer law, if you are going to say that something is GM free under those circumstances where testing the final product cannot give you a test, you have to be able to say that all the ingredients in it are at least GM free. Otherwise, the claim is invalid. Is the European law in this area going to go into the detail of the various permutations that could come together? It is easy with raw material to test it because you have it in front of you. It is easy if you are the manufacturer to test it because you have the

[**Mr Jack** *Cont*]
ingredients, but if you buy something from a third party and they say "GM free" you have to take it at face value because the thing you buy cannot be tested for GM. There are a lot of possible permutations and loopholes. Is the European law going to approach each one with a protocol? Is it going to be very specific or is it going to rely on surrounding legislation to ensure that there is an inner discipline in the chain of production so that when claims are made they are true claims?

(*Baroness Hayman*) You have perhaps put your finger on why it has taken some time to produce a definition of "GM free" that is testable and usable and why I think it is important that we keep that area in the voluntary labelling regime because no one is obliged to put a label saying "GM free" on something. If they choose to do that, there is going to be rigour at certain places within the process. What exactly those places should be is something that we need the Commission to bring some proposals for and then individual countries to look at and consult with their own manufacturers and retailers about deliverability and testability of, because I am very anxious that we should not have meaningless standards, or standards that cannot be tested. Whether an enzyme that has been produced by GM technology should be allowed into a definition of "GM free" or not is one individual bit of debate that I am sure will take place, just as something so highly processed that it has no DNA material at the end of it. I think there has to be a debate about each of those issues, so we do have a comprehensive definition and one that is testable and assurable.

573. As the United Kingdom government will make a contribution to that debate, at what stage is our own thinking on addressing some of the very pertinent questions that you have just enunciated?

(*Baroness Hayman*) We need to see some proposals from the Commission as to what they would want to see. I have a personal view that you start with some basics and you may add sophistication to them, but it is important to get a regime that is comprehensible and verifiable. Then you build on that as necessary, rather than producing something that is so difficult to fulfil and so complex that you throw the baby out with the bath water and no one uses the nomenclature from the start. That is very much a personal view.

Mr Todd

574. When someone uses the term "GM free", what do you think it means?

(*Baroness Hayman*) That is what Mr Jack and I were just discussing. I think it means different things to different people at the moment. Some people use it interchangeably as something that does not have to be labelled as "GM". Some people and some retailers are using it to suggest that there has been no "contamination" with any form of genetic modification, whether by process or animal feed—

575. It is not a very helpful phrase to use?

(*Baroness Hayman*) At the moment, because it does not have a definition, it can mean a variety of things to a variety of people.

576. What do you think the definition should be?

(*Baroness Hayman*) It needs debate amongst consumers, however we represent them, manufacturers and retailers so that we isolate the important elements that matter to the people who are going to rely on these claims and the elements that can be readily tested and verified, so that we get a definition without being didactic about what the definition should be. It should be something that is broader and more comprehensive than just something that does not need to be labelled as "GM" because it is a marketing claim in a sense.

577. Indeed. Would you accept the view of an organic specialist that currently they seek a definition of zero threshold essentially on their product and that it would be confusing in the market place to have a definition agreed by this wide community of interested parties that you talked of which indicated that GM free might involve some degree of tolerance of certain aspects of GM technology in the process?

(*Baroness Hayman*) I think that is a very debatable issue because the organic sector is a small proportion of the market and they may choose to have very specific requirements, including in the area of GM as they might have in pesticides or anything else, which are different from and more stringent from the definition that could apply to conventional food. It may well be that some people who are not interested in organic food are interested in "GM free food" but are willing to have a different definition.

578. As you rightly said, this is all about marketing and presentation of goods to a customer. A unique selling point for an organic specialist might be that their product was genuinely, 100 per cent GM free. They would be disappointed to find that one of their customers could go to a local supermarket and find a product marketed as GM free under a future threshold agreement put together by this community of interests, which would destroy their unique selling point, because the customer would presumably say, "I can go and buy that in Tesco or in Sainsbury's", or wherever.

(*Baroness Hayman*) That is one element that would go into the discussion about what the definition should be. I do not think it should be the only defining element. If you look at fat content, for example, there are different claims about fat content: low fat, reduced fat, fat free. There are different levels at which different consumers may pitch where they want to do their buying. It is possible that exactly the same will pertain in terms of GM content.

579. We have had a variety of views about where the threshold should operate. We have had one view which is that it should be based on due diligence which is that the suppliers should seek to find sources they can rely on and use their best endeavours if they fail in some way and be subject to a claim; that there should be no thresholds in this because they do not have particular faith in how the threshold will be measured. How would you perceive that?

(*Baroness Hayman*) That was not the view we took in terms of the definition of GM and what needed to be put in there. I tend to be of the view that if you cannot measure it you cannot change it. Measurement is important. In a sense, the labelling requirement for GM is a combination of the two because there has to be due diligence to get a product

[**Mr Todd** *Cont*]
that is not GM and then there has to be a test of a one per cent threshold, but one per cent is not so that people can mix GM and non-GM in a proportion that only gives you one per cent of an ingredient.

580. That is one per cent of any ingredient?
(*Baroness Hayman*) Yes. I think it is important for testing and measuring that you do have some objective standards, not simply qualitative tests.

581. Novartis have told us—and indeed others have said it—that it is difficult to obtain seed where a tolerance level of one per cent is possible in all crops. It is in some crops but not in others. Does that present a difficulty?
(*Baroness Hayman*) I do not think it does because we are talking about several stages down from the seed in terms of the ingredient in the food. Generally, seed purities are around 99 to 99.5 per cent. Perhaps I could look particularly at that bit of evidence.

582. We have heard evidence that it varies and can go below 99 per cent in some instances. I am intrigued by that because you said seed is some way back in the process. If you were able to obtain seed with a purity level of only 98 or 97.5 per cent, would the crop outcome be acceptable as being GM free under the one per cent definition?
(*Baroness Hayman*) No. The one per cent definition is not GM free.

583. It appears to be moving a little that way.
(*Baroness Hayman*) That is quite important because you might want seed purity to be one of the tests in your definition of GM free, or one of the barriers or one of the tests, before you could claim something was GM free. You might want to set a level for seed purity and you might want to set a level for whether enzymes produced by GM technology are appropriate. That is different from the obligation to label as containing GM material which has to be related to the end product and measurement within the end product. That is where the one per cent threshold comes in.

584. Corresponding with your one per cent threshold, how would you perceive a crop with a seed purity below 99 per cent?
(*Baroness Hayman*) That is where the parallel breaks down because seed purity levels are not relevant to the labelling of a finished food as having GM content or not, although they may be in future relevant to the claim that something is GM free.

585. The crop from that seed will be an ingredient of a food. The one per cent tolerance level and the fact that the seed purity may be below 99 per cent is not relevant to whether that ingredient which comes from that crop—
(*Baroness Hayman*) What is relevant is what is in the ingredient and that may be determined by all sorts of issues. The seed purity may start it off but it may be processing and all sorts of things.

Mr Jack

586. Some people are exercised that giving GM foods to animals may have some problems but in your evidence, paragraph eight, you make a bold claim that there is no suggestion that the use of GM animal feed gives rise to any safety concerns. Upon what do you base that statement?
(*Baroness Hayman*) The approval processes and the scrutiny of the GM ingredients that were carried out by the Advisory Committee on Novel Foods and Processes before they would be permitted into animal feed and the research that suggests that the product from animals fed on that feed does not have any difference from the product of animals that have been fed on non-GM food.

587. The second half of that sentence talks about the fact that there is not a problem in terms of the composition of the meat or other animal products. So that I am entirely clear on that, what you are saying is that if, for example, you fed a beef animal on soya which was of a GM type, when it came to serving the beef that came from that animal, you would not be able to detect any geo-DNA which indicated that that animal had been fed on a GM substance.
(*Baroness Hayman*) That is my understanding of the scientific position, yes.

588. I presume that that general statement applies to all the normal species which are consumed by human beings, whether it be land based or, for example, farmed salmon or anything like that. There is not a cross-contamination problem in that context.
(*Baroness Hayman*) No.

589. I gather that your government is pressing the Commission to develop detailed labelling requirements at Community level to address this particular issue. Are you doing that because it is the right thing to let people know? If there are not any problems as your two definitive statements have said, one may say it is not an issue. Is it purely for information that you are pressing for progress in this area?
(*Baroness Hayman*) The issue about the content and labelling of animal feed goes wider than GM material. It is an issue of EU competence and there has been some concern in some far more fundamental and less scientifically abstruse areas, so I think we need to make progress at the European level about labelling of animal feed in general. It is not a safety issue as far as we are concerned. We believe there would have to be the proper regulatory processes there. We have set up the Advisory Committee on Animal Foods precisely to specialise in this area, rather than being a sub-group of the Advisory Committee on Novel Foods and Processes. I think it is an issue of consumer information. There are farmers who want to know more about the content of their animal feed including whether it is GM or not. We should meet that request for information. People should be able to know what they are using and what its content is. That may be important to them in a commercial environment if we do get into situations where people are trying to source because they want to make a claim, for

[**Mr Jack** *Cont*]
example, about GM food and they want to know about traceability throughout the food chain. It is part of a wider movement to greater traceability.

590. Do you think we are going to get into the theatre of the absurd? We were talking in our earlier discussions about the distances between GM and non-GM crops. Let me put a hypothetical situation to you. Beef animals are being grazed on grass very close to a field where there is an oil seed rape crop of a GM type being grown. The pollen which may contain DNA material from these GM crops blows over the hedge on to the grass. The cattle eat the grass. The farmer might say, "My grass is GM free", but it is not. How do you deal with that kind of issue because there are some people who may take such a view for purity and say, "I cannot guarantee" and then there will be a fear generated that somehow there is a problem; whereas your very clear definition here says there are not any problems. How are we going to deal with that in the real world?

(*Baroness Hayman*) We are going to need some common sense because we could get into the ultimate chicken and egg argument here. In terms of feed is it enough to know what an animal has been fed on for a year before it came into the food chain or ever? Do you need to know what its mother was fed on? We need some common sense.

591. What about these rules that are going to try to deal with some of these difficult issues that ought to be covered? Is it purely information or should it go beyond that? I am talking about EU rules for animal feeds?

(*Baroness Hayman*) I think there are two issues. One is to tighten up on some of the definitions of what is allowed into animal feed, and that is not a GM issue. That is an issue about animal feed overall because there is concern about what goes into animal feed. We know that can have major public health repercussions. That is not an information issue; that is an issue about safety and content, but that is not particularly a GM issue because there is no reason for us to believe there is any concern about the GM content of animal feed. I think it is basically an information issue and we have to have some common sense about how far back you go, what you label and in what detail you label. Otherwise, you can get into the land of trying to be so precise and give so much information that you give nothing of any use to the end user.

592. What is the general level of enthusiasm from our EU partners to all of this? Is everybody very gung ho, saying, "Yes, this is an issue we have to tackle" or are some of them sitting about saying, "It is all too difficult. Let's play it into the long grass"? Where are we in terms of progress on this?

(*Baroness Hayman*) The discussion today has illustrated that there are lots of areas where more work is needed to be done and it is quite detailed, difficult, technical work that then requires quite an input of policy, judgment and proportionality. Working your way through it takes some time. We are tackling this *seriatim*. We have done the labelling of foods for restaurants and additives in flavourings. We have done the issue of the one per cent. I hope we will move on to the definition of "GM free" next. Equally, animal feed has been around for quite a long time and it has not made the progress I would like to have seen.

593. Our EU partners perhaps do not share the same enthusiasm as we do for sorting these problems out.

(*Baroness Hayman*) We have a very well developed sensitivity to some of these issues in this country and in some countries there is not the same level of anxiety or putting it up as a priority. A lot of it is simply workload with the Commission. I do not think it is particularly a reflection of a lack of enthusiasm or people trying to block things. It is a matter of there being a very big workload.

594. Is the proposal to have a European Food Standards Agency going to help or hinder this process?

(*Baroness Hayman*) I think it will help it.

Chairman: I think probably we will not get drawn into that, much as I would like to. We ought to let you go, Minister. We are very grateful. We expect to be able to get the transcript of today's proceedings onto the Internet tomorrow in uncorrected form. This means there is sometimes an incentive for your officials to check what you said rather quicker than normally is the case, but, secondly, you have promised us a number of detailed responses on issues which you did not have the information at your fingertips on. It would be very helpful to have all of them by the end of next week, please. Some Members of the Committee thought I was a little unfair when I used my parallel about Dr Strangelove. I apologise for that. Perhaps A Clockwork Orange would have been better but, like Peter Sellers in almost my favourite film, you have worn a number of hats with great skill and we are very grateful to you. Thank you very much.

Supplementary Memorandum from the Ministry of Agriculture, Fisheries and Food (R 44)

AGRICULTURE COMMITTEE: INQUIRY INTO THE SEGREGATION OF GM FOODS

I refer to your letter of 19 January following Baroness Hayman's appearance before the Committee, in which you asked me to provide further information on the five topics raised by members, and to which Baroness Hayman agreed to reply in writing. I will go through these in the order in which they were raised.

1. *Mr Michael Jack asked whether MAFF attempted to evaluate why the GM tomato paste was suddenly rejected by consumers (Questions 505–508)*

It is not a matter for the Government to monitor sales of individual foods and seek explanations when sales fall away. Such matters are, as Baroness Hayman made clear, for the market place.

At the beginning of 1999, with several national newspapers running a sustained campaign opposing GM foods, it is little surprise that consumers were less inclined to buy GM foods than they had previously been. As you will be aware, in the first half of last year all the major supermarkets decided to avoid the use of GM ingredients or foods in all their own brand products; in the case of Sainsbury's and Safeway this policy included the removal of GM tomato paste from sale. In such a climate it is doubtful that any meaningful information on purchasing decisions would have been forthcoming.

2. *Mr David Curry asked whether there were other stages to be completed following the farm scale evaluations before commercial planting could begin (Question 527)*

The steps required before general cultivation of GM crops can begin, consist of:

— approval for marketing of the GMO under Directive 90/220/EEC;

— the seed legislation requirements, for National Listing or inclusion in the European Common Catalogue;

and, in the case of herbicide tolerant (HT) crops,

— the necessary pesticide approval.

There are in addition legislative requirements for approval of products as food- and feedingstuffs.

No GM crops have as yet completed all the regulatory requirements for general use in the UK. Directive 90/220 is currently under revision, and in future all applications for marketing consent will be required to consider the likely impact on wildlife brought about by any changes in management practice when GMHT crops are grown on the farm.

3. *The Chairman asked for a note on progress towards putting the SCIMAC Guidelines on a European Union statutory basis (Question 529)*

In its welcome for the SCIMAC measures in May last year, the Government stated its view that the Guidelines could, in the longer term, form the basis of legislation. UK legislation would not be an option since the territory is at least partly occupied by EU law. However EU action is not straightforward, because the measures do not fit precisely with existing EU provisions.

The Government has pursued the issue during discussions between officials in MAFF and the European Commission. We are satisfied that the voluntary guidelines are the best way forward during the farm-scale evaluations. We do not believe there is a need for precipitate action, as there will be no general cultivation of the new crops in the UK before 2003 at the earliest. Our next step is to explore further the possible legal basis for alternative statutory controls with the European Commission.

4. *Mr Michael Jack asked for an assessment of risk factors when pollen drift occurs (Question 532)*

There is no single answer regarding the likelihood and potential impact of pollen drift. Different types of pollen travel different distances, and the likelihood of cross-pollination would depend on the availability of a compatible species within the travelling distance. Cross-pollination between GM and non-GM varieties can be minimised by using established separation distances and other safeguards. Cross-pollination with weeds is much less likely to occur, and research shows that it is a rare event and that almost all offspring are infertile. This aspect is also thoroughly examined during review of each application, and GM crops likely to cross-pollinate readily with weeds are unlikely to be approved.

5. *Mr Alan Hurst asked what provision there was under the SCIMAC Guidelines for information to be available on whether land had been used in the past for growing genetically modified crops (Questions 537–539)*

The SCIMAC Guidelines require that farmers keep formal records of crops and cropping for at least seven years and stress that particular attention should be paid to identification of fields in which herbicide tolerant crops are sown, operations on the crops from sowing to harvest and post-harvest volunteer monitoring and control action on volunteers. The records must be kept easily accessible for independent inspection by the auditing body. The period of seven years is based on the requirement of the post-monitoring provisions in proposed revisions to Directive (EEC) 90/220. The availability of such records to prospective purchasers would be a matter of negotiation.

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APPENDICES TO THE MINUTES OF EVIDENCE

TAKEN BEFORE THE AGRICULTURE COMMITTEE

APPENDIX 1

Memorandum submitted by Northern Foods plc (R 1)

Like most UK food companies, Northern Foods has never specified the use of GM ingredients in its foods. Inclusion of GM ingredients in our products arose from the use of American soya and maize by our suppliers of various food ingredients such as soya protein, soya lecithin, maize starches and maize (corn) oil.

Soya and maize are commodities. The supply chain is set up to handle huge quantities of materials. The USA soya crop in 1997 was 70 million tons. For economy of scale, the transport and storage systems are on a vast scale with storage silos being operated on an area basis not a farm basis. The silos range from 5,000 tonne to over 100,000 tonne capacity. Twenty thousand tonnes of soya will be carried in a single boat from area storage silos to the crushing mills or for onward transportation.

Commodity markets accept there will be cross contamination in the supply chain. Seed is normally guaranteed only 99 per cent. pure. When buying a commodity, 98 per cent. purity is normally accepted. So a consignment of wheat could contain 2 per cent. barley or maize, a non-GM maize could be mixed with 2 per cent. GM maize.

American farmers saw no reason to segregate GM and non-GM varieties which may be grown on the same farm and on adjacent fields. They are currently harvested without any attempt to segregate GM and non-GM varieties. However, even if the GM and non-GM varieties were to be segregated at harvest, the transport and storage systems do not exist for dedication of equipment to either GM or non-GM varieties. This would require duplication of assets which is currently not economically viable.

All the major soya processors have established non-GM soya protein products in small quantities for niche markets. However, this is possible only when the end product has a high value which can carry the additional costs of the segregation and auditing schemes.

The edible oils and animal feed markets cannot bear these costs and so no attempt is made to manufacture these from a non-GM feedstock.

About 55 per cent of the USA soya crop is GM. To ensure a high purity non-GM bean, the best choice is DuPont's Synergy soyabean. This has been developed by conventional plant breeding to be tolerant to a particular herbicide but this herbicide kills the Monsanto Roundup Ready bean. However, the Synergy bean carries a cost premium and the management and audit systems to ensure integrity of the non-GM supply chain also adds cost. To dedicate a UK soya mill to Synergy beans would increase the costs by £11 per tonne of beans. Of these beans, 80 per cent could be used for animal feed, 20 per cent for edible oil and 0.5 per cent for lecithin. The UK farmer will not pay the on-cost on animal feed when the industry is, at best, only marginally profitable. The edible oils industry is suffering the lowest prices for 11 years and an increase in soya oil prices will result in users switching to other oils such as rape, corn or sunflower oil. That means that the £11 per tonne on-cost would have to be borne by the lecithin (an emulsifier used in chocolate and fats and hard to replace), an on-cost of £2,200 per tonne of lecithin!

Recently, environmental groups have been lobbying for animal feed to be non-GM. This will mostly affect the poultry and pig industry where soya is an important part of the diet, and to a lesser extent, beef. Soya is an excellent and cheap source of protein in the animal diet. Replacing it will increase the cost of animal feed by as much as 20 per cent and the typical cost of rearing the animal by 10 per cent. These costs can only cause the UK food industry to use less UK origin meats and import more in order to remain competitive and continue to offer value for money.

In summary, segregation of the USA soya and maize crops will only be effected by the development of a non-GM market that is prepared to pay the additional costs. We are a long way from that.

We have learnt in Europe that the consumer is not interested in commodity crops which may have environmental benefit in the USA but have no direct consumer benefit. For GM crops to be established in Europe, they will have to offer a real consumer benefit. In such a case, the added value nature of the crop will mean that the growers and processors will have an incentive to segregate so that the added value crop is not "contaminated" by the conventional crop.

28 September 1999

APPENDIX 2

Memorandum submitted by DuPont (UK) Ltd (R 2)

DuPont comprises many diversified businesses from large-scale commodity to specialty chemicals, fibres, polymers, coatings and finishes, to life sciences with sales of $25 billion in 1998. DuPont is a science-based company, with particular focus on chemical and material sciences, and biological sciences. The unique strength of the DuPont enterprise is an ability to integrate scientific knowledge into valuable commercial applications for our customers and society. Some of our best known inventions include: Nylon, Lycra flexible fibres, Teflon non stick finishes, the ultra low use rate sulfonylurea herbicides, Sustiva (a novel drug for AIDS treatment), and Kevlar for bullet proof vests.

In the sphere of agriculture and nutrition DuPont has many activities:

DuPont Crop Protection: Among the top four companies globally, and which specialises in the protection of arable and specialty crops from diseases, weeds and pests.

Pioneer Hi-bred Seeds: Due to merge with DuPont in early October, is the world's most important supplier of seeds and seed technologies to farmers.

Hybrinova: A specialist hybrid cereal company based in France.

Cereal Innovation Centre: Research and development centre in Cambridge for novel uses for cereals in food, health and nutrition and bio-based materials.

Optimum Quality Grains LLC: A technology based animal feed joint venture between DuPont and Pioneer.

Protein Technologies International, are global leaders in protein isolates from soybeans used in a range of health and nutritional products from Infant formula, sports drinks, vegetarian and hypo-allergenic products to animal protein replacement.

Qualicon: A company addressing food safety needs via the supply of automated equipment used for identifying food poisoning organisms, based on the use of sophisticated molecular biology techniques.

Bio-based Materials: A newly formed business unit, established to develop and market our broad range of technologies in non-food arenas.

DuPont Agriculture and Nutrition is a biotechnology based enterprise with key focus on added value quality traits in major arable crops such as cereals, soybeans and maize. This is achieved through the application of traditional and modern scientific techniques for improvements in crop nutrition, functionality, and performance, which bring better tasting and healthier food and ingredients to the consumer, as well as feed products for livestock.

Many of DuPont's biotechnology initiatives will also bring real environmental benefits. For example:

- Low phytate corn and soybeans for livestock, which greatly reduces Phosphate pollution from slurry. The use of renewable resource crops for energy systems and the production of novel stretch polyester polymers and chemical intermediates from renewable crop based starches and microbial systems rather than non-renewable petroleum oils.
- Agriculture and Nutrition businesses continue to pursue their vision of a growing partnership with nature, focused on creating value added crops which are delivered through effective and efficient value chains for food and feed crops, food ingredients and nutrition science.

Summary of Comments

1. DuPont is a science-based company with 200 years of history providing many novel products and services to improve the quality of life, and well known for its core values of business ethics and safety.

2. DuPont is committed to value enhancement in the food chain from seed production and protection to food ingredients, analytical diagnostics, and novel packaging solutions.

3. DuPont has managed a successful Identity Preservation system for the last three years on bulk value added crops such as certain varieties of soybeans and maize.

4. DuPont advocate informed consumer choice.

5. In order to provide adequate consumer choice in commodity systems Identity Preservation is needed for crops and materials.

6. To deliver IP from "farm to plate" requires a Quality Assurance approach, and partnership through the food chain from seed to finished product.

7. Quality Assurance is based on an ISO 9000 approach (also applying principles from Hazard analysis critical control point, HACCP) backed up with auditing, independent certification and continuous improvement process.

8. Tolerances are necessary when handling global, bulk agricultural crops. Any tolerances must ensure quality expectations throughout the food chain are met, and must not be used as an excuse for the ineffectiveness of systems.

9. IP is essential for managing existing and future agricultural technologies, guaranteeing consistent quality and providing traceability and transparency through supply chains.

1. The Importance of "Identity Preservation" for Food and Feed Supply Chains

1.1 *What is Identity Preservation?*

"The term Identity Preservation refers to crop or raw material management which preserves the identity of the source or nature of the materials" Alan Buckwell, London University (also quoted in CEAS Wye College Report Dec 1998: Economics for Identity Preservation of Genetically Modified Crops).

As such Identity Preservation is not a novel concept for agriculture and has been practiced for hundreds of years in some segments of the industry, for example the preservation of specific varieties of crops such as fruits, vegetables, and vines. The tendency has been to preserve and segregate higher value specialty crops. It has been common practice with Apples, Pears and Potatoes for centuries. It has not been common practice to preserve the origin or segregate high volume commodity crops such as corn, soybeans, cereals, oilseed rape, apart from in very specific cases where certain varieties are required for specialty uses, such as Malting Barley, Wheat for infant formulas and white hilum soybeans for Tofu production.

1.2 *Why is Identity Preservation needed?*

Identity Preservation is essential for any value added trait, whether GM or non-GM, to preserve its integrity from production through to the consumer.

Specific traits such as those mentioned above need to be preserved and segragated throughout the supply chain if the traits are to reach the consumer in the intended form without adventitious dilution.

With the advent of biotechnology there will be many value-added traits, which will provide benefits to processors, and consumers, which will need preservation throughout the supply chain.

Identity Preservation will provide systems for the "ring fencing" of quality traits from the origins through processing, packaging and distribution to the final consumers.

Identity Preservation will provide "traceability" of food products and ingredients back through the supply chains to their origins, and provide confidence and trust in the quality and pedigree of materials.

Through Identity Preservation systems there will be a "transparency" to supply chains for consumers, retailers, producers and processors.

Identity Preservation systems will provide all parts of the food chain with product consistently meeting defined specifications.

2. The Need for Informed Consumer Choice

DuPont recognises and supports the consumer's right to informed choice.

The current crisis over GM technology (and more broadly, food safety and the desire for traceable supply chains) has highlighted the fundamental importance of consumer choice. At the core of the debate is lack of consumer choice, generated by the shift of commodity production systems to Roundup Ready Soyabeans and Bt Corn. The absence of systems to preserve (identify and segregate) these traits through supply chains has led to widespread presence of GM containing products in food, animal feed, ingredients, additives, colours and other products, resulting in the consumer being unable to choose whether to use a new technology product or not.

We believe that Identity Preservation systems are vital for the controlled production, processing, distribution and marketing of quality traits, whether these are based on GM, non-GM or other technologies. They are also critical for informed consumer choice, and the maintenance of consumer confidence in food safety and quality.

We also believe that unless consumers are provided with a choice now, that it is increasingly likely that they will reject GM technology not on science and its merits, but on emotive issues and lack of choice. DuPont supports and promotes consumer choice, and the development of Identity Preservation systems to ensure product consistently meets specifications and requirements.

3. "GM Free" Definitions

There is widespread reference to "GM free" by the Press, Influence groups, Consumers and even some Retailers. With the current state of diagnostic testing we believe this statement to be misleading. Most current testing relies upon the Polymerase Chain Reaction (PCR) technique which is only a semi quantitative technique, but with existing advances in reliable laboratories can get down to 200 ppm detection levels with ingredients. And tests based upon immunoassay (ELISA) technology will be more specific, rapid and quantitative.

The main conclusion is that analytical techniques will improve down to ppm or ppb levels. To claim "GM free" will continue to be misleading, as tests are only reliable down to "the level of detection". The preferred definition is "non GM", to reflect the origin and management systems (identity/quality preservation supply chain).

4. "Thresholds"

Agricultural and food science is not an exact science, and to guarantee 100 per cent purity in biological systems is not practical and should not be the aim. Producing products, which are safe and practically free from co-mingling, is more appropriate, and threshold tolerances are needed to guide industry practice, and ensure adequate choice. However these should not be used as an excuse for ineffective systems. The EU intention is to introduce appropriate threshold tolerances to trigger "GM free" and "GM" labelling.

5. The DuPont STS Identity Preservation system

To deliver higher value products to customers the DuPont Enterprise has created a sophisticated Identity Preservation system.

5.1 During the last five years DuPont has created and implemented a unique Identity Preservation system for its growing number of added value crops. The most recent offering is our STS Identity Preserved soybean and DuPont's Synchrony STS herbicide. We have tested and refined this system during the last three years, and now offer economically, commercial quantities of Identity Preserved soybeans through this system.

5.2 The DuPont STS Identity Preservation system has been developed for the soybean, however the same management principles have been applied to IP Maize, and will also apply to other bulk commodity crops. The system is currently utilised to preserve non-GM traits, but can equally be used to preserve and segregate GM or other traits.

5.3 DuPont supports the use of numerous technologies, including biotechnology, to develop products, which result in food that meet consumer's demands for:

- improved nutrition;
- improved taste;
- more variety and availability;
- improved processing productivity and lower cost;
- increased safety for the food supply and environment;
- increased health benefits;
- characteristics which create better processing and value in the food chain.

5.4 In the United States DuPont is already marketing such improved products as "high oil corn" and "high sucrose soybeans." These products have been created through traditional breeding techniques. However, the company has also introduced a new product using the tools of biotechnology, which is a "high oleic" soybean yielding higher quantities of low saturated fat oil with improved functionality. Within the next few years the company also expects to commercialise many new varieties of corn and soybeans that will result in improved animal nutrition, and in new food ingredients so that food companies can produce healthier, more nutritious, better tasting and more varied food products.

5.5 Principles for STS Identity Preservation.

The system is focused on partnership with the food chain from seed to finished product. Its uniqueness is a food based quality assurance approach applied to an Agricultural commodity system.

Utilise existing infrastructure to minimise investment and operating costs.

The system is a "Ring Fenced", controlled system with selected testing and minimal hand-offs.

The STS IP system provides for "Traceability" of materials throughout the supply chain.

The STS IP system is "Transparent" to customers, and partners to build trust and confidence.

The focus is for an integrated "Quality Assurance" approach based on ISO 9000 principles, with Independent Auditing and Certification.

The guarantee is for the Quality Assurance system, from the genetic purity of starting materials to preservation of identity throughout the chain to final ingredients.

5.6 Seed certification and purity.

The system uses a patented DuPont STS seed based on the "Williams" soybean variety. There are now over 100 different types (such as early, mid, late season varieties) supplied by many seed companies. The STS varieties are popular and widely used in N America, and have been grown on approximately 10 mm acres during the 1999 cropping season.

The varieties have been developed using standard breeding techniques, and do not employ transgenic material. The production of seed is certified.

A unique feature of the STS seed is its reduced sensitivity to DuPont's Synchrony herbicide, which is used for broad-leaved weed control in soybeans (see section 5.9). Farmers have to buy certified STS seed, and retain invoice records.

As soybeans are a self-fertile crop it is possible to grow in close proximity different varieties and traits without risk of contamination. A six metre separation is more than adequate with visible field markers. For crops pollinated by wind (Maize) or bees (Rapeseed) these procedures have to be modified with more dispersed geographic segregation.

5.7 Farm Management and Contracting.

The STS IP programme production starts with contracted growers in the US. The initial 1999 programme covered over 2,000 farms and 500,000 acres, and has subsequently been increased to meet consumer demand. The farm programme relies on detailed quality assurance management (see chart 1).

5.7.1 Training. All participants receive technical training prior to the season of production, and are screened for suitability in managing an exacting quality programme.

5.7.2 All contracts, locations, acreages are maintained on our Internet contract management "OSCAR" tracking system (Optimum Sales Connection and Resource).

5.7.3 Crop management protocols are followed to ensure that appropriate quality and purity levels are maintained. Field location and cropping history are checked to ensure no contamination with volunteers from previous crops.

5.7.4 Machinery and Equipment: protocols are in place for the cleaning of all equipment used for the STS IP crop. Including on farm storage for seed and crop, which has to be segregated, cleaned and inspected. Planting seed drills: cleaning and inspection, Combine Harvesters: have to be cleaned and inspected, with crops cut sequentially starting with STS IP crops. As it is not practical to dedicate combines due to high cost and cropping practice, prevention of adventitious contamination has to rely upon quality assurance practice. (For example farms may be growing GM crops alongside non-GM, and different trait GM crops on the same farm, in Canada for example it is common practice to grow non-GM Cereals on the same farm as GM Canola (rapeseed) and use the same combine).

5.7.5 Herbicide validation is required with Synchrony broad-leaved herbicide, this provides an additional safety step, as Synchrony also is not selective on GM soybeans, which are killed. This ensures a cleaning step on the crop in the event of adventitious co-mingling of the seed.

5.7.6 Storage on farm has to be segregated, cleaned and inspected. Moving equipment (augers, belts etc) and trucks/trailers can rarely be dedicated at farm level, and have to be rigorously managed.

5.7.7 Samples from each farm are retained for future analysis and tracking in the event of problems.

6. Transport off farm to elevators has to be managed in a similar fashion, with identification, clear marking, cleaning, inspection to the same exacting quality standards.

7. Large elevation (Silos) are the most common form of storage in the US, which unlike the UK has relatively little on farm storage capacity. Selected elevators in our programme (100 during the 1999 season) have similar training and operational protocols. At the elevator level crops have to be segregated totally, using isolated drop pits, grain moving systems (augers, belts) and storage bins. The elevators maintain records of contracts, yield and field details, retain and analyse samples, and cross-reference information to ensure no mistakes occur. Each elevator is profiled by PCR or similar analysis. At this stage in the system we can verify STS soybeans as PCR negative for GM traits.

8. Shipping is largely done by barge onto the Ohio and Mississippi rivers, then down to Gulf ports for loading onto ocean going vessels. Barges are strictly regulated, and have procedures for clean out, inspection, identification, and certification. From the barges ocean vessels are direct loaded to avoid additional elevation, and grain moving equipment which can be an easy source of contamination. Outgoing barges are tested for non-GM purity.

9. Processing, Managing Identity Preservation through processing represents one of the more challenging steps due to the scale, diversity and integration of many commodity crop processing facilities.

9.1 The most reliable solution is to dedicate 100 per cent processing facilities. For soybeans this starts with the crushing plants which operate generally on a huge scale, and are often fully integrated for the production and refining of soyoils, meal for animal feed, proteins such as flour, protein concentrate, textured vegetable protein and protein isolate (ISP >90 per cent protein) for numerous food and pet food ingredients and applications (see chart 2).

9.2 As an example for our own manufacture of protein isolate (ISP), our company PTI has a dedicated crushing facility at Crestland (Illinois), producing white flakes which are then transformed into ISP at 100 per cent dedicated plants in the US and Europe. Through this IP chain applying our quality assurance approach, ISO 9000 principles and analysis at critical points, the performance on preserving STS is exemplary, with the average level of detection in final ingredients (by PCR analysis) being 0.1 per cent or at

the level of detection for current analytical technology. The integrity and preservation within our system is critical as most of our ingredients like SuPro go into products like infant formulas, healthcare and nutritional products which need a "gold standard" of quality performance and reliability. It is also essential to maintain the credibility of brands and protect consumer confidence.

It is important to note that what is possible for one crop (eg Soybeans) may not be possible for another (eg wind pollinated Maize).

9.3 In other processing systems, segregation and dedication are the ideal methods for Identity Preservation, this includes unloading and storage of raw materials, as well as storage and shipping of processed ingredients. In addition to the crop raw materials entering the manufacturing plant, all other materials in the process have to be reviewed to ensure that no external source of contamination can arise.

9.4 Cost implications: Some legitimate extra costs are incurred due to some loss of flexibility in the supply chain and testing expenses. The system described here is "counter cultural" to many commodity trading operations, however the costs for detailed segregation and management need not necessarily be excessive. The farmers, elevators and shippers need an incentive to implement precisely the IP protocols. If processing facilities are dedicated and consumer demand adequate to support this then the overall premiums in the system can be as low as 10 per cent to 15 per cent premium versus current commodity systems, but with all the inherent benefits of an IP system. To take this through the chain to the final products this could mean less than two pence on the price of a whole chicken or less than 1/1,000th of 1 per cent on the cost of ice cream using lecithin, depending upon how existing supply chains are structured.

10. Audit and Feedback. As all biological systems are dynamic, it is essential to have each stage of the IP supply chain audited, and with continual assessment of opportunities to improve processes, quality and system performance. In the STS IP programme we use internationally accepted certification and auditing bodies such as SGS (Societé Générale de Surveillance).

11. Corrective action and procedures will be documented. In the event of accidental mixing of genetic materials, the affected material is held until the situation has been reconciled, and this material is not permitted to enter the channels of trade that require non-GM materials. Details of such events, and corrective actions undertaken to isolate the affected material and to identify the cause, and remedy it, are recorded, and the records are retained.

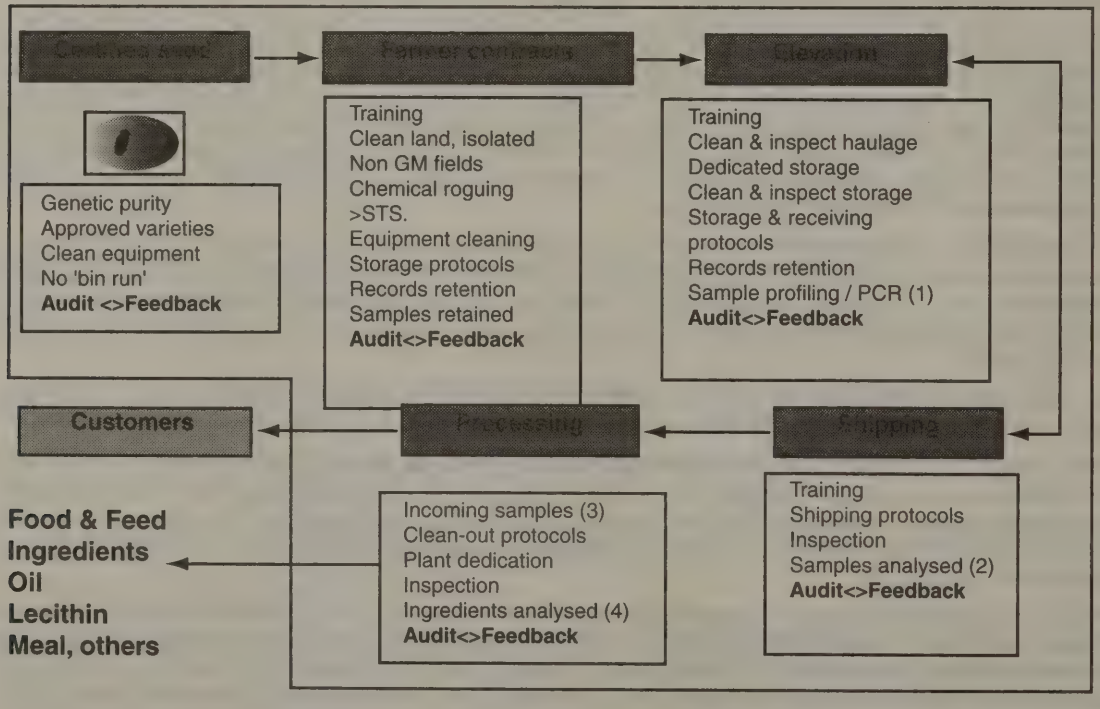
12. The benefits of Identity Preservation.

12.1 Is a "Ringfenced" total system to ensure quality traits are preserved. The STS IP system has been operating successfully for three years in a large volume value added agricultural crop.

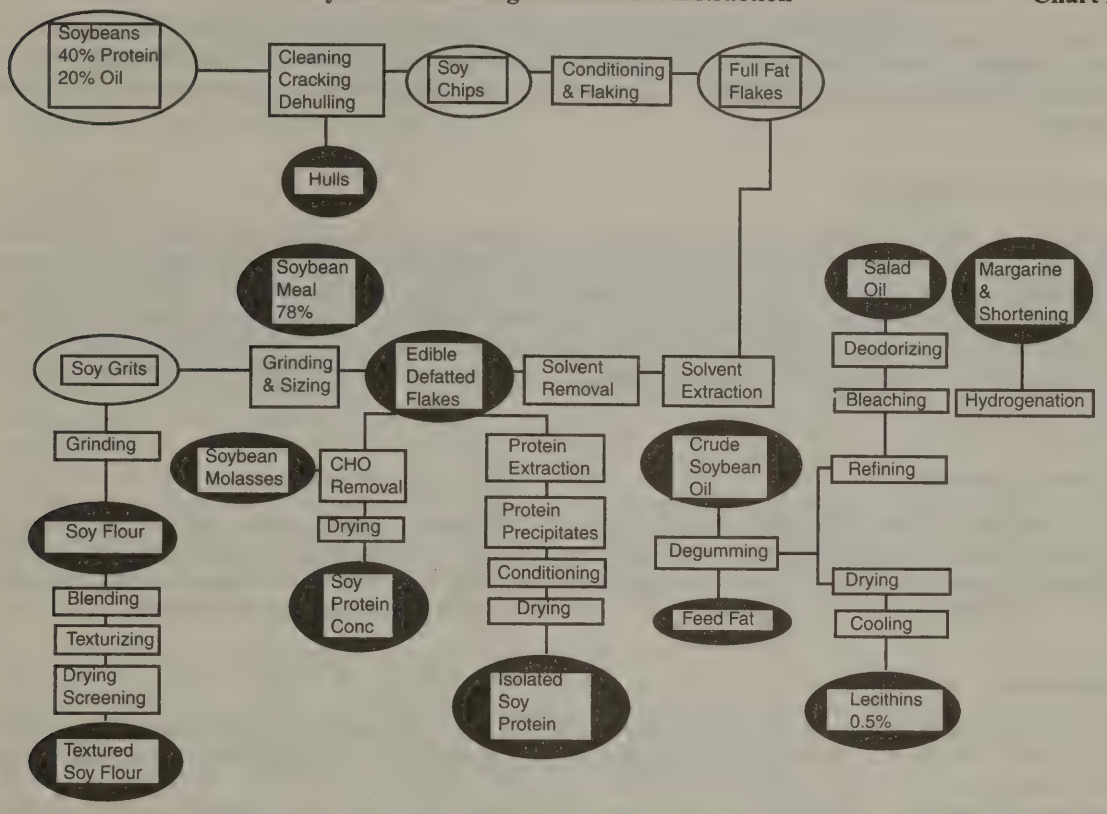
12.2 The system performance provides a high quality and stable source of product. The system incorporates traceability of materials back to farms, independent certification for customer confidence, and transparency.

29 September 1999

STS IP Prgram **Chart 1**



Soybean Processing with Solvent Extraction **Chart 2**



APPENDIX 3

Memorandum submitted by the UK Maize Millers' Association (R 3)

The UK Maize Millers' Association represents companies processing largely imported maize for use in breakfast cereals, brewers' grits, snackfoods and many other food products.

There is a lot of misunderstanding and sometimes misinformation on the subject of tolerances or thresholds in relation to GM labelling, non-labelling or claims that products are GM-free. In particular, it has been suggested that the Commission plans to set a threshold of 2 per cent for GM-free claims. This is not the case. The following note therefore seeks to clarify the current, admittedly confused, position in a way which we hope will be of value to the Committee.

EU Legislation

An EU Council Regulation (EC Reg 1139/98) was adopted in May 1998 which required that products should be labelled as containing GMOs where GM protein or DNA from soya or maize was present. The same Regulation invited the Commission to look at methods of analysis, thresholds below which labelling would not be required and the so called negative list (ie refined products not requiring labelling) with a view to making recommendations. A combination of slow progress in Brussels followed by the Commission's mass resignation this spring means that none of this has happened, making compliance with EU law extremely difficult meanwhile.

Commercial Developments

The extensive and largely hostile media coverage concerning biotechnology has caused commercial demands in relation to GM and non-GM material to run way ahead of legislative developments. In particular, many retailers first moved to labelling on the basis of GM origin rather than GM presence in foodstuffs bringing, for example, refined oils into the net. The market has since moved towards the elimination of GM materials in food production. Most retailers have been careful to couch this in terms of using conventional and/or organic raw materials. It is, however, frequently misrepresented as a move to GM-free.

Types of Labelling

Media coverage of labelling has generally polarised the issue between GM and GM-free. By contrast, the whole emphasis of policy development in Brussels has been to provide a workable distinction between GM (labelled) and conventional (unlabelled) supplies, with products labelled GM-free providing a potential third category.

Tolerances/Thresholds

The threshold of 2–3 per cent which has been described as completely unacceptable in relation to GM-free labelling is, in fact, the figure which the Commission has been considering for unlabelled product where demonstrable steps had been taken to source raw materials from conventional, non-GM supplies. The Commission presently has no intention to issue a threshold for GM-free labelling but the working assumption is that the limit of detection should apply (ie if you can detect it then you should not label GM-free). Broadly speaking, this is a view which manufacturers and retailers seem to share (ie GM-free should mean what it says).

Bulk Commodities

The volumes of material traded internationally and the length of supply chains make it impossible to guarantee complete purity of supply; there may be some grains of wheat mixed with maize and similarly the presence of small amounts of GM material cannot be excluded. The smaller the volumes being traded, the more demanding the tolerance which can be met but, equally, the higher the price of doing so.

Conclusion

In the opinion of the UK Maize Millers' Association the procedures adopted (often described as identity preservation) should be the primary determinant of whether conventional agricultural raw materials have been segregated from their genetically modified equivalent and should therefore be exempt from GM labelling. If, however, a threshold is to be set, any figure lower than 2 per cent is unlikely to be consistently deliverable for bulk commodities at reasonable cost, while any figure higher would probably be unacceptable to consumers. GM-free claims should mean what they say (ie the absence of GM material at or about the limit of detection).

1 October 1999

APPENDIX 4

Memorandum submitted by Consumers' Association (R 4)

Introduction

1. Consumers' Association (CA), publishers of *Which?, Health Which?* and other consumer books and magazines, is an independent consumer organisation with over 700,000 members.

2. We have carefully monitored the introduction of genetically modified (GM) foods on to the UK market over several years and have conducted consumer research, including surveys and focus groups, to assess consumer attitudes in line with developments. While we do not therefore have practical experience of implementing systems to segregate GM foods, our research assessing consumer attitudes towards GM may assist the Committee with its Inquiry.

Consumer Research

3. Our research has repeatedly shown that consumers feel very strongly about GM for a variety of reasons. Some are concerned about the long-term consequences of GM. Others, for example, are concerned from an ethical point of view. People therefore feel strongly that they should be able to choose whether or not to eat GM. Crucial to this is effective labelling of foods and ingredients produced using GM. But for choice to be effective, it also needs to be ensured that alternatives to GM are available. This is one of the reasons why segregation is so important.

4. Consumers see GM in terms of the process rather than the final product which is at odds with the approach that has been taken by EU legislation. A CA survey in February 1999[1] found that:

— 90 per cent of respondents had heard of genetic modification;

— of these, 94 per cent felt that there should be clear labelling on food packaging;

[1] 1,914 people aged over 15 who were representative of the population were interviewed face to face in their homes between 19 and 25 February 1999.

— 92 per cent agreed that food ingredients that come from a GM plant, but which cannot be detected in the final product because they have been processed should be labelled; and

— 76 per cent wanted to know about GM when eating out.

We are currently carrying out further qualitative consumer research and will be able to provide the Committee with the results at a later stage.

Traceability

5. To meet these requirements, labelling must be based on traceability throughout the food chain, so that manufacturers, retailers and caterers know what they are using in their products and can give consumers clear information based on this. More generally, traceability is also important for reasons of safety. As we have repeatedly seen, for example with BSE, *E coli* and more recently dioxin contamination, traceability is essential for ensuring food safety and is an important aspect of any Hazard Analysis Critical Control Point (HACCP) approach. Many uncertainties still remain in relation to GM. We are not satisfied that there are adequate safeguards in place at the moment, that the approval process is rigorous enough or that there has been enough research into the long-term implications of GM. If a problem were to be identified in the future, it would be important to ensure that all potentially affected products could be withdrawn from the market and that consumers could be given clear information about any potentially affected products. To do this, we need to know where ingredients are going and therefore GM crops need to be segregated. Similarly, if we are to monitor the long-term implications of GM on our health—something that the government has acknowledged as important and instructed the Advisory Committee on Novel Foods and Processes (ACNFP) to consider—we need to know where ingredients are going, and therefore need to ensure segregation at source.

6. The current labelling regulations are based on whether or not GM DNA or protein can be detected in the final product and therefore the product is "no longer equivalent" to an existing product. Using testing of the final product as the basis for labelling is an inadequate basis for regulation on several grounds. It excludes some ingredients which consumers clearly want to know about, such as soya lecithin and soya oil. Labelling requirements are also likely to change as test methods become more sensitive.

Identity preservation

7. CA has therefore supported an approach based on identity preservation (IP) throughout the food chain, beginning with the seed producers and following it right the way through until purchase. We consider this to be the most effective way to ensure that consumers can be given clear information about the presence or absence of GM. It is also consistent with ensuring a HACCP approach more generally. We do not however see identity preservation as a way of allowing GM-free claims to be made on products. There is always the danger that there could be accidental contamination at some point in the chain, although this can be minimised. "GM-free" also suggests that the technology has not been used in any way, and so it would need to be ensured that no GM animal feed or processing aids, for example had been used. It is highly unlikely that a product could fulfil these criteria. We therefore see IP relating to those products that carry no label or claims.

8. We have called for this type of approach based on clear segregation of GM and non-GM supplies since the problem of commodity crops first emerged. Initially we were told that this was impossible to achieve and therefore unrealistic. It was suggested that consumers would have to pay a price premium for segregated supplies of non-GM soya or maize. However, this has not been the case in practice. This year it has become clear that non-GM supplies are becoming available to meet the clear demand in Europe, and that this can be achieved without increasing the price of foods to consumers. As manufacturers, retailers and caterers continue to work together to secure supplies, more are likely to become available making controls easier and ensuring that there are no additional costs.

9. The approach that is needed, and is being implemented in many cases, involves ensuring segregation at all stages of the chain and ensuring that there are mechanisms in place to verify this. This involves the use of testing at critical control points and also independent inspection to ensure that the necessary measures are being complied with.

Thresholds

10. One important issue in this respect is that of thresholds: at what level should accidental contamination be permitted? From a consumer point of view, if you are buying something that does not say that it contains GM ingredients, it is reasonable to assume that none are present. However the complexities of the distribution chain make this more difficult in practice. Any threshold would need to be set as low as can be practically ensured. We understand that 0.1 per cent can, for example, be achieved. There is however the danger that once a threshold is set, there will be no incentive to strive to reduce levels beyond this point—and therefore the industry may work within this threshold. It may therefore be appropriate to phase out a threshold as more non-GM supplies become available, and experience results in more effective controls at all stages along the

line. In addition, we have welcomed efforts by some retailers to segregate animal feed and ensure that their meat is not reared on GM feed, in line with their general policy of removing GM ingredients. Ultimately, we would hope that this could also be extended to include GM processing aids.

Industry-wide standard

11. Although efforts in this direction have been very welcome and have ensured that consumers can choose whether or not to consume GM, we consider it necessary to establish an industry-wide standard. This would ensure that where consumers saw products that were not labelled as "GM", they could expect them to mean the same thing ie that they had been produced to a standard that ensured that GM contamination had been kept to an absolute minimum. We hope that industry and the Government will work together to develop such a scheme. It is also important that this approach is reflected within European legislation which at the moment is failing to keep pace with market developments and practicalities.

12. Although the crops that are causing most concern at the moment are soya and maize which are not grown in the UK, it is likely that other crops may come onto the market, some of which may actually be grown in this country. This will present new problems of possible cross-contamination that need to be addressed as soon as possible. While no crops are being grown commercially at the moment, we are concerned that the farm scale trials currently taking place could result in cross-contamination if adequate controls are not ensured. This has raised particular concerns for organic farmers who have to make sure that GM is not used in their products. Clear guidance will be necessary on appropriate separation distances—and how these can be enforced—before crops are grown commercially in the UK. Similarly, it should also be ensured that any crops grown in the rest of Europe are effectively segregated.

8 October 1999

APPENDIX 5

Memorandum submitted by Consumers in Europe Group (CEG) (R 5)

THE CONSUMERS IN EUROPE GROUP (CEG) IS AN INDEPENDENT UK UMBRELLA BODY FOR 34 UK ORGANISATIONS WITH AN INTEREST IN THE EFFECTS OF EUROPEAN UNION POLICIES AND PROPOSALS ON UK CONSUMERS

Introduction

1. As a general comment, CEG is not against genetic modification in itself, provided it is tightly controlled. We recognise that this new technology could potentially offer benefits to consumers. However, consumer confidence in genetic modification is facing a crucial time as the first GM commodity crops are used as sources for a wide range of food ingredients. CEG appreciates that many consumers are concerned about genetic modification of crops and the foods produced from them, for this reason we consider segregation of GM crops as a necessary step to ensure consumer choice.

Approval Process

2. The approval process for GM crops and GM foods is split between many different scientific committees, both at UK and EU level. Each committee has a strict remit and considers each approval on a case-by-case basis. As stated in the recent Royal Society report, "there is no means for looking at GM technology as a whole". In particular, there is, as yet, no committee to look at the wide-ranging impact and ethical issues surrounding the use of genetically modified crops to produce food and the effects that they have on the food chain from farm to consumer. This gap affects issues such as segregation of GM and non-GM foods and also how labelling schemes could be introduced and validated through the supply chain.

3. CEG has recommended that the European Commission and the UK set up overarching committees to consider the wide-ranging impact of genetic modification on consumers and the environment. The Government announced in May that it would set up a new Agriculture and Environment Biotechnology Commission to cover the use of biotechnology in agriculture and its environmental effects. This appeared to be a step in the right direction, however CEG is not aware that this Commission has been established yet. Also it is not clear how it will bridge the gap between GM crops and GM foods, which will be the responsibility of the Food Standards Agency.

Segregation

4. Segregation of GM crops and GM foods throughout the supply chain is essential to meet consumers' calls for the clear labelling of GM-produced food and conventionally-produced food. Even if segregation is not legally required (because of world trade rules), it should be possible for the food and farming industry to provide voluntary segregation. CEG is concerned that the crop from GM maize grown in other Member States may not be segregated. This will make it far harder to establish a non-GM line of maize products within

the EU, and all EU maize could end up labelled as GM because of potential cross-contamination during bulk processing.

5. At present, GM crops are in the minority but are expected to grow to about two-thirds of the US crop. If this trend continues then segregation may focus on separating out the non-GM crop/food and creating an "Identity-Preserved" source. Conversely, foods that have been genetically modified to provide a selling-point (such as healthier oil) to the consumer may also be segregated since they may well be sold at a price premium.

6. Segregation would need to be accompanied by detailed records and an audit trail through the supply chain, in a similar process to that used for organic foods.

7. CEG strongly supports the segregation of GM and conventional foods throughout the food chain. GM crops grown in the EU must be segregated from the farm onwards.

Labelling of GM Foods

8. EU legislation does not require segregation of GM crops and food, nor does it require the labelling of all food produced from GM sources. EU law is likely to remain based on scientific detectability of genetic modification. However, several food retailers have followed consumer demand to label GM food more fully than the strict legal requirements and some manufacturers have re-formulated products to avoid using soya.

9. A consequence of the EU legislation is that foods produced from GM crops, but which are refined or processed so that any modified DNA or protein is not detectable, will not have to be labelled. CEG has serious concerns about the concept of a "negative list" of such food products. The establishment of a negative list of products could potentially mislead consumers because it may give the impression that foods on the list, eg soya oil, have not been genetically modified. The list must be based on tests that are accurate, reliable, validated and readily available to retailers and the food industry at a reasonable cost. However the tests are under constant development and it is not clear how the "negative list" will be amended to take into account new tests or new limits of detection in existing tests.

10. CEG strongly supports the labelling of all foods produced from GM sources, based on traceability, in addition to those foods that are legally required to be labelled.

11. A negative list of GM products which do not need to be labelled is misleading to consumers.

Maintenance of Choice

12. Labelling of GM foods is important to inform consumers when foods have been produced using genetic modification. As GM crops become more widely grown, and mixed with conventional produce, then the proportion of food needing a GM label may increase. Potentially, the majority of products from some crop species may be labelled as GM.

13. Choice is a basic consumer principle. A choice between GM and conventionally-grown food must be maintained for those consumers who do not want to eat GM food. CEG recognises that this is impractical for every food product on the market. However, it should be possible for a non-GM alternative to be made available for each type of product, for example via supermarkets' own brand labels. There may be practical difficulties in providing this, but it is not impossible, and customer pressure may demand it.

14. As the proportion of GM-produced foods increases, it may become more important to identify non-GM foods by labelling. As the law stands, if a food is not specifically labelled as genetically modified then it is still possible that it has been produced using GM sources but that no changes due to the modification can be detected. Consumers may prefer to buy foods labelled "GM-free" or "non-GM". EU law allows for this type of labelling. Retailers may be reluctant to make claims for "GM-free" if they think that such claims may be hard to substantiate, especially if analytical tests detect small amounts of GM material.

15. In Germany, a national law has been passed that specifies criteria for food claiming produced "without genetic engineering". It states that a small amount of accidental contamination with GM material may be unavoidable, and is acceptable provided that appropriate proof can be given that the foodstuff has been produced without the use of GM. For those consumers who have concerns about the use of GM as a technology, this sort of labelling based on the production method could be the most suitable.

16. Organic foods could provide an alternative to some GM foods, although many consumers may not be able to afford the price premia on organic foods, and organic alternatives are not available for the wide range of processed food.

17. Consumers must be given a meaningful choice between food produced using GM sources and food produced using conventional methods. Labelling must clearly distinguish GM food from non-GM food; it must be possible to verify labelling claims. Organic food should not be the only alternative to GM foods.

4 October 1999

APPENDIX 6

Memorandum submitted by Mr Stuart Walters (R 6)

WHAT IS SAFE?

Politicians and scientists assure us that trials of GM crops and the consumption of GM food are "safe". But what does that mean? Is it possible to talk meaningfully about "safety" without being more precise?

If GM crops could affect everything and everyone in the environment, is it not reasonable to ensure that there is a very public debate on the principles, assumptions and parameters governing trials *before* they are conducted?

GM trials are to establish what effects, if any, GM plantings have on the environment. They could conceivably affect non-GM crops, the earth, plants, birds, insects, animals and people over a wide area.

Arguably the quality of life in this country is at stake. So is the future of the GM food and grains industry. Hence the pressure for trials.

There are many questions that a layman might want to ask:

Once GM trial crops have been sown in the open how is it possible to ensure that they do not affect the environment?

Even if they are pollen-free, how can you ensure that birds, insects and animals do not feed on the GM crops and that the earth does not absorb what they contain?

And, if they do, how will it be possible to monitor them when some species can move over considerable distances?

What basis is there for saying that GM trials will *not* have any long-term irreversible harmful effects?

How will the environment be monitored over time to take account of possible changes in species over generations?

What period of time will be necessary for monitoring to detect possible changes in generations of species?

What will be the basis for deciding that period of time and who will make the decision?

What if "harmful" effects do not show up in the short term but only after one or more generations of insects, animals, birds and humans?

How will species be tested? Will the testing look at genes, changes to limbs, blood, organs, glands, the nervous system, the reproductive system, the lymphatic system, the immune system, the skin, bones and other aspects of the body?

Could such trials trigger manifold irreversible changes to species over time?

If it is not clear what risks are involved in initiating trials, what basis is there for conducting them?

If it is to gain information, who can justify that the information to be gained is worth the risk and on what basis?

There are other important questions:

How will the size of an area to be monitored be determined?

How far can the wind, birds and insects carry pollen from a crop?

Does this vary by location and climatic conditions?

Is it being assumed—and, if so, on what basis—that people will not be affected by trial crops?

Is it, for example, being assumed that air quality will not be affected and that various species will not inhale air containing GM pollen and will not suffer as a result?

If there are some side effects, at what point will they be considered *harmful*?

How is "harmful" to be defined?

At what point in time can one be 100 per cent certain that such crops will have no "harmful" effects in either the short or longer term?

Or does one have to settle for something less than 100 per cent certainty?

And, if so, what level can be judged acceptable and by whom?

How long do you have to test the effects of a crop before you know it could be "harmful"? Is it months, years, decades?

How is *consumption* of GM foods to be tested in the light of the above questions?; and

Whose word is to be final in deciding how these questions are to be resolved?

23 August 1999

APPENDIX 7

Memorandum submitted by PG Economics Ltd (R 9)

Introduction

This evidence is submitted by PG Economics to the House of Commons Agriculture Committee investigation into segregation of GM foods.

It is drawn from a combination of work previously participated in by the authors[2] and a series of reports currently available from PG Economics that examine in detail the economic and strategic issues through the food chain of GM crop[3].

Definitions and General Rationale

Within the context of production, trade and use of GM crops, the terms segregation and identity preservation have and are becoming increasingly used. However, their use and association with genetically modified crops can mean different things to different people. Therefore, it is important, to first define what we mean by segregation and identity preservation (IP).

Both segregation and IP essentially refer to any system of crop or raw material management that segregates or preserves the identity of the source or nature of the materials. At a general level segregation is synonymous with "keeping crops, products etc apart" whilst IP is more widely considered to apply where there is a positive desire to preserve the identity or source of a crop or product. In relation to agricultural products this is not a new concept since some degree of segregation or IP tends to occur for almost all farm products once they are traded beyond the farm gate.

The underlying rationale for any form of IP and consequential segregation or grading of agricultural products is to facilitate sales and trade of products from farms to the purchasers at each stage in the food chain, the first stage processors (eg millers or crushers), food manufacturers, retailers and final consumers. The segregation, IP or grading allows the purchaser to choose the appropriate grade or variety for his requirements. It permits impersonal buying and selling "on specification" of crops by enabling buyers to obtain the grade of crop anywhere in the world and be assured or guaranteed as to its characteristics without needing to examine the crop in detail. Thus, a limited system of widely accepted grade specifications has tended to develop for most agricultural products and been incorporated into standard contracts for the sale of each crop. Distribution systems have developed to facilitate the efficient storage, handling and transportation of large volumes of products to these grades in what is often referred to as the "commodity-based" trading system.

Although the majority of agricultural products are traded through a commodity based system according to limited grading or very basic IP of the respective crops, there are also numerous examples of more sophisticated IP occurring. Where this occurs the segregation or identity preservation steps reflect the additional specifications or requirements requested by purchasers of the product. These tend to reflect two forms of greater sophistication:

- additional requirements concerning the content or composition of products (eg a specific wheat variety suitable for making bread);
- additional requirements not related to content or composition (eg region or method of production, for example organic).

The classification of IP and segregation into these forms also highlights two important concepts that come into play in considering IP and segregation developments, namely testing and tolerances.

- *testing.* For many crops, segregation or IP offers purchasers guarantees and confidence that the product supplied is the one specified. An important part of the IP system is the testing of samples for physical or chemical *content* (eg, of protein content). However, testing is not always possible. For some crops it is not possible to test or measure whether the purchaser's specifications or requirements have been met. This applies to most cases of IP relating to production *process* and, in such cases confidence in the IP (eg, organic soyabeans) relies on the integrity of the supplier and the level of confidence that purchasers have in suppliers and the robustness of the segregation or IP system initiated;
- *tolerances.* The issue of tolerance arises because of the impossibility (outside a laboratory), in any practical food processing and handling chain, of ensuring absolute purity of products. Thus a specified soya variety may contain up to a threshold level of other materials. A particularly relevant use of such tolerances is that applied to organic crops. Because of the difficulty of eliminating all co-mingling throughout the harvesting, storage, transport, and processing chains, there is a 5 per

[2] Economics of identity preservation for GM crops (1998) for the Food Biotechnology Communication Initiative, produced in conjunction with Wye College, University of London.

[3] Four separate reports covering wheat, soyabeans, maize and oilseed rape.

cent tolerance of non-organic material allowed in some processed foods derived from and labelled as being made from organic ingredients.

In recent years, there has been significant development of more sophisticated segregation or IP systems for agricultural products. There are currently many more systems that aim to trace produce back through the food chain to the point of production (farm level) and to provide purchasers with increasing levels of assurances as to content, composition and method of production. Notable examples include the growth in the development and demand for organic products and quality assured supplies of cereals (eg the combinable crops scheme in the UK).

The motives here have been consumer health concerns, loss of confidence in product content and quality, consumer protection, concern for the environment and ethical concerns for welfare standards in livestock production. The IP or segregation principle in these cases is that the consumer is concerned with *process,* how crops are grown, how animals have been fed and looked after. In the beef example, the driving force has been the problem of BSE and its link to contaminated feed. In the cereals combinable crops scheme the driving force is primarily associated with issues such as pesticide residues and other possible contamination of crops through the supply chain (eg, cleaning, storage, transport).

In addition, an underlying feature of most agricultural product and derivative markets is the drive to add value to products by improving or altering the inherent characteristics of a product for which price premia may be charged. Alternatively the desire to obtain greater consistency and uniformity of the crops and products supplied to markets or as raw materials used in the manufacture of final consumer products. These features strengthen the competitive position of the added-value product *vis à vis* its substitutable alternatives by differentiating it and potentially reducing the cost of processing (eg, developing a soyabean with a higher protein content). Such technical developments may involve the use of both conventional and, in the future GM technology.

The Rationale for Segregation or IP for Genetically Modified Crops

The underlying driving forces for segregation or IP comes from the nature of GM technology itself which can be distinguished according to two main categories of intended, immediate beneficiary of the technology. Broadly these two categories can be defined as:

- modifications that focus on quality traits which alter the nature of a crop or product; and
- modifications that focus on agronomic traits which aim at improving the profitability of primary agricultural production through aspects such as reducing costs, increasing yields etc.

Modifications for Quality Traits

These comprise genetic modifications which bring about changes in the crop or product compositional, quality traits and hence may contribute to making possible various industrial and pharmaceutical applications of crops. For example, altering the protein content of a soyabean. The point of the modification is to provide the consumer with a new product or one with improved attributes. The direct beneficiary is the purchaser of the product who may be the final consumer or a food manufacturer. The latter of these two beneficiaries may often also derive some cost saving benefits from the technology (eg through the better matching of raw material characteristics with production process requirements).

The scope for developing new value added crops derived from GM seed will depend on the traits offering real value to users who in turn may then be prepared to pay price premia to farmers to grow crops containing such traits. Once such opportunities are created, it is in the interests of all participants in the supply chain to segregate or use IP methods to maintain the integrity of the new or modified product throughout the supply chain. In this case the underlying force for segregation or IP in this category of GM product comes from the supply side (the provider of the technology, farmer, processor, manufacturer). It is the only way that the desirable properties of the new GM can be identified and paid for and becomes a crucial vehicle in demonstrating or advertising to the customer or consumer the desirable new features or traits of the GM derived material.

This category of GM crop is, relatively uncontroversial. There is agreement between all parties in the supply chain through to and including final consumers that segregation or IP is desirable and practicable.

Crops modified for various quality traits are however more likely to be specialist, minor crops not occupying as large areas of crop land as conventional crops. The principle example currently available on the EU market of a GM quality trait relates to the tomato modified to slow the post-picking ripening process and thus to produce tomatoes with less post-harvest spoilage and provide thicker tomato paste. This was until mid-1999 regarded as a technical and marketing success although in the wake of increased media coverage and opposition to GM technology both purchases and availability in retail outlets (eg in the UK) has recently fallen off.

Modifications for Agronomic Traits

These comprise mainly agronomic resistance and growth traits such as herbicide and insect resistance and the development of hybrid seeds (which are higher yielding). These traits offer the farmer who plants the modified seeds the opportunity to reduce labour or machinery use, or to make less use of pesticides. These, in turn, are likely to result in some cost savings. Alternatively, the modification (notably hybrid seed development) might enable an improved yield of the crop.

For these, essentially cost-reducing modifications, there is no intention or desire of the GM provider to change the nature or composition of a crop, only to make it easier, cheaper and more profitable to grow. Compared with the non-GM crop alternatives, the GM crop and its derivatives are, to all intent and purposes, the same as, or substantially equivalent to, the non-GM crop. From the supplier perspective, that is the farmer and those further down the food distribution chain, this substantial equivalence of non-GM and GM product has been the basis for arguing that segregation or IP of either form of product is unnecessary. There is no direct economic incentive to initiate segregation or IP of such crops from the supplier or supply side perspective as there clearly is for value-adding, quality trait GM crops.

The driving force for segregation or IP of GM crops that are targeted at farmers (containing agronomic or cost saving traits) therefore comes from consumers. This has arisen and continues to arise when people express a desire to have the opportunity to avoid support for, or consumption of, GM crops and their derivatives.

European consumers' concerns about GM crops are a mix of ethical, health and environmental issues. To fully accommodate these concerns by offering choice must mean that the segregation or IP and consequential labelling must embrace not only foods which contain GM material but also those which have been made from GM crops. This distinction is important to grasp as the focus of concerns is on the process of production (ie, the process of using GM technology) as well as the content of food products derived from the crops grown from GM seed.

Segregation or IP Costs and Who Bears Them?

The costs

The additional costs of segregation or IP arise because of the additional work involved in handling, storage, transport, processing, cleaning-out of storage bins and processing machinery, and administration of GM crops to ensure that they, and all their derivatives can be identified and kept separate from non-modified equivalent materials. These real, additional costs arise in connection with each of a number of stages or functions through pre-farm, farm, transport, further storage, processing, manufacture of products, labelling and distribution.

The magnitude of these additional segregation or IP costs will depend on the precise circumstances of the crop and the range of products derived from it, the uses to which they are put, the tolerances and specifications set and the sophistication of the distribution system.

Two aspects can be anticipated about these segregation costs. First there may be a tendency for those who are unconvinced of the need to undertake segregation to overstate the magnitude of the costs. This was evident in the case of herbicide resistant soyabeans where in 1997–98 the initial pronouncements of global traders and suppliers of soyabeans (mainly from North America) was that at first it was simply not possible to segregate. Later this changed so it was possible but extremely expensive and more recently in mid 1999 there can now be found large scale traders and crushers of soyabeans offering to supply segregated (non GM) soyabeans, if required. Second, segregation or IP costs are likely to change as the supply chain and user industry learns how best to organise segregation and as the volume of material requiring segregation increases.

This has potentially an important effect on the segregation procedures required. For example, if a market segment develops for products that were derived from non-GM crops, it may not be possible to undertake tests to verify claims that a specific food product contains or is derived from a "non-GM crop". Consequently, such a market segment will only develop if the suppliers to it develop a quality assurance monitoring, control and verification system in which consumers have confidence. For some products, like soyameal destined for the animal feed market where the extent of processing is small, the additional costs of such IP may cause a significant rise in the feed price per tonne. For others, like some uses for soya protein in high value processed convenience foods, the soya component is a tiny part of the total product price and the additional cost of IP may have no noticeable impact on the final product price. In addition, it is highly likely that to make segregation or IP practicable, some degree of specialisation of growing, storage and processing facilities will develop—either within or between firms and between regions. Thus particular plants (maybe at particular times) may only accept GM or non-modified crops.

Who bears the cost?

Any cost increase within the food chain tends to be shared between the different parts of the chain from input supplier through farmer, processor, retailer and onto the end consumer. In the case of GM crops, the sharing-out of the costs of segregation or IP from one stage to the next depends on the responsiveness of demand and supply to price at each stage[4]. Generally the less responsive is demand (ie the less price elastic are consumers), then the most of the cost increase they will absorb in the form of higher prices. Equally, the less responsive is supply (ie the less price elastic are suppliers), the less their ability to pass on the cost rise to consumers.

The responsiveness of demand to price for raw materials or ingredients at each stage of food processing itself depends on the ultimate responsiveness to price of demand for the final products and on the substitutability of the GM product. If there are many such substitutes then demand is more price responsive. For example, a possible rise in the price of GM soya caused by the additional costs of IP may cause food manufacturers simply to switch to non-GM soya, or to an alternative raw material such as rapeseed, sunflower or groundnut or some other substitute (if appropriate). This is a case of a price responsive demand, where the cost of segregation can not easily be passed on down the supply chain to the processor or consumer. In such cases the segregation costs will be reflected back up the supply chain to the primary producer in the form of lower farm gate prices. In other uses the particular properties of, for example soya may be such that other oilseeds are not easily substituted, ie their price responsiveness is low. In such circumstances the scope for passing on the additional costs of segregation or IP are greater and therefore it is likely that these products will carry some of the extra costs of segregation or IP in the form of higher prices.

A critical price responsiveness in the chain is however, at the level of the final consumer. The same principles apply as discussed above. The less price responsive the demand for the end product, the greater the scope for passing on any additional costs of IP in the form of higher prices and vice versa.

GM Value-Adding Quality Traits

These GM traits offer scope for food processors and manufacturers to market new and improved products for which consumers may be willing to pay price premia relative to existing products. In essence the GM trait is contributing to developing a new and better product, therefore with a better (ie higher) price. The only real GM example currently available in Europe that falls within this categorisation is that of tomato paste made from GM tomatoes whose improved consistency makes better sauces than conventional non-GM derived tomato paste. As the alternative is to consume the perceived inferior non-GM tomato paste, the demand for the new paste is fairly price inelastic providing scope for the food processor to pass on the additional costs of IP in the form of higher consumer prices.[5]

GM Agronomic Traits

For these GM traits that offer cost saving, yield enhancement or reductions in risk, the issue is more complex.

First, crops modified with agronomic traits focus on the cost of production and apparently offer no direct value to the final consumer. They do not create a new, improved product and therefore there is no incentive for consumers to pay price premia. The only likely instance of willingness to pay a premium in such circumstances is for crops grown without using GM technology. This occurs if some consumers perceive non-GM products to be "superior" to GM crops and therefore may be willing to pay premia to cover the costs of segregation or IP necessary to provide such products. The scope for passing on the costs of segregation or IP for the non-GM product will depend upon how strong the demand for non-GM products is likely to be. The stronger the demand, the more unresponsive to price change and the greater the scope for suppliers to pass on the costs of IP in the form of higher prices.

Second, the main benefit of the agronomic, cost saving GM technology is to reduce farm gate prices, and thence, in principle, to reduce prices further down the supply chain. The problem is that this price reduction from a single specific technical change is almost impossible to detect. The agricultural raw material price is a small and decreasing fraction of final consumer food prices. Thus small cost savings at farm level translate into imperceptible price effects at the retail level. Furthermore, such technology-induced price reductions occur in an economic environment of volatile agricultural prices and general price inflation. The net result of this is that many consumers argue (especially those against the adoption of the technology) that GM crops

[4] In economic terms, this responsiveness is measured by the own-price elasticities of supply and demand at each stage of the food chain.

[5] As indicated earlier, there is a clear incentive for suppliers such as farmers, food processors and retailers to initiate segregation or IP to retain the identity of the GM value adding trait and hence market a new, distinct product for which consumers may be willing to pay higher prices. In the tomato paste case however, the savings derived at the processing stage also provided scope for reducing the price, as well as offering a new, improved product. Thus, the suppliers did just this, reduced the price relative to the non-GM product (by 10-15 per cent), passing on some of the benefit to consumers but retaining the rest of the benefit as increased margin.

containing agronomic traits like herbicide or insect resistance offer no benefits to consumers. This is however an incorrect conclusion.

Distribution of Costs and Benefits

The pattern of distribution of the costs and benefits of any new technology is complex and the precise magnitudes and endurance of the costs and benefits will very from case to case. From the day of launch of a new product, there is initially just a small number of farmers (the innovators) who take up the new technology. It may even, initially, cost them more than the new technology returns to do so. They take time to learn how to utilise the new technology, and the early versions are often relatively expensive. However, precisely because these farmers are innovative they expect to find ways to make the new technology work and to give them improved returns (otherwise why innovate?). As improved returns materialise, and as this information becomes more widely available, more and more farmers adopt the new technology.

As the proportion of farmers using the new technology mounts, it is likely that the supply of the product (eg, a herbicide resistant soya) increases. In a normal market this will drive down the price of the product causing the benefits to the adopters to start to fall. The precise magnitudes of the supply increasing effect and the resulting decline in price depend on the nature of the technical change and the responsiveness (elasticity) of demand for the product, however the direction of these effects is clearly as indicated.

This fall in price is the main way that new technology in farm production benefits consumers and has occurred on an enormous scale over the last century or two and especially since World War II. This is evident from the general decline in real food prices over time. This in turn is reflected in many ways: the declining proportion of income, on average, which consumers spend on food, or the number of hours or minutes of work, on average, to earn enough to buy, for example, a loaf of bread. These indices have systematically fallen both because of the improvement in productivity of food production and thus in the real costs of food and also, because of improvements in productivity and thus real income in the rest of the economy.

Nevertheless, it is very difficult for the consumer to make any link between a specific new technology on the farm (or in processing or distribution) and the price paid for end products, even though the link is real. There is no other explanation for the fall in real food prices. There are however many effects which can obscure this link. These include:

- the raw material component within the price of final food products has often got smaller especially as food processors and manufacturers have sought to add more value to raw materials. This reduces the impact of, say, a 10 per cent reduction in farm gate price, on the price of the processed product at retail level (but does not eliminate the cost reducing effects of the technical change);
- government policy interventions (notably the CAP). These can reduce or even prevent the supply shifts and price reductions that are the vital ingredients which transmit the benefits of technical change from producers to consumers[6]. In these cases, the responsibility for any failure of consumers to benefit from the new technology should be laid at the door of the policy makers not the farmers or the suppliers of the new technology[7];
- imperfections in competition in the food chain. It is the existence of good information, and ease of entry and exit of firm which create the competitive forces which ensure that price reductions at one level are transmitted through to consumers. If market structures are such that these forces do not operate, then, once again, the problem is not the new technology but in this case, the lack of effective competition policy.

As consumers start to share in the benefits of any new technology (in the form of lower real prices), the erosion of product prices caused by the increased supplies starts to signal a new motive for adopting the technology for farmers. Thus instead of the driving force being to increase profits resulting from the cost reduction, it increasingly becomes the need to maintain profits, or even avoid losses by reducing costs. The early adopters make money by adopting the new technology, later adopters are trying to avoid losses. The reason this happens is because the market transfers some of the benefits of the new technology to consumers via the fall in prices.

By the time the technology has reached "maturity" and has been adopted by all but a few the full extent of the benefit to consumers is achieved. This may be maintained indefinitely, or it may erode somewhat. The benefits to the technology supplier starts as a negative (ie costs) which increase as research and development is undertaken. These costs then decline as the distribution costs are partly offset by initial sales. Profits to the supplier then usually peak at around the time of mature adoption and then decline as competitive products arrive on the market and as the product goes out of patent.

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[6] Classic examples can be found in the EU such as the European dairy and sugar sectors where the combination of a system of production quotas (in which increases in production are penalised) and intervention prices (which artificially maintain prices) ensure that very little of the benefit of technical progress in production reaches the consumer.

[7] Another masking factor could be imperfections in competition in the food chain. It is the existence of good information, and ease of entry and exit of firm which create the competitive forces which ensure that price reductions at one level are transmitted through to consumers. If market structures are such that these forces do not operate, then, once again, the problem is not the new technology but in this case, the lack of effective competition policy.

SEGREGATION OF GM CROPS CONTAINING AGRONOMIC TRAITS

It is possible to perceive that there is a high substitutability between the GM and traditional products (ie consumers will not consume the modified (new) version at all, especially if the price is higher), because they perceive the GM and non-GM versions of the product to be inherently the same. This would mean that the consumer would not bear any of any associated, additional segregation or IP costs. All these costs would then be passed back to the primary producer and processors where they will offset some of the cost saving advantages offered by the GM technology at the farm level. In such a case if the costs of the IP associated with the GM crop are equal to, or greater than, the cost savings of the technology to farmers then there will be little incentive for farmers to adopt the new technology.

However, it is unlikely that the reaction will be so extreme. The group of consumers who wish to avoid products containing or derived from GM crops will react negatively to the appearance of labels on foods signalling either the "content of" or "derivation from" genetically modified ingredients. But this is likely only to describe the behaviour of a segment of the population (how large a segment is extremely difficult to predict). It should be noted that not all consumers read product labels when they purchase goods. Those consumers with less strong views on the subject will probably not be influenced by any positive labelling of GM products and hence be unlikely to alter their purchasing patterns (if the price of both GM and non GM are the same).

Some European food manufacturers had already, voluntarily, labelled some products before the introduction of EU Regulation 1139/98 eg biscuits and pizzas as containing genetically modified soya ingredients and consumer reaction (in this case in the Netherlands) where the reported impact was very small (ie there has been no significant change in purchasing patterns by consumers). Whilst such examples cannot be cited as providing definitive evidence of how most European consumers may react to any positive labelling of products derived from GM crops, it suggests that the elasticity of substitution between GM and non-GM products is not necessarily very large. In such cases the additional cost of positive labelling of the GM products is likely, at least in part, to be passed onto and shared with the final consumer. It should be recognised however that the labelling of GM products is only one (small) element of segregation or IP and hence constitutes only a small element of total possible segregation costs. The (Dutch) example discussed above is a case where there was no segregation or IP of the modified or non-modified soyabeans or soya derivatives. These ingredients were traded through the normal commodity system offering no segregation or labelling. This cannot therefore be classed as an example of full segregation or IP of GM crops in action. In addition the case refers to labelling initiated in 1997–98 before the current intense and broad media attention to the issue arose.

A further point to consider is if the GM crop containing an agronomic, cost saving trait is sufficiently advantageous at the farm level it may supersede the traditional non-GM crop. During this process of adoption, once the GM crop accounts for a significant proportion of all traded products, it becomes the norm and may set the baseline for the commodity traded price of the crop. Should this occur it is likely that the benefits of the cost saving at the farm level will be passed on down the supply chain in the form of lower real prices for the commodity traded crop and derivatives. In this situation, the baseline price for the crop, both GM and non GM varieties, will effectively be set by the GM version at a lower real level than currently prevails. The net effect of this would be to make the growing of the non-GM varieties (with their higher production costs) less attractive to farmers. Unless purchasers of the crop in the processing chain, or if final consumers were willing to pay a premium price for non-GM varieties relative to the new commodity GM crop, the latter would dominate the market place. In these circumstances, the onus for, and costs of segregation focus on the traditional, non-modified version.

The ability to pass cost increases such as segregation or IP costs through to the next stage in the food distribution chain is also dependent on the competitive structure of the industry. The less competition there is, and the more concentrated the structure of the particular processing industry. The more likely that the additional costs of segregation or IP will be passed back to the previous stage, or forward to the next stage. As the market power in the food chain is stronger at the food manufacturing and food retailing levels (than either the farm or final consumer levels). This means that they have greater bargaining strength to avoid absorbing cost increases. This in turn means that the cost increases are likely, either to be passed back to the farmer in the form of lower prices for the raw material, or passed forward to the consumer in the form of higher prices for the finished product. If the costs are passed back to the farmer this will offset some of the benefits of adopting the new (cost saving) technology and may discourage uptake. If the costs are passed onto consumers, it may result in reduced levels of consumption according to the level of responsiveness of consumers to changes in price.

In summary, insisting on segregation or IP will create additional costs in the food chain. If initially imposed on GM crops, these costs will be carried out by the GM crop and its derivatives and shared through the food chain as discussed above. However, over time, the incidence of the extra costs between different parts of the supply chain and between the modified and non-modified products may change. In addition, extra costs of segregation will probably diminish through learning by doing. Once a system is up and running it usually costs less to operate than when it is new and staff have to learn the necessary steps. Also, extra costs of segregation or IP are likely to diminish as the volume of the crop subject to segregation or IP increases (it will probably be processed and handled by larger and more specialised facilities and the extra costs, for example, of shut down and cleaning of machines will be reduced or may no longer be necessary).

It is however difficult to predict the balance of the various effects of GM technology (especially agronomic, cost saving traits) and any consequential segregation and labeling on the costs per tonne of the crop or its derivatives. This balance itself has a complex dynamic pattern.

Segregation or IP in GM Soyabeans: Current Market Developments

Traditionally there has been very limited segregation occurring within the soya supply chain in Europe with the vast majority of soya entering the EU via the commodity based system. However as GM herbicide tolerant soya has been one of the first GM crops to be commercialised, the presence of GM soya in the European food supply chain has become widespread. This has played a major role in fueling the current controversy and debate about GM crops in Europe and led to a number of instances of IP or segregation being developed. The key points to note concerning these developments are:

— there are clearly additional costs associated with the segregation/IP process; mainly concerning costs of testing and IP post-farmgate, ie the costs fall mainly at the processing and transport phases. These include some capital (start-up) costs and some additional running costs. Ultimately the additional cost relative to use of commodity sourced soya varies according to the ingredient and use made of the soya derivatives. Consequently it is difficult to ascertain whether these additional costs are, or will be passed onto end purchasing consumers in the form of higher prices. As this is a fairly new and fast developing market, it remains to be seen whether the respective instigators or segregation/IP will be willing to absorb the costs. To date where the soya or its derivative has been used as direct ingredients in human foodstuffs the additional costs do not appear to have been passed onto the consumer in the form of higher retail prices. Rather those demanding non GM soya have expected suppliers to address the problem and largely incur additional costs. It would appear that this has so far been (reluctantly) accepted at the food manufacturing level of the supply chain although this may simply reflect the limited use of soya and its derivatives relative to total raw material costs used in a product. For example, in chocolate soya derived lecithin accounts for less than 0.5 per cent of total ingredients used and less than one per cent of total ingredient costs. In the longer term, it is difficult to predict whether this will continue to occur, especially if European food retailers begin to demand that all livestock products are derived from animals fed non GM feed. As the animal feed compounding industry is one that operates on relatively low margins per tonne of output, and feed accounts for a significant part of total production costs for meats such as pork and chicken, it is difficult to see how the supply chain upstream of European retailers can absorb any additional costs of IP/segregation unless fairly generous tolerance levels are used.

— the costs are heavily influenced by the tolerances set. The tighter they are the higher the cost. Hence, estimated costs cited have varied between as low as +15–25 per cent of the farm-gate price (where fairly liberal tolerances of 1–2 per cent are used) to +150 per cent where the tolerance set is no detectable residue (in reality equal to about 0.01 per cent tolerance[8] which is about the limited of current commercial testing);

— there is evidence that the costs of segregation/IP (post-farmgate) appear to decline once set-up costs and a learning curve of operation has been experienced;

— a further point to take into consideration in examining any additional costs of segregation/IP for the future and whether participants in the supply will be willing to source segregated non-GM soya relates to the availability of non-GM soya relative to GM soya. In 1997–98 GM soya varieties accounted for about 30–40 per cent[9] of all soyabeans planted in the US and a significantly lower share of soya output in the other main producing countries. For example, Brazil, where authorisation of herbicide resistant GM soya planting has been given regulatory approval but 1999 plantings will be the first crop in which GM varieties may be (legally) grown. This means that currently non-GM soya varieties probably account for the majority of world production and hence set the baseline for world soyabean and derivative prices, traded through commodity-based systems. In the next season or two however, if GM soya varieties continue to expand their share of overall production as they have in the US over the last two to three years, a position may soon be reached whereby GM soya production accounts for the majority of world production and traded soyabeans and hence GM soya may set the baseline for commodity traded price of soyabeans. Given that GM soya varieties offer significant production cost savings to growers (estimated to result in 10–40 per cent savings on herbicide applications costs, improved weed control and resulting in a clearer crop hence higher harvested yields[10]), this scenario of GM soya dominating production and supply of soyabeans could soon occur. Should this occur, it is likely that the benefits of the cost saving will be passed on down the supply chain in the form of lower real prices for commodity traded soyabeans. Thus, the baseline price for all soyabeans, including non-GM soya will effectively be set by GM varieties at a lower real level than currently prevails. The net effect of this would be to make

[8] In other words tolerance levels of about 5 per cent rather than 0.5 per cent as some are currently working to in the EU.

[9] Estimates suggest the figure is 50 per cent plus in 1999.

[10] Whilst the precise benefits can be argued over, based on empirical evidence, what cannot be disputed is the rapid take up of the technology by US soyabean farmers who consequently must see a significant cost saving benefit, otherwise the take-up rate would probably be much lower.

the growing of non-GM soya varieties (with their higher production costs) less attractive to soyabean farmers unless purchasers of beans (in the processing and users sectors) were willing to pay a premium price for non-GM varieties relative to the new commodity GM-soya that would probably dominate world trade. There is already the first signs showing of this market development occurring with the offering of contracts to US farmers in the summer of 1999 to plant non-GM herbicide resistant soyabeans for a farm gate premia of 4-5 per cent on average 1999 US soyabean prices.

In sum, to date sourcing of segregated or IP non-GM soya is occurring at some additional costs relative to commodity system supplied soya. This has been relatively easily facilitated by the widespread availability of non-GM soya grown, the fact that non-GM soya is currently setting the baseline for world soyabean prices and most users of non-GM soya are using small quantities (relative to the total ingredient use per product) in high value, human food products. In the medium term, however it is reasonable to assume that the availability of non-GM soya may diminish and real soyabean prices may fall (baseline prices may be set by GM varieties with their lower costs of production). Should this occur, the premia required by producers to grow non-GM varieties is likely to increase resulting in real increases in the cost of IP GM-soya relative to current additional costs of sourcing. Also if non GM soya is demanded in animal feed rations it is very likely that additional incentives (relative to current farm level premia) will have to be provided in order to obtain sufficient volumes of supply. In turn this would probably lead to some of the additional costs of segregation/IP being passed on right down the supply chain to retail level. It is however difficult to estimate what level or to what extent this may occur.

8 October 1999

APPENDIX 8

Memorandum submitted by the Food and Drink Federation (R 10)

This is in response to the invitation to comment on the segregation of GM foods as announced in Agricultural Committee Press Notice No 23 of 30 July.

FDF as such has no direct expertise in the practicalities of the segregation of GM crops on farm, in storage, or in transit. Such expertise will reside, *inter alia*, with the companies identified in the MAFF website list of suppliers offering non-GM material.

FDF wishes to draw attention to the importance of ensuring the sourcing of identity preserved (I-P) non-GM (ie conventional) ingredients as a basis both for satisfying consumer demand for non-GM products and of ensuring sufficient legal certainty for companies in not GM-labelling such products.

The background of difficulty in controlling the co-mingling of GM soya, and to a lesser extent GM maize, due to unsegregated supplies, principally from the USA, is well known. In view of the scale and complexity, particularly of the production and transportation of GM soya, and the relatively small amount required for production of derivatives for the UK food and drink manufacturing industry, it was held by suppliers that segregation would not be possible other than at very substantially increased prices. For many manufacturers, the response has been to remove, where possible, derivatives of soya and maize from products. This is not, however, a satisfactory, long-term answer overall.

EC Regulation 1139/98, on GM soya and maize labelling, requires labelling where GM material (protein or DNA) is present in the final food; the absence of GM material from products of GM origin thereby removing the need to label. There is substantial customer demand, however, that GM labelling be applied to *all* products of GM origin, whether or not GM material is present. Accordingly, the only route to the supply of non-GM products to these requirements is the secure sourcing of identity-preserved, conventional material.

It is, therefore, a current priority amongst both manufacturers and retailers to agree a best practice standard for the supply of I-P soya and maize, demonstrable compliance with which could be the basis of not GM labelling products. The objective of such a scheme is to minimise any adventitious presence of GM materials by the monitoring of all key points from which such presence might arise. The approach might best be described as a "target-zero, due diligence" approach where zero presence of GM material is the target but demonstrable compliance with the system would provide a due diligence defence if a low level of GM material was found to be present in non GM-labelled products, the relevant ingredients of which have been so sourced.

With the passage of time, and an increasing demand for conventional materials, there is an evident increase in ability or preparedness of growers to supply conventional materials. It is hoped that increasing demand will result in an economically viable supply of conventional materials identity-preserved to an agreed standard.

8 October 1999

APPENDIX 9

Memorandum submitted by the United Kingdom Agricultural Supply Trade Association Ltd (R 13)

UKASTA welcomes this opportunity to give evidence to the Committee on this most important and relevant subject. UKASTA represents approximately 330 companies involved in a number of aspects of the agricultural supply industry including animal feed manufacture and distribution, seed multiplication and distribution, agrochemical and fertiliser merchanting and the first buying and trading of combinable crops from UK farms.

Given the breadth of the UKASTA membership and its interests, the Association feels suitably qualified to comment on the Committee's chosen issue of segregation of GM foods. Within the association the issue of GMOs is dealt with by a principle committee, the Crop Technology Forum. This is a cross sector body drawing together interests from the various aspects of UKASTA including seed, agrochemicals, fertilisers, crop marketing and animal feeds. The Crop Technology Forum therefore enables the wide range of views within the association to be considered and drawn together into a coherent policy.

In addition to this work, UKASTA is also a founding, and continuing member of SCIMAC (the Supply Chain Intiative on Modified Agricultural Crops). Through this the Association has had a direct input into the development of the SCIMAC guidelines for the production of GM crops in the UK. These guidelines, which extend from the development of these novel traits and their inclusion in commercial crop varieties, through to the marketing of the resultant produce at the farm-gate, specifically address some of the issues on which the Committee has requested evidence.

GM Crop Production

As submissions from elsewhere will undoubtedly indicate the production of GM crops in the UK is intended to operate under a set of guidelines which have been produced jointly between government and industry. The Supply Chain Initiative on Modified Agricultural Crops (SCIMAC), to which UKASTA belongs as a founding member, has spent many months in consultation with both government, through MAFF and DETR, as well as a large number of other interested bodies and non governmental organisations. The outcome of these consultations was a series of documents, approved by government earlier this year, including guidelines for farmers who are intending to plant GM crops in the UK. Not only do the guidelines provide additional information, over and above good agricultural practice, on specific measures which need to be addressed, they also clearly require the harvested GM crop to be stored separately.

Despite protestations to the contrary there does remain a wide diversity within UK agriculture. The majority of farmers do retain a balanced crop rotation and as such are not dependent on a monocultural system. It is due to issues such as these that SCIMAC, when drawing up its guidelines, felt able and confident to require that GM crops be stored separately on farm. It must be remembered that the issue of identity preservation will become just as important in the future for the benefit of the GM crop as well as the conventional variety. As the industry moves into the production of GM crops which have enhanced nutritional characteristics or improved non food uses, then it will be imperative that cross contamination does not occur which could affect the suitability of such crops for these new markets.

Importantly the SCIMAC guidelines should not be viewed as being an option which farmers may choose to take on board. Adherence to the guidelines, checked by an external and independent audit of compliance, is mandatory. Those life science companies operating in the UK and who are looking to supply GM seed are committed to the principles developed by SCIMAC. Failure to adhere to the necessary requirements by growers, or indeed those companies supplying the seed will trigger a penalty system and could, if the shortcomings are serious enough, result in the farmer/company concerned losing access to GM technology. Information on all those in such a position will be held centrally by the independent auditor.

Given such a system, it is the belief of UKASTA that the production of GM crops in the UK will be suitably controlled to ensure that the foremost requirement of consumer choice remains available for those products of UK origin.

Handling and Storage Issues

The UK system for the handling and storage of agricultural commodities cannot be compared to the bulk oriented systems in place in North America. Different systems have evolved over a period of time which are sympathetic to the style of agricultural production in the UK which is also very different to the US. The nature of the UK system is largely responsible for the fact that SCIMAC was able to make it a requirement of its over arching Code of Practice for the production of GM crops that such crops should be stored separately.

Whilst segregation or identity preservation through storage may therefore present logistical difficulties it is not foreseen that these difficulties will be insurmountable. There are many who would liken the situation to that faced by growers or traders involved in both feed and milling wheat or feed and malting barley. As mentioned earlier it is also quite conceivable that in due course the need for identity preservation down the chain will be more of an issue for maintaining the purity of the modified crop and its particular attributes.

Transport Off-Farm and Storage

Whilst the SCIMAC remit does not extend beyond the farm-gate it is the intention within UKASTA and its Crop Technology Forum, that the SCIMAC principles in the area of segregation and identity preservation be carried through the marketing and transport of crops from farm to end user. This is an area which is therefore now under active consideration within UKASTA. As a result of wider concerns within the food industry UKASTA has been developing certain assurance schemes. The Trade Assurance Scheme for Combinable Crops (TASCC) has been developed within UKASTA to continue the principles of the farm assurance scheme, ACCS (Assured Combinable Crops Scheme). How GM crops may fit into TASCC is now being debated.

GM Crop Segregation and End Users

It is within the end users that the question of segregation becomes more of an issue. Clearly UKASTA is only able to speak for animal feed compounders, although such companies do represent end users of a significant quantity of UK crop production—they are also directly involved in the issue of GM segregation through their reliance on imported raw materials such as soyabean meal and corn gluten feed. It is imperative that the question of home produced and imported crops are dealt with separately because of the different farm structure between the UK and elsewhere as highlighted earlier. For feed materials produced in the UK the question of segregation is easier to address given the presence and acceptance of the SCIMAC guidelines. What continues to be an issue of greater importance is the situation surrounding that of imported products and particularly soyabean meal and corn gluten feed. What must clearly be recognised is that the non segregation of these products is a result purely and simply of the long established storage and transport structure within the agricultural industries of both North and South America. Coupled with the comprehensive regulatory process this led to a belief, borne out by the evidence from their home market places, that there was no further consumer issue which would require the introduction of segregated lines and the cost implications this would bring with it.

The issue of identity preservation in itself is not a new phenomenon to the animal feed manufacturing industry. Suitable systems are already in place for a number of small use/high value feedstuffs and organic production is one good example of this. What would present problems for this part of the industry however would be a widescale move towards a marketplace which was looking for finished products produced in quantity of both GM and non GM streams. This would require a significant change in the structure of feed mills, particularly their storage systems and would require capital inputs which would need to be recovered through higher costs for finished products.

Implications for Consumers

Results from consumer research to date would suggest that the issue of traceability does remain an important factor. Labelling therefore provides a crucial element of a traceable system for GM as indeed for any other aspect of production. Clearly there are many issues relating to labelling which remain to be addressed by the European Commission, including the issue of thresholds. Any effective labelling system will however only operate if it can be seen to be effective and transparent through not only the supply chain but also the processing and retailing elements also. This is an area UKASTA has been discussing with Ministers and continues so to do. There is however little point in introducing comprehensive and effective labelling systems through the primary agricultural system if this information does not then follow the food processing chain to provide complete traceability through the system. This, together with labelling which is informative, clear and standardised, can only realistically be achieved through statutory means.

It has to be recognised that full segregation is going to have a cost to consumers in some, if not all products. Where separate storage has not been a feature until now there will clearly be cost implications in adapting the sytem. Storage is however only one element. Processing operations can be considered to be an opportunity for cross contamination. Segregated processing, or comprehensive cleaning between processes may well be a more significant cost factor. For example the need to move to dedicated feed mills for GM and non GM products will have transport cost implications as the distances between supplier and mill and/or mill and customer will become greater. These figures are as yet unquantified. They will not however be a minor factor.

With the above in mind we support the decision taken recently by Marks & Spencer to initiate a test marketing of products derived from animals fed on non-GM ingredients. We believe this will be a small but important indication of the likely consumer reaction to the implications for segregation within the bulk commodity market as well as being an important determining factor for the likely final on-cost which such a system will need.

Conclusions

UKASTA is of the view that identity preserved systems remain an important factor in being able to deliver, with confidence, a non GM product. Whilst such systems are extremely unlikely to be able to allow those in the supply chain to provide guarantees on the origins of the raw materials they are trading, they do have the

ability to provide material within tolerance thresholds assuming they are set at a level which is in line with the assumptions being made at present by those with an indication of the Commission's line of thought.

Such systems will inevitably however introduce an element of additional cost and it appears clear that this cost element has to be addressed at the consumer end of the market. With this in mind a decision has to be taken on where the role of legislation lies. UKASTA is of the view that the market place will be in a position to determine the thresholds which are acceptable to consumers and which may well change over time as consumer perceptions are adapted in line with new information. We believe however there is a role for legislation in determining that the consumer is obtaining clear and unambiguous information. Legislation must establish definitions for terms such as "GM free" in order that the consumer is not misled and continues to believe in the integrity of the food production and retailing system.

Crop production in the UK has advantages over other countries in its ability to address consumer concerns over traceability. We believe systems are now in place through the SCIMAC initiative which can deliver these advantages and we would look to the Committee to acknowledge this whilst bearing in mind that some sectors will be viewing a major structural change in order to provide the market requirements.

Looking slightly further ahead to the second generation of GM crops, it is felt that identity preservation is a more relevant and important factor than pure segregation. As GM crop technologies move into the production of crops for non-food purposes the reasons for identity preservation will switch as the concerns over unwanted co-mingling become greater for the GM crop and its potential end use.

Finally we believe that labelling and traceability count for nothing if the system which is operating does not do so on a seamless basis—SCIMAC principles start this trend and we feel these must continue through processing and retailing elements if the requirements of consumer information and choice are to be achieved.

We hope this memorandum on the views of UKASTA will assist the Committee in its deliberations and the Association remains at the Committee's disposal should it wish to discuss the issues further at a later date.

8 October 1999

APPENDIX 10

Memorandum submitted by the National Farmers' Union of England and Wales (R 14)

1. Introduction

The National Farmers' Union (NFU), in association with the British Society of Plant Breeders (BSPB) and the United Kingdom Agricultural Supply Trade Association (UKASTA), released two complementary codes of practice in April 1997 (see revised versions, Appendix 1 and 2 [not printed]). Both codes laid out guidelines that were intended to ensure traceability for individual UK consignments of genetically modified (GM) crop varieties. This was to be done via a seed package identifier plus accompanying information, appropriate on-farm record keeping, segregation, and post-harvest documentation that should accompany each crop consignment. These procedures were designed to ultimately allow foods that contain material derived from GM crops to be labelled to ensure consumer choice. These codes were produced well in advance of the commercial growing of GM crops in the UK, which at the time of preparing this submission is still not occurring.

In response to a consultation process on GM herbicide tolerant crops that was initiated by MAFF in the summer of 1997, the group that had produced the two codes of practice re-convened. On this occasion five groups were able to agree on a submission to MAFF. These were the NFU, BSPB, UKASTA, the British Agrochemical Association (BAA), and the British Sugar Beet Seed Producers Association (BSBSPA). As a result of the degree of cooperation that had proved possible, it was decided that the informal group should be constituted into a more formal body. As a consequence the Supply Chain Initiative on Modified Agricultural Crops (SCIMAC) was formally launched in July 1998, with the five member groups being those who had submitted the joint statement to MAFF. This new body has proved to be an effective one and it has produced a set of guidelines for growing newly developed herbicide tolerant crops (Appendix 3 [not printed]).

2. The SCIMAC Herbicide Tolerant Crops Guidelines

The SCIMAC guidelines, code of practice, and associated documents, were developed to ensure that farmers and growers grew GM crops in a responsible manner. These documents were endorsed by government in May this year. They are now being used as a means of controlling the growing of herbicide tolerant GM crops in the government-sponsored field-scale trials. The processes outlined in the guidelines were derived from well established practices that have been used for many years to grow crop varieties for certified seed production. A comparison of the SCIMAC guidelines with the appended MAFF guidance notes for growers of seed crops in England and Wales show that there are many similarities in the procedures outlined in the two documents (Appendix 4 [not printed]). For example, the requirement for isolation distances, the provision of appropriate information, etc, are common to both. Also the need to physically separate the produced seed (ie segregation) to provide a clearly identified product (identity preservation) is a clear requirement.

3. Other Crops that Require Segregation/Identity Preservation

Another type of crop that has to be separated from other varieties is one that produces a specialised oil. In the UK this presently means a high erucic acid variety of oilseed rape (HEAR). For this crop, and to protect certified Brassica seed crops in the area, a zoning system has been set up in North Essex to try to ensure that contamination is unlikely to occur (see Appendix 5 [not printed] for details of the scheme).

4. Segregation/Identity Preservation

The two examples that have been given show that UK farmers already have experience of segregation and identity preservation. There are several reasons why segregation and identity preservation may be required. These are as follows:

- Consumers demand choice and the only way that they can be given it is by a process of segregation/identity preservation. For example, consumers may be unwilling to eat foods that contain genetically modified (GM) ingredients, and so GM food will need to be labelled. Other consumers may have ethical reasons why they do not wish to eat certain products (eg animal products if one is a vegetarian, various religious taboos).
- A crop may be grown because of its increased value (eg one for certified seed purposes, a crop producing a specialised oil, a GM crops with specialised qualities). To maintain this increased value separation of the produce is required.
- A crop could be grown that would be hazardous if the products of it were eaten by humans or livestock (eg a crop designed to produce industrial chemicals, pharmaceutical products, etc). Such crops would generally have to be grown in confinement. However, again the harvested crop will need to be separated from other non-modified varieties.

5. Requirements for Segregation/Identity Preservation

There are a range of requirements that need to be put in place for the establishment and maintenance of segregation/identity preservation. However, it should be noted that not all farmers and growers are presently suitably equipped to carry out these processes. It should also be noted that a failure to maintain appropriate standards at any stage could lead to a breakdown of segregation/identity preservation. Note that the degree of effort required to produce segregation/identity preservation will depend on the degree of purity that is defined in the contract between farmer/grower, and the company to which he/she supplies the harvested product. This may be further complicated by any legal requirements that may be in place at the time. The requirements are as follows:

- The purity of the initial seed is essential. The development of new crop varieties has to take place under very controlled conditions. For example it is common practice to maintain a *cordon sanitaire* around the crop being developed to reduce the likelihood of cross-pollination with adjacent crops. This distance is generally recognised as being sufficient to attain a seed purity level of at least 99 per cent. As with plant breeding, the crop to be used for seed multiplication has to be separated from adjacent crops to attain a high level of purity.
- When available to the farmer the seed variety has to be clearly identified by a seed package identifier. This identifier needs to be supported by more extensive information. This would include information on the nature of any genetic modification, and advice on good farm management practice for that particular seed variety. An information helpline, or another means of accessing additional agronomic advice should be provided by the seed supplier.
- It is important that each crop be clearly identified by variety at all stages of production, from initial seed stock, through planting, to harvesting and storage. Detailed accurate records of plantings and other information need to be kept.
- Uncontaminated planting equipment needs to be used. Pre-treatment of the field to be planted is necessary if a different variety was grown in it over the previous growing season. Agronomic advice on this should be available.
- To minimise the likelihood of cross-pollination, agreed separation distances between the GM crop and adjacent ones must be put in place. These distances are outlined in the SCIMAC guidelines for several herbicide tolerant crops (see Appendix 3 [not printed]).
- It is important that the harvesting process does not cause contamination of the favoured crop. For example, the harvesting machinery must be thoroughly cleaned before use. The farm machinery used to transport the harvested crop also needs to be cleaned. Care must also be taken to make sure that GM seeds are not split on transport to avoid the possibility of the contamination of non-GM crops. The on-farm storage bins must be cleaned before the harvested crop is put into them.
- The equipment and processes used need to be independently audited to ensure that the requirements are carried out.

— To maintain identity preservation throughout the food chain similar care to that taken on the farm will need to be taken at all levels of the chain.

6. Costs of Segregation/Identity Preservation

It should be noted that because of the procedures required for the attainment of segregation/identity preservation, there will inevitably be extra costs involved. For example, the extra land area required because of the separation distances needed to grow GM crops will have to be factored into the eventual costs of the harvested product. In the same way, the extra care required for growing GM crops will add labour costs to the endeavour. Consequently, this process is only practical if there is a significant agronomic and/or cost advantage over and above the growing of traditional varieties of the crop in question. The two examples given earlier in this document are ones where this has been the case. The economics of identity preservation of GM crops have been studied in a detailed report (Buckwell *et al*, 1999) and a similar conclusion has been drawn.

7. Conclusions

The use of segregation to produce and identity preserved agricultural or horticultural product is already commonplace for the production of certified seed. Similar processes can be used for GM crops. However, it should be noted that there is a cost involved in such a process.

8 October 1999

APPENDIX 11

Memorandum submitted by the Royal Institution of Chartered Surveyors (R 15)

This paper is submitted as evidence in response to the Agriculture Committees Press Notice No 23 dated 30 July 1999.

Introduction

This evidence has been prepared by the Royal Institution of Chartered Surveyors (RICS) which has some 100,000 members around the world. The Rural Practice Division of the RICS has members who are involved in the management of much of the rural and agricultural land in the United Kingdom. Members work for public, private and corporate landowners and farmers, as well as tenants. In addition, they work for many public bodies such as MAFF, English Nature, and the Countryside Agency and Countryside Council for Wales, as well as for other bodies such as the National Trust.

Much of the recent debate surrounding Genetically Modified Organisms (GMOs) has centred around the perceived dangers of the technology. This has had a considerable impact on consumer confidence in GM food and GM technology. In turn many food processors and supermarkets have opted not to buy GM produce at the current time. As part of the debate the RICS has sought to raise issues which have implications for land management.

Even if fears about GM technology are scientifically unsubstantiated, those fears will still create uncertainty for investment in farming, a sector which is already in crisis. It is important that in order to boost consumer confidence traceability systems are put in place to facilitate choice.

Segregation of GM and Non GM Crops

The court cases of Regina v MAFF ex Parte Watson and the HSE v Monsanto and Perryfield holdings have highlighted the problems of segregating GM crops.

Many farmers or growers may not be practicing organic farming but may nevertheless wish to remain GM free. These farmers and growers may have crops affected by cross pollination from GM crops grown on land in the vicinity. Evidence published this year (eg from the National Pollen Research Unit) shows that cross pollination via insects and wind may occur at greater distances than previously thought.

There may also be mixing of seeds, both prior to sowing and post harvest, due to, for example, the lack of proper cleaning of equipment such as seed drills and combine harvesters. This could be a particular problem in the case of agricultural contractors.

Cross pollination or the presence of GM volunteers in the soil could destroy the organic or GM free status of a farm and, as many supermarkets and consumers are at present keen to market or buy non GM food, the loss of the GM free status on a farm could have adverse financial consequences.

SEGREGATION AND SCIMAC GUIDELINES (PLEASE SEE RICS COMMENTS AT APPENDIX 2) [*not printed*]

CODE DEALING WITH FOOD CHAIN FROM "PLOUGH TO PLATE"

The voluntary industry led code deals only with the management of the crop up to and including the despatch of the harvested crop ex farm. The RICS considers that, in order to maintain consumer confidence, the whole matter of segregation should be a seamless protocol from "Plough to plate". An identification system could be designed. The information would include a reference identifier for the specific gene or genes utilised in the modification including any promoter and the source organism of each inserted gene or promoter. If this information is available throughout the food chain any problems which may arise can be quickly identified and dealt with accordingly.

USE OF MACHINERY AND GM CROPS

We have already referred briefly to the problem of contractors inadvertently spreading or mixing GM seed by inadequate cleaning of equipment. The SCIMAC guidelines state that contractors will be responsible for observing the guidelines. The practicality, however, of cleaning seed drills and combines in field situations is highly questionable as is the "policing" of this if the growing of GM crops becomes widespread. It seems unlikely that this can be properly controlled and monitored unless there is a requirement that GM crops can only be sown and harvested and handled using designated machinery.

NEIGHBOURING FARMS

The guidelines propose a notification procedure for GM growers to inform neighbouring farmers of their intention to grow GM crops. In view of the evidence about cross pollination, the lack of any power to veto the growing of GM crops, by neighbouring farmers is likely to cause immense friction in the countryside, together with expense, as has been demonstrated in the Watson and Perryfield cases.

It would also be difficult for a farmer to discover if a neighbour was cultivating GM crops without prior system of consultation, unless some form of register was kept.

POST HARVEST MANAGEMENT

If at a later stage in the process of food production it transpires that mixing has occurred it would be important to try to establish at what point in the process the mixing had occurred. This will be especially important if retailers or buyers maintain contracts requiring ingredients and products to be "GM-Free".

There is also a risk that GM volunteers would persist in the soil following the harvest. Mixing may occur when future, supposedly "GM-Free" crops are harvested from a holding where GM crops have previously been grown. It will be important to monitor the spread and control of any volunteers.

PUBLIC REGISTER

One of the lessons learnt from the BSE crisis was that lack of adequate records has severely hampered the industry's attempt to win back consumer confidence. A properly maintained register would enable the questions raised below to be answered.

This lack of consumer confidence in British agriculture may further be exacerbated if rigid traceability procedures are not put in place early before the growing of GM crops becomes widespread. Whilst the register may demand resources at this stage it could in the medium to long term be the most cost effective way of dealing with any problems which may occur and provide a means by which the purchaser of land can protect his or her interest under the *"caveat emptor"* principle.

There are a number of advantages which a register would bring:

- it would provide traceability in the food chain;
- it would provide traceability if it was found that there were some harmful effects from a particular GM product;
- it would provide certainty for those wishing to purchase produce from land;
- it would provide certainty for those wishing to purchase land.

It is the Institution's opinion that such measures would assist in developing consumer and purchaser confidence in the food production industry. Such measures would also facilitate consumer choice for those who wished to purchase products which were "GM free".

REGISTER FORMAT

It is suggested that a register should include, *inter alia:*

(a) The location of the crop ie the OS field parcel number.

(b) The nature of the genetic modification.

(c) The type of crop.

(d) The dates of sowing.

The register should be publicly and readily available and maintained by the Government or a public body.

The information could be collected using the existing IACS (Integrated Administrative And Control System) database. This has the advantage of being a comprehensive map based system and will reach the majority of those farmers who would be likely to grow GM crops.

The analysis of the information and inclusion on a register should be carried out by MAFF with the data held regionally for public inspection at the MAFF Regional Service Centres.

The RICS is most concerned about the traceability of GM crops on particular holdings. For example, when carrying out of a valuation of land, surveyors will need to look at whether the holding has a history of GM cropping or whether GM crops have been grown on other land in the vicinity. Clients will expect Chartered Surveyors to highlight these issues and, from a professional indemnity point of view, it will be necessary for surveyors to be aware of the matter.

As the cultivation of GM crops may affect the value of land, it is important, that the location of any land upon which GM crops have been cultivated is known so that surveyors can value land correctly and purchasers can pay a realistic price.

RICS National Survey

A National Survey of rural practice firms was carried out by the RICS during the spring of 1999, in order to explore the land management aspects of the growing of GM crops. A summary of these results is included in Appendix 1 [not printed].

Seventy six per cent of respondents to the survey supported the maintenance of a register of all land where GM crops had been grown and 67 per cent considered that this register should be publicly available. This view is also supported by the European Society of Chartered Surveyors and the European Landowners Organisation.

12 October 1999

APPENDIX 12

Memorandum submitted by Nestlé UK Ltd (R 16)

Summary

Nestlé UK does not consider the current framework for labelling foods containing derivatives of Genetically Modified Organisms to be capable of equitable, meaningful and consistent enforcement.

Current rules therefore meet neither Industry nor Consumer requirements.

Recent EU Commission proposals will not be any more effective.

Serious anomalies will arise if an "adventitious presence" threshold is introduced without an appropriate *De Minimis* level.

The proposed maximum of 1 per cent should be progressively reduced to reflect best possible practice, rather than acceptable practice.

1. Introduction

Nestlé UK is the British operating business of Nestlé SA, the World's largest food company. We manufacture, import and export, and distribute products, via retail and catering outlets, in virtually every sector of the food and drink industry. Our brands include such household names as Nescafé, Rowntree, Crosse & Blackwell, Buitoni, Findus, Nestlé Ice Creams and Chilled Desserts, SunPat, Gales, Perrier and many others. We also supply a range of products for major retailers under their private label.

In the UK, we employ some 12,000 people, in over 20 factory and head office establishments, with an annual turnover of £1.8 billion. World wide, Nestlé employs approximately 225,000 people, operates some 500 factories and has an annual turnover of approximately 70 billion Swiss Francs.

Our own internal structure and the increasingly global nature of World food trade dictate that we purchase raw materials and finished products on a truly International basis. Our European factories operate, similarly, on an International basis and production within the UK may be destined equally for European consumption as for the domestic market. Likewise, products sold in the UK may well have been produced elsewhere within Europe.

Issues relating to the trading, use and labelling of Genetically Modified Organisms and their derivatives must, therefore, be considered on an International basis. Actions by a business in one country will inevitably have knock-on consequences in other countries and on other businesses.

As a general principle, labelling must be accurate, truthful and meaningful. Legislation must be capable of uniform interpretation and it must be uniformly enforced. We do not believe that the current EU GM legislation will meet these criteria until further detailed requirements have been elucidated.

The current EU framework for labelling GMO's and their derivatives—despite recent developments—remains ambiguous and incapable of uniform, meaningful application. Further consolidation of existing requirements is now urgently required, whereby principles applicable to current and future approvals should be established, such that a single framework of equitable, enforceable rules may be introduced.

We therefore welcome the opportunity to contribute our comments in writing and would be prepared to clarify any points of detail more directly to the Committee.

2. Nestlé UK Position on Genetic Modification

New and creative solutions will be required to feed an ever-growing World population with affordable and wholesome foods, in an environmentally sustainable way. As one of the World's major users of agricultural produce, Nestlé has long been a pioneer in encouraging more efficient and sustainable farming methods, especially in the Developing World, where we operate more than 100 factories.

We firmly believe that biotechnology, including Genetic Modification, has the potential to become one of the principal tools available to meet these challenges.

Nestlé UK remains convinced that the responsible use of Genetic Modification, by all in the supply chain, will guarantee safe products and, ultimately, bring significant benefits for farmers, industry and consumers alike. However, at this point in time, without the trust and confidence of all parties, this cannot be achieved.

Nestlé UK recognises that there is consumer concern in this country about different aspects of the application of gene technology to food crops. Consumer confidence in the technology appears to be low and some wish to avoid foods containing ingredients derived from GM crops altogether.

Recognising these concerns, Nestlé UK is therefore providing as far as possible non-GM products in the UK:

- We have removed from the majority of our products ingredients which may have contained modified genetic material and will continue this process.
- We will endeavour to purchase ingredients from non-GM sources or find substitutes where non-GM sources cannot be guaranteed.

Nestlé UK does not produce its own raw materials but, in common with almost all manufacturers of prepared foods, buys its ingredients on the open market. We are, therefore, very closely involved in the debate on traceable, non-GM ("Identity-Preserved") ingredients.

3. Labelling of Novel Foods

Nestlé UK believes that the current legal basis for labelling is incomplete and is therefore working urgently with all interested parties to secure a satisfactory resolution of all outstanding matters. In particular, there is a clear need to establish a limit to the amount of accidental mixing of GM with conventional materials, and to address fully the labelling consequences deriving from such a limit.

It is essential that any standards and legal requirements, which may be introduced, are fully enforced by the Authorities and perceived by consumers to be adequate, increasingly on global rather than a national basis.

The current EU Regulation 1139/98, referring specifically only to Monsanto Soya and Novartis Maize, whilst clarifying to a certain extent provisions relating to these two products, does not apply to other GM crops.

There is thus, already, a very clear need for the requirements of the various regulations to be consolidated and harmonised.

We believe that, in principle, the scope of the Novel Food Regulation 258/97 is appropriate as a means of achieving a consistent approach to the approval and labelling of all Novel Foods and as a basis for ensuring both consumer confidence and fair trade.

However, the labelling requirements currently specified by this Regulation are defined in extremely subjective terms and left open to potentially very wide interpretation. This situation is further confused by references to "substantially equivalent", and to "no longer equivalent". There is a difference of meaning between these phrases and the extent or significance of this difference is totally unclear within the Regulation.

In our opinion, all requirements under Directive 90/220, Regulations 258/97 and 1139/98 and the recent Commission proposals should be consolidated, and the underlying principles converted into one single

Regulation which should then be applicable to all future approvals of genetically modified crops and their derivatives.

We believe the aspect of "equivalence" to be fundamental to the whole question of labelling of Novel Foods. It is of some concern, therefore, that the EU regulators appear to have applied a far stricter interpretation to this term than is generally recognised internationally.

It is inevitable that the early introduction of genetically modified crops will carry improved agronomic traits. The benefits to the consumer will not, therefore, be immediately apparent. Equally, the interpretation of "equivalence" differs widely between interested parties. This has led to the wide divergence of approach between the EU and the USA/Canada, with the consequential difficulties relating to the supply of commodity crops such as soya and maize.

The EU cannot isolate itself from world commodity trade and the more the EU legislation diverges from that of USA, Canada and the rest of the World, the greater will become the difficulties in sourcing commodity materials on a global basis.

This will place additional financial burdens on our industry, and consequently consumers, without generating any tangible benefits.

Future regulation in this area must remain based on scientific considerations, albeit tempered by a political recognition of the sensitivity of this technology, and must be applicable to all relevant stages of the food chain, regardless of the size of the enterprise. Any legislative controls must be capable of uniform interpretation and be equitably enforced across their range of application. Providing this is done, there should be no undue imbalance of impact on any sector of the industry.

Derogations from the legislation should be minimal if any and, if granted, must in no way prejudice the consumer confidence in the totality of the regulatory control over genetic modification.

We are deeply concerned as to how current EU GM labelling legislation will be enforced in practice.

In particular, the question of thresholds and agreed analytical methodology will be paramount.

4. The Current Labelling Framework

Council Regulation (EC) 1139/98 specifies additional compulsory labelling for defined derivatives of Monsanto RoundUp-Ready Soya and Novartis Bt-Maize. Although some Additives and Flavourings are currently outside the scope of this Regulation, Commission proposals are now under consideration to remove these exemptions.

Any foods and food ingredients (covered by the Regulation) sold to the final consumer, produced in whole or in part from these two crops, and in which modified (ie Novel) protein and/or DNA is present, must declare the fact in one of several defined ways. This requirement is absolute—there are currently no numerical/threshold exemptions.

However, the Regulation provides for the development of a list of products/derivatives that will not require labelling. These derivatives are likely to be those in which neither Novel protein nor DNA is present (ie cannot be detected) but, to date, no significant progress has been made in the development of such a list.

Furthermore, there is no officially-validated analytical detection method (quantitative or qualitative), which would allow this regulation to be enforced uniformly or equitably for very low levels of inclusion of derivatives of these crops in foodstuffs or of GM crop presence in bulk consignments. [Introductory Recital 11 calls for the development of such a method, and we understand that progress is being made.]

The possibilities of introducing a threshold for the detection of DNA or protein arising from "Adventitious Contamination" and the question of setting a De Minimis threshold for the presence of DNA or protein were both introduced (Recitals 14 and 15 respectively).

It is useful to consider how, or whether, the threshold for "adventitious presence" of GM in segregated crops and the concept of de minimis interrelate.

We are convinced that the consequences of applying current and proposed labelling rules to final foodstuffs will not meet the criteria of equitable and enforceable legislation set out above.

5. "Adventitious" Presence

Recital 14 of Regulation 1139/98 (Adventitious presence of GM) reads as follows:

"Whereas adventitious contamination of foodstuffs with DNA or protein resulting from Genetic Modification cannot be excluded; whereas labelling as a result of such contamination could be avoided by setting a threshold for the detection of DNA and protein;"

Implementation of this is now under discussion within the recently-published Draft Regulation (III/5125/99), which states that the presence of material derived from a GMO at less than 1 per cent will not require labelling, providing this presence is "adventitious", and that appropriate documentary evidence exists to this effect.

Since this Regulation will be binding, verbatim, it is relevant to consider what is meant by the term "adventitious" presence.

"Adventitious" in dictionary definitions is strongly linked with "happening by chance", and "fortuitous". "Fortuitous" in turn can be regarded as denoting "that which happens by a cause which cannot be resisted . . . or that which neither of the parties have occasioned or could prevent"—(Shorter Oxford English Dictionary).

"Adventitious" presence can thus be defined to be both accidental and unavoidable but, somehow, stronger than both. It happens despite the best endeavours to prevent it.

Many regard "adventitious contamination" as arising only during the agricultural stages of the supply chain. We would refute this view. It is essential that any future provisions should apply at any point in the food chain, including "adventitious contamination" of ingredients during their manufacture and the production of the final food itself. Many of the derivatives of soya and maize are themselves handled in bulk, using equipment that may be common to other processes. The same principles which are applied to segregation in the agricultural supply chain must, therefore, be applicable throughout the whole food manufacturing chain.

The currently proposed maximum of 1 per cent for allowable contamination of non-GM with GM materials is considerably more appropriate than the 2–4 per cent previously canvassed and is to be welcomed in the short term.

Currently achieved and commercially accepted contamination levels of 2–4 per cent for soft/hard wheat, barley/wheat, yellow/white maize, even maize/soya cross-contamination are related to quality, not ethical parameters. Since the GM debate is addressing ethical rather than quality or food safety issues, any final, agreed figure for the accidental presence of GM material will consequently need to reflect something more stringent than current, "common practice". Much higher standards of cleanliness and dedication of equipment will justifiably be required in order to meet consumer expectations.

The target for "non-GM" (Identity-Preserved) products to be "free from GM material", except for adventitious contamination, should therefore be as close to 100 per cent freedom as can practicably and economically be achieved. Even 1 per cent of GM material in a 60,000 tonne bulk shipment of soya equates to 600 tonnes of "unavoidable" contamination—ie 20 x 30-tonne grain lorries!

We believe that 1 per cent is achievable today and would expect to see levels of 0.5 per cent and 0.1 per cent routinely achieved in 6–12 months, respectively, as next season's Brazilian and North American crops are harvested.

We are, therefore, concerned that setting a legal maximum well above that which would be achieved by responsible operators will encourage other parties to operate closer to the maximum, with attendant cost advantages to themselves and to the detriment of the consumer and the responsible traders.

For the purposes of UK Enforcement, the legal framework should encompass the concept of "all reasonable precautions and all due diligence" having been taken. In this way, the occasional, unavoidable "glitch" would be satisfactorily accommodated, whilst meeting the highest consumer expectations for the vast majority of consignments.

6. The *de Minimis* Principle

Recital 15 of Regulation 1139/98 (*de minimis* threshold for "presence") reads as follows:

"Whereas urgent consideration must be given, in the light of any relevant scientific advice, to the question of whether a *de minimis* threshold for the presence of DNA or protein resulting from genetic modification can be set and, if so, at what level;"

It has always been our contention that this is not the same concept as "adventitious" presence.

The expression "*de minimis*" translates to "departing from the minimum otherwise specified" or, in layman's terms, "the law is not concerned with minor deviations from a specified limit".

A *de minimis* threshold for the legal "presence" of novel DNA/protein in the final food, as delivered to the final consumer (now to be extended to include mass caterers), is essential, in order to introduce a (very small) level, below which (for legal purposes) foods can be said NOT to contain GM protein/DNA resulting from Genetic Modification, even if it is theoretically detectable.

The absence of any de minimis provision for finished foods will result in major anomalies

A level of up to 1 per cent of GM material, as acceptable "adventitious" contamination in so-called traceable, "non-GM" crops will exempt any derived ingredients from labelling—regardless of their level of inclusion in the finished food—whereas even the minutest level of a non-segregated derivative will require to be indicated on the labelling of the final food.

This will result in inequitable, illogical and potentially confusing labelling, which will unfairly discriminate between manufacturers and be of little, if any, benefit to consumers.

Further, we believe it is illogical that an ingredient, containing novel DNA/protein at or just above the limit of detection (and which would therefore require labelling—but only just—when sold as such) should trigger labelling of a compound foodstuff when present at, for example, considerably less than 1 per cent in the finished product.

This situation is being made even worse in the latest proposals from the Commission, whereby ingredients currently exempt from declaration because of their extremely low usage rates—of the order of parts per billion in some cases—will have to be identified if they are not from a "non-GM" source.

Soya beans are processed to produce a range of high protein derivatives (between 42 and 90 per cent protein) which may be used at substantial levels in, for example, vegetarian Spaghetti Bolognese/Chilli con Carne etc and at lower levels in many other products.

Since approximately 1 per cent of the total protein in GM soya is "novel" (GM) protein, these high-protein derivatives could contain as much as 0.9 per cent of "novel" (ie GM) protein. If these derivatives are derived from traceable "non-GM"sources, they and the products containing them will be exempt from labelling, regardless of their level of inclusion in the product and the type of outlet from which it is sold.

On the other hand, maize starch derived from a non-segregated commodity supply will contain something less than 0.5 per cent of total protein, of which, again, the GM fraction will be as little as 1 per cent. This starch could be used at levels of less than 1 per cent to thicken the sauce in a compound ready-meal—ie at perhaps 0.3 per cent of the total product (eg Chicken in Wine Sauce). However, because it is from a non-traceable source, labelling is required, even though the "novel" (GM) protein is present in the final food at two or more orders of magnitude less than in the previous example of the vegetarian meals.

In order to explain this anomaly more fully, Annex 1 gives examples of typical recipes which show a factor of about 250 times less "novel" protein to be quite feasible, but nevertheless to require labelling.

This situation is totally inequitable, illogical and potentially confusing. It is certainly not to the benefit of the consumer.

Clearly, this issue should now be considered in its entirety and addressed in respect of both the *de minimis* consideration and the "adventitious contamination" threshold, together, in order to draw logical conclusions. These should then be progressed within the appropriate legal framework at the earliest opportunity.

In earlier discussions with the UK Government and the EU Commission, we were asked whether it was feasible to define a set value for either adventitious agricultural presence, or *de minimis* in the end product.

A single, defined numerical value in the final product will ultimately be essential if legal uncertainty is to be avoided. What value, what parameter and how to calculate/decide will, however, be very difficult to define. Whatever, and however, the level is to be set, it has to be compatible with, on the one hand, feasible agricultural and food handling practices and, on the other, valid consumer expectations. The problems of establishing such a threshold are complex but this should not prevent an attempt being made.

For example, a given level of "novel" protein or DNA in an ingredient can be equated to a nominal value for the commodity/crop but would result in different values, depending on the actual ingredient, eg soya flour (42 per cent protein) or soya protein (92 per cent protein); maize grits (ca. 10 per cent protein), maize starch (0.4 per cent protein).

Conversely, a single crop threshold would result in different values for each derivative!

A clear preference, therefore, is to attempt to agree a true *de minimis* threshold for novel protein and/or DNA in the food that is actually sold ("delivered") to the final consumer, regardless of its actual origin.

This level could well be dictated by the limit of quantification of a (yet to be) validated method.

We do not believe that the average consumer is at all concerned by what route the novel protein/DNA has arrived in the final food. Many are demanding zero tolerance but without, perhaps, recognising the complexities of global, commodity trading. However, for those who do recognise the practicalities of the supply chain and accept that a very low presence of novel protein/DNA may be unavoidable, whether that presence derives from the use of an ingredient from a"non-GM" ("Identity Preserved") route, or from a GM or conventional supply of a particular ingredient, is likely to be irrelevant.

If a single, final-product *de minimis* threshold could be set (regardless of whether the GM presence was from "adventitiously contaminated" crops or deliberate inclusion of a commodity ingredient), it could then be for the manufacturer to show that the final food product was below this threshold if the presence of GM material was not declared. This could be shown either by analysis of the final product (in simple cases) or by analysis of the relevant ingredients, allied to a recipe-based calculation. Clearly, however, in the majority of cases, analysis would NOT be necessary since sufficient ingredient information would already be available. In the simplest of cases, if all ingredients were below the threshold, the final product could never exceed the same limit.

12 October 1999

Annex 1

"ADVENTITIOUS CONTAMINATION" THRESHOLDS AND END-PRODUCT *DE MINIMIS* LABELLING DILEMMA

Example Recipes Showing GM Protein Levels in Finished Foods

Assumptions:

1. 1 per cent adventitious contamination threshold, below which no GM labelling is required.

2. No *de minimis* threshold for commodity supplies or their derivatives.

3. 1 per cent of total protein in ingredients is "novel protein". (The precise level does not matter, since it is common to all calculations for a given crop. It does, however, give an illustrative order of magnitude.)

4. Soya beans processed to Soya Protein "Concentrate" (70 per cent protein) or Soya Protein "Isolate" (90 per cent protein).

5. Maize processed to Maize Starch ("Cornflour" in UK culinary parlance), containing 0.4 per cent protein.

6. 50 per cent of Soya crop is GM. 25 per cent of Maize crop is GM.

7. In all cases, the level of "novel" GM protein content in the final food equals:
(per cent ingredient in recipe) x (per cent protein in ingredient) x (per cent "novel" protein) x (per cent GM crop in harvest).

Recipe 1: Vegetarian Bolognese/Chilli type product

Contains, say, 10 per cent (dry weight) of Soya Protein Concentrate, derived from "non-GM" (Identity-Preserved) source:

Thus, Novel (GM) Protein in end-product equals:

10 per cent (inclusion) x 70 per cent (protein) x 1 per cent (GM protein) x 1 per cent (adventitious crop threshold) = 7 parts per million GM protein. EXEMPT FROM LABELLING

Recipe 2: Cheese and Ham Pizza

Contains 5 per cent of processed ham, which contains 0.3 per cent Soya Protein Isolate derived from commodity soya—50 per cent of soya harvest is GM:

Thus, Novel (GM) protein in end-product equals:

(5 per cent x 0.3 per cent) (inclusion) x 90 per cent (protein) x 1 per cent (GM protein) x 50 per cent (crop) = 0.7 parts per million GM protein. REQUIRES LABELLING

Recipe 3: Custard Powder

Contains 95 per cent cornflour (maize starch), derived from "non GM" (Identity Preserved) source:

Thus, Novel (GM) protein in end-product equals:

95 per cent (inclusion) x 0.4 per cent (protein) x 1 per cent (GM protein) x 1 per cent (adventitious crop threshold) = 0.38 parts per million GM protein. EXEMPT FROM LABELLING

Recipe 4: Cod in Wine Sauce

Contains, say, 1 per cent starch in sauce; sauce is 30 per cent of product as sold, ie 0.3 per cent starch in product: (Maize starch = culinary "cornflour")

Thus, Novel (GM) Protein in end-product equals:

0.3 per cent (inclusion) x 0.4 per cent (protein) x 1 per cent (GM protein) x 25 per cent (crop) = 0.03 parts per million GM protein. REQUIRES LABELLING

Conclusion:

In the absence of a consistent, end-product threshold, products will be exempt from labelling and yet contain levels of over 200 times more GM protein than those which will require a declaration . . . "produced from genetically modified x".

This is illogical, inequitable and unlikely to be helpful to the consumer.

APPENDIX 13

Memorandum submitted by the Board of United Kingdom Register of Organic Food Standards (R 17)

BACKGROUND TO UKROFS' INTEREST

1. The United Kingdom Register of Organic Food Standards is the body established in 1987 by Agriculture Ministers as the UK Authority for organically produced foods. Since the establishment of EC Standards for Organic food and farming (principally Council Regulation (EEC) No 2092/91 and Council Regulation (EC) No 1804/1999) it has become the inspection authority for control of standards for the production of organic food in the UK.

2. UKROFS has approved six private sector bodies (Organic Farmers and Growers Ltd, Scottish Organic Producers Association, Organic Food Federation, Soil Association Certification Ltd, Bio-Dynamic Agricultural Association and Irish Organic Farmers and Growers Association) for all aspects of organic production. In addition it has approved Food Certification (Scotland) Ltd for organic salmon production. UKROFS itself is also able to register producers directly, although only 10 producers are registered under this scheme.

3. The UKROFS Board—see Annex—is appointed by Agriculture Ministers. There is a small secretariat supplied by the Ministry of Agriculture, Fisheries and Food.

UKROFS' POSITION ON USE OF GM MATERIAL IN ORGANIC FARMING

4. As early as 1995 the Board of UKROFS stated its view that GMOs or their derivatives have no place in organic production systems. In giving this opinion the Board said that it was mindful of the potential benefits of gene technology, but considered that most consumers and producers would, currently, be opposed to the application of the technology to organically produced foods.

The UKROFS Standards for organic food production were amended in 1997 specifically to exclude GM products, or derivatives, whether as whole organisms, ingredients, processing aids or ingredients for animal feeds. UKROFS took this decision in advance of EC legislation, although Regulation 1804/1999 published on 24 August 1999 has instituted similar EC-wide provisions with immediate effect.

5. The initial provisions in the UKROFS standards were concerned with the use of GM products or their derivatives. However, with the introduction of field scale trials of GM crops and the likely commercialisation of such crops, attention is now especially focused on the need, which the Board of UKROFS and the organic industry perceive, to ensure that GM materials are fully segregated from organic foods at all stages of production.

6. The difficulties of ensuring absolute segregation of crops were highlighted in the Report produced for MAFF by the John Innes Centre "Organic Farming and Gene Transfer From Genetically Modified Crops" (May 1999). The report confirmed that once released, GM crops, like all crops, cannot be contained completely and that the complete isolation of organic crops cannot be guaranteed under present circumstances. The report suggested that it was necessary for "acceptable levels" of contamination of organic crops to be decided and measures identified to achieve them. EC Regulation 1804/1999 also recognises this possibility and makes provision for the setting of *de minimis* thresholds for the presence of GM material in organic products, although this provision has not yet been used.

7. The Board of UKROFS remain concerned that many consumers and producers of organic foods have a strong desire to avoid GM material entirely and for them a minimum acceptable level would be a betrayal of the organic ideal. The Board believes that the presence of GMOs (irreversible incorporation of genetic material into the food chain) is of an entirely different order to accidental environmental contamination by pesticides, a comparison which is sometimes made by those outside the organic movement.

8. In farm or horticultural production of organic crops, the Board identify two particular dangers: the "pollution" of crops through incorporation in plants of genetically modified genes by sexual transmission and "contamination" through the external presence of pollen etc. In addition the Board identify other routes by which organic farming might be affected, such as through agricultural inputs (seed, feed etc) or through modification of soil flora or gut microflora in animals.

9. In the preparation of organic foods, processors are required by law to ensure that any non organic materials used (eg processing aids or minor agricultural ingredients not available organically) are GMO free. This exclusion extends also to derivatives of GMOs described in Regulation 1804/1999 as "any substance which is either produced from or produced by GMOs, but does not contain them". It is thus important that there is clear labelling of all food ingredients derived from GMOs whether or not they contain the genetic material of the original organism.

10. The Government has placed much emphasis on the ability of the industry which produces GM seed to police the introduction of commercial planting and to ensure adequate separation between GM crops and other plants, including organic crops. The Board of UKROFS does not accept that this is an adequate approach or that the protocol drawn up by SCIMAC (Supply Chain Initiative on Modified Agricultural Crops) is sufficient to protect organic production.

11. On 16 July 1999 the Chairman of the UKROFS Board, Professor Roy Ward wrote to the Minister of Agriculture Fisheries and Food to ask that Ministers should confirm their previously stated commitment to protect the right of consumers to eat organic food. In addition the Board requested discussions to agree procedures for the approval of field trials of GM crops and assessment and monitoring of the impact on organic farms of the field trial programme.

12. The Board called for further research and assessment of the impact of release of GMOs into the environment and for a moratorium to be imposed on the commercial planting of GM crops. The Board emphasised that it was suggesting this not as a campaigning point, but because it felt that it was impossible to introduce adequate controls without further information.

13. Whilst MAFF has undertaken to consider further research and development work on the lines requested by the Board and to consider the adequacy of arrangements for protecting organic crops from GM planting, the Minister has replied that a moratorium would be unnecessary, since there are sufficient safeguards in place and that there would be legal and other difficulties in preventing the planting of GM crops which had successfully negotiated the approval process. The Minister has said that "GM crops can be introduced in a cautious and carefully controlled way, ensuring that justified concerns are fully addressed".

Recommendations to the Agriculture Committee

14. Despite the Minister's assurances, the Board of UKROFS believes that justified concerns are not being met at present. The Board recommends that, pending the outcome of further research the Committee should:

- reiterate the call for moratorium on the commercial planting of genetically modified crops;
- call for organic farmers to be compensated for any loss of organic status resulting from a trial as a condition of the approval;
- urge the establishment of better arrangements (already discussed with MAFF) for the assessment of the likely impact on all organic farms within an agreed radius of trials of GM crops;
- urge the commencement of further research (also already discussed with MAFF) on the impact of the introduction of GMOs on organic farming;
- insist on clear labelling so that any food or ingredient derived from a GMO is identified whether or not it contains GM material.

8 October 1999

Annex

UKROFS Board Members—June 1999

Professor Roy Ward. Emeritus Professor of Geography, University of Hull and former Deputy Vice Chancellor. (Chairman).

Mr John Barnard. Consultant and former senior Trading Standards Officer, in Norfolk.

Mrs Dorothy Craig, MBE JP. Chairman, Food and Agriculture Working Party of Consumers in Europe Group.

Jan Deane. Organic Horticulturist and Official of International Federation of Organic Agricultural Movements.

Mr Robert Duxbury. Product Manager—Organics, Primary Agriculture Dept., Sainsbury Supermarket Ltd.

Mr Nigel Elgar. Organic Farmer in Powys.

Mr Douglas Gray. Regional Veterinary Manager, Scottish Agricultural College.

Mr John Hoey. (from December 1999) Organic agricultural adviser and former organic farmer in Northern Ireland.

Mr Andrew Jedwell. Managing Director, Meridian Foods Ltd, Corwen, Denbighshire.

Ms Diane McCrea. Consultant in food and consumer affairs, Commissioner of the Meat and Livestock Commission. Negotiator for Consumers International at Codex Alimentarius.

Professor John McInerney. Glanely Professor of Agriculture Policy and Director of the Agricultural Economics Unit, University of Exeter.

Mrs Charlotte Russell. Organic Farmer in Cornwall.

Mr Charlie Wannop. Organic Farmer, Kirkcudbright.

Mr Lawrence Woodward. Director, Elm Park Research Centre, Hamstead Marshall, Near Newbury.

Mr Simon Wright. Consultant Food Technologist.

APPENDIX 14

Memorandum submitted by the American Soybean Association (R 18)

SUMMARY

In the present memorandum the American Soybean Association submits to the Agriculture Committee of the House of Commons its thoughts on the possibilities for the segregation of genetically modified crops. It seeks to provide material for reflection on the following points:

— the role and scale of global soybean production in meeting the nutritional requirements of the world;
— the structure of the US soybean industry;
— its genetic resource base;
— the integration of biotechnology into soybean production;
— the practicalities of distinguishing transgenic soy;
— the implications of customers' requirements for segregation of genetically modified crops;
— the experience of the US soybean sector in meeting specific customer requirements through an "identity preserved" (IP) system;
— IP as a response to European customer demand for non-biotech soy products;
— the need for a clear specification for IP in such products.

CREDENTIALS

1. The American Soybean Association (hereinafter "the ASA"), headquartered in St Louis, Missouri, represents 32,000 producer members on national and international policy and issues important to all US growers of soy.

2. Its efforts are underpinned by the soybean producer organisations in the thirty producer states, and by the United Soybean Board, which collects and allocates research and development funds from America's 600,000 soybean farmers. Its commitment to international markets is attested by its thirteen international offices spread throughout the world, and by its ongoing promotion program for US soy products to a wide range of customers.

3. This is the second occasion on which the ASA has contributed material to a UK parliamentary committee on an issue related to developments in biotechnology. The first was in June 1998, when observations were submitted to Sub-Committee D (Agriculture, Fisheries and Food) of the European Communities Committee of the House of Lords in connection with the Sub-Committee's inquiry into the EC Regulation of Genetic Modification in Agriculture.

INTEREST IN THE COMMITTEE'S INQUIRY

4. To put the ASA's interest in the Committee's inquiry into context, a short summary of the basic economic facts may prove useful. The growth of world soybean production as a source of vegetable oil and protein is a relatively recent phenomenon in the history of the world grain trade. However, there can be little dispute as to the contribution it has made since the end of the war in improving nutrition generally and in responding to increased demand in line with population growth.

WORLD SOYBEAN PRODUCTION

5. Worldwide, about 50 countries have some soybean production, mostly in small quantities and consumed domestically. Since the 1970s, however, major soy product export industries on the US model have developed in Brazil and Argentina, and there are also substantial producers with few exports, such as China, India and Indonesia. World soybean production now stands at over 150 million tonnes annually.

THE US INDUSTRY

6. The United States is the world's major producer and exporter of soybeans, the principal world source of vegetable protein, and a major source of vegetable oils and other food products. Annex I and Annex II show, respectively, soybean processing in schematic form and the range of products derived from soybeans. Production is carried on mainly in the Mississippi River basin, an area which can be considered broadly as running some 2,000 miles north to south and a similar distance east to west. Iowa, Illinois, Minnesota and Indiana are the leading producer states. Certain Atlantic seaboard states are also significant producers of soybeans.

7. Soybean production in the US grew from a near-zero base in the 1920s to current levels in response to growing demand from the world food and feed industries. It developed strongly after 1945 in response to growing US and world demand. Acreage immediately before the war had not reached the 5 million mark. By

the mid-1970s, it had increased tenfold. Since then, it has been yield enhancement, through improved varieties and cultivation techniques, more than acreage extension, that has underlain increased output. That said, in 1999, US area planted to soybeans was about 75 million acres, a figure which approximates to the combined land area of the United Kingdom and the Republic of Ireland.

8. The climatic conditions in which soybeans are produced vary widely across the US, with 13 different identified climate patterns requiring different approaches to variety choice and to agronomic management. Soybeans are almost universally associated in rotation with maize, and, depending on region, with other crops as well.

9. Harvesting is concentrated between the end of September and mid-November, and large quantities of product have to be moved off the land and towards storage facilities, crushing plants and ports, within a tight timeframe. This is achieved by means of an efficient bulk commodity system, founded on high volume barge traffic in the Mississippi River system, a high-capacity railfreight industry, efficient port facilities, and the financial support and price discovery offered by the soybean futures complex, notably on the Chicago Board of Trade.

10. In 1999, US production of soybeans is expected to reach a figure of over 75 million tonnes, of which almost half will be exported to world markets, and over 10 per cent of the total to Europe, mostly in the form either of whole beans for crushing in various European port installations, or of soy meals produced after oil extraction in the US.

11. Any development, such as a demand for segregation, which blunts the efficiencies of commodity crop exports—and we are not referring only to the US—will, if responded to in a disorganised way, lead to the creation of burdens for the world food system. It is our conviction that depriving commodity crop movement of the liquidity it has acquired over the years will lead to increased costs which will weigh indiscriminately on both industrialised and developing economies, and will deprive final consumers, in whose interest the trading system is supposed ultimately to operate, of the benefits of one of the constant technical improvements that food production undergoes worldwide.

12. Our interest in the Committee's work is therefore centered on the way in which, and the extent to which, we think that special customer requirements in the UK can be met. We propose, with the Committee's permission, to explain this in the remainder of the present memorandum, by defining terms, by presenting elements of the problem that have not hitherto received attention in the European debate, and by expressing our confidence in the economic and environmental benefits of a technology which we helped to develop.

The Genetic Background

13. The number of varieties of soybean cultivated in the US runs into thousands, with seed provided by a range of large- and small-scale multipliers to suit local conditions. As with agricultural crops in general, there is an observable tendency in most cases for a soybean variety, which may have been developed and bred over 10 or more years, to peak in commercial use and to decline into obsolescence over a rather shorter period as plant breeders introduce further improved varieties to the market.

14. The genetic resource base is therefore in a constant state of development and renewal, and about 100 new varieties, obtained through classical selection procedures, enter commercial production each year. We estimate that there are about 2,500 varieties on offer to soybean farmers in any one year, classified in the first place into maturity groups corresponding to the latitude under which they will be grown. Some idea of the wealth of the germplasm available to public and private seed breeders in the US can be gained from the fact that the USDA's soybean germplasm collection in Urbana, Illinois, contains over 18,000 accessions, each of which is characterised according to dozens of traits and compositional references.

Developments in Seed Breeding Technology

15. With the development over the past 20 years of modern biotechnology, additional genetic options have become available to soybean producers. The advent of recombinant DNA technology has enabled precisely-targeted improvements which have a favourable impact on agronomic practice, in terms of production costs, both of inputs and labor, in terms of farm health and safety, and in terms of good environmental practice.

16. The 1996 US planting season saw the first commercial use of Roundup Ready (RR) soybean seed. The Monsanto Company had begun to make available to seed breeders under licence the right to incorporate into the genomes of their soybean varieties the RR event, the effect of which is to impart to the soybean plant enhanced tolerance to glyphosate, the well-known systematic non-selective herbicide with low environmental impact, which had been in use for nearly 30 years, and of which the best-known brand name is Roundup, a trademark of the Monsanto Company.

17. Commercial plantings of RR beans in the US, Argentina and Canada only began after all existing regulatory requirements had been complied with in major export markets. To date, RR beans are the only transgenic soybeans in production that are exported to Europe, although authorisation procedures are under way for others, both in Europe and elsewhere.

18. Of the 2,500 or so varieties currently available for planting, approximately 1,000 are also available or becoming available in converted form for use as part of the RR herbicide application package.

19. Farmer interest in the package, nurtured over several years of trials, was reflected in rapid uptake. The key to the technique is "over the top" application to soybeans (and to other crops) of glyphosate usually in proprietary formulations at the post-emergence stage. This permits in most cases elimination of other herbicide treatments, whether pre-planting, post emergence or late season. It brings financial savings in herbicide purchase and application costs, reduced loadings in residues, and less disturbance of soil through compaction or topsoil erosion.

20. The technology can be summarised as follows. It works by eliminating crop damage from glyphosate application to the emerging plant which would otherwise be inevitable. Damage is avoided by the conversion, using a line developed through a recombinant DNA technique, of the variety planted to render it tolerant to glyphosate. Glyphosate works as a herbicide by blocking the functioning of an enzyme (EPSP synthase) essential for the synthesis of certain amino acids, without which the plant cannot develop. The effect of the conversion is to enable the plant's DNA to express in its leaf cells a variant of that enzyme of the functioning of which glyphosate cannot block. The variant enzyme thus offers, through a kind of bypass in the relevant biochemical pathway, a means for plant development to continue normally, in spite of the herbicide's presence.

Problems in Drawing Distinctions

21. The variant enzyme, itself widely found in nature in soil bacteria, expressed by the recombinant DNA segment amounts to about a thousandth part of the soybean's protein which constitutes about a third of the harvested weight. The variant is 99 per cent identical in amino acid sequence to the enzyme the function of which it takes over.

22. This degree of identity presents problems for effectively distinguishing between RR and non-RR product. It is what underlies our contention that there is no effective difference in nutritional terms between the two classes, and that the two categories are substantially equivalent. It is complicated by the fact that the genetic variation between any two of the thousands of varieties of soybean cultivated is likely to be far greater than that which distinguishes a variety from its RR conversion.

23. This means that the difference between two soybeans, one of an unconverted variety and the other its corresponding Roundup Ready conversion, is utterly imperceptible in a farm or a trade context without resort to sophisticated molecular analysis techniques. It is further masked by the enormous range of varieties, converted and unconverted, which would make up a consignment. Yet it is this difference that is the sole basis on which the demand for segregation of the soybean production and delivery system reposes.

24. In the first planting season, about 2 per cent of America's soybean acreage was planted to RR beans, with about 15 per cent in 1997, 30 per cent in 1998, and 50 per cent in 1999, with as many as nine farmers out of 10 in some areas having some RR production in their crop plan. The limiting factor on RR acreage has tended to be the availability of seed, multiplication of which sometimes cannot keep pace with demand. As noted earlier, by early 1999, US seed suppliers had made licensing arrangements with the Monsanto Company to incorporate the RR event into about 1,000 of their varieties.

The Issue Under Examination by the Committee

25. Segregation based on whether or not rDNA technology has been used to introduce a novel plant trait into soybeans which subsequently make up a given batch is of course what the Committee is seeking to examine. The RR soybean is at the centre of this issue, but there are many more biotech traits in the pipeline, which will either reduce input costs in production, or enhance output characteristics for nutritional or other reasons. Output characteristics will give rise to crop separation on farm so as to enable the additional value of the output traits to be captured. That said, the only transgenic novel trait in the soybean that has completed the approval process in Europe is the Roundup Ready event, and it must serve as a model for what will be done in respect of future practice.

26. The European regulatory background against which these American developments took place was initially unproblematic. The principal requirement was a decision authorising the clearance of such beans for deliberate release into the environment under Council Directive 90/220/EEC.

27. That decision (96/281/EC) was taken by the European Commission on 3 April 1996, following a favourable recommendation after detailed examination from the United Kingdom's competent authority, and a qualified majority in favour of the decision from the member states of the EU meeting within the appropriate regulatory committee.

28. Neither the US nor EU regulatory authorities saw any need to require separation of RR beans from other beans, and the harvesting and marketing of all soybeans entering the bulk commodity system has never therefore involved such separation.

29. However, with the entry into force of the so-called novel foods regulation (258/97) in early 1998, the European Commission decided that there were significant differences between food products produced from

crops with two biotech novel traits in their genetic makeup (RR soybeans and maize derived from a Novartis insect-resistant line) and decided to enact a regulation requiring specific labelling of such foods.

30. It is clear that labelling requires some effort to be put into the task of standing over declarations or claims made on packaging, and that it implies drawing a physical distinction of some kind. The process initiated by the Commission has yet to be completed, and there are significant elements missing from the structure of its labelling legislation for RR soy material. There are as yet no indications of verification or sampling methods which will give any convincing backup to the distinctions that they wish to see drawn.

31. Debate has intensified in Europe in the past year, and the Committee will be aware that, as a result, the US soybean sector in particular has achieved an emblematic status among European opponents of biotechnological innovation in agriculture as something of a villain.

32. Misunderstanding, fuelled by misinformation, and considerable confusion have resulted, partly because the structure of the industry is poorly understood. There are mistaken impressions which have gained ground about the respective roles of the Monsanto Company, of the seed breeders, of the seed multipliers and providers, of the various sectors of the grain handling and storage business, of the crushers, of the bulk international traders and of the financial underpinnings offered by the Chicago futures markets for the soybean complex. There is also much confusion about the way in which intellectual property rights are distributed and drawn upon during the production process.

33. In order to cast light on all of these aspects, we welcome the opportunity to set forth clearly for the Committee's information what we see as the key elements to a solution, and hope that any contribution we can make will be of value.

Outline of a Practical Solution

34. We wish in the first place to re-emphasise what we have often said, namely, that the ASA has consistently favoured arrangements which facilitate delivery of product with special clearly identifiable characteristics to customers with corresponding requirements.

35. At the centre of this position lies the concept of "identity preservation" which has been applied for over 30 years between, in particular, US farmers and Japanese importers of soybeans for traditional Japanese food products. We see no reason why this concept cannot be adapted to meet any demand that might come from Europe. It is however essential that European regulators and the European food industry understand exactly what in practical terms is available under such a system.

36. Hitherto, no standard specifications or form contracts to underpin this kind of delivery of non-transgenic beans have been elaborated, and, apart from some tentative fact-finding, the ASA has not been approached by any customers in Europe with a view to helping to draft them and recommending them to its membership. The fact that EU labelling rules are incomplete have left all of the participants in the chain, producers, processors, traders and retailers, in a state of great uncertainty as to what legal requirements are to be satisfied, and as to the practical measures called for to satisfy them.

37. It seems clear that the success of labelling in satisfying special customer demands on biotech crops will be measured by the extent to which it accurately reflects a physical separation between a commodity flow consisting of a mixture of beans or meal without distinction between biotech and non-biotech varieties, and a flow in which measures have been taken to exclude biotech beans or meal.

Identity Preservation as Applied to Non-Biotech Crops

38. With this in mind, we understand the requirement for segregation is predicated upon a demand for food and feed ingredients that have no element of recombinant DNA technology in their development or production. Such segregation is understood to imply separate planting, cultivation, harvesting, transport, storage, processing and delivery to the final user, with a view to ensuring that no comminglement takes place between product of varieties converted by the incorporation of an rDNA event in their germplasm. In addition, we understand that such segregation cannot sustain the risk of comminglement of residues in handling and processing equipment, and in processing machinery.

39. However, even before the beans have exited the farm, the first implication of the requirement is that the final user is asking the farmer to contract to produce soybeans using a specified variety or varieties. This implication has consequences that cannot be easily glossed over, and must take into account the varietal purity of seed delivered to the farmer, something in which established international standards play a role.

40. We feel bound to point out, when we consider the situation beyond the farm gate, that there are great differences between segregation, which we see as an arbitrary division in commodity crop handling and transport facilities, and identity preservation (IP) which we see as a means of delivering product to customers with special requirements. The two systems are further compared and contrasted below and annexes III and IV contain flow diagrams which illustrate the difference between the commodity flow, whether under segregation or not, and the IP method as applied over the past 30 years, notably in food grade soy exports to Japan.

41. The principal characteristic of segregation is that it is an arrangement whereby non-specialised crops are kept separate from other non-specialised crops. For instance, commodity crops like soybeans and corn are kept separate for obvious commercial reasons.

42. Commodity crops, such as soybeans, are developed under general standards set by the industry. Such crops are not separated because they are produced in volume to meet general food industry needs. All commodity beans produced to general industry standards are commingled and enter the same transport system, including those for export.

43. Segregation under the current commodity transport system would require large-scale duplication of systems for growing, harvesting, transporting and processing, without the level of guarantee of non-commingleme nt that we are told certain European customers require.

44. Identity preservation (IP), on the other hand, is a known and tried system, particularly in trade with Japan, under which a crop is grown, under contract, and handled, processed and delivered under controlled conditions, through which the final customer is assured that the product has conserved its specific identity from the field to the point of delivery, conceivably on the other side of the world.

45. IP works because product is mainly transported containerised, under seal, outside the bulk commodity system, using seaborne liner services rather than large dry bulk carriers. The IP concept does not exclude bulk transport, but it is recognised that the inevitable increased commingleme nt risk will give rise to a loss of added value to the customer, and that this loss increases as batch size gets greater. Maintenance of identity is not going to be as successful in a 3,000 tonne holdful as in a 20 tonne container load, although for some grades the customer may find the bulk conditions acceptable. It should be emphasised that transport is the most significant element in the additional costs involved in providing Japanese customers with soy products of food grade for traditional cuisine.

46. IP crops are intrinsically of higher value to the end-user, and they involve additional expense, in inputs and handling, to the farmer. These costs are reflected in the contracts struck before planting. If however the IP system is intended to conserve characteristics from the seed as planted to the processed food as consumed, then steps must be taken to prevent commingleme nt all the way through the processing, packing and distribution chains as well, something that is not a part of the arrangements with our Japanese customers.

47. Implicit in the idea of IP is the provision of a tolerance agreed between grower and customer, under which the contract is deemed performed if not more than a certain percentage of beans entered into, but Japanese food industry customers appear in general to regard 95 per cent performance as standard for their contracts with US growers.

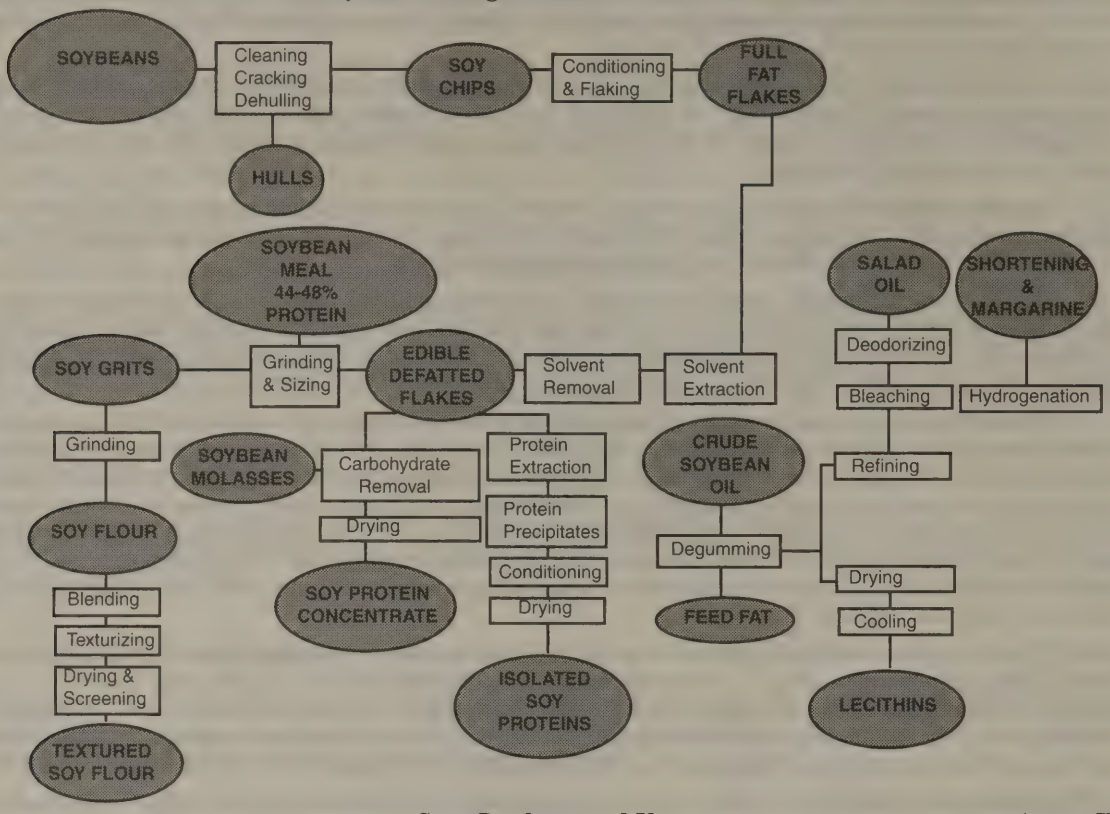
Concluding Evidence

48. We have never seen any reason why IP cannot be applied to meet a demand for product not derived from rDNA genetic technology, as long as there is a clear specification, which carries within it provision for contractual arrangements, notably on price and on performance benchmarks, between grower and end-user, which take into account existing rules on the respect of varietal purity standards in seed and reliable sampling and analysis rules, and which admit that resort has to be had to obsolescent herbicidal practice, with application costs and environmental loadings in excess of what is available to the farmer under the biotech option.

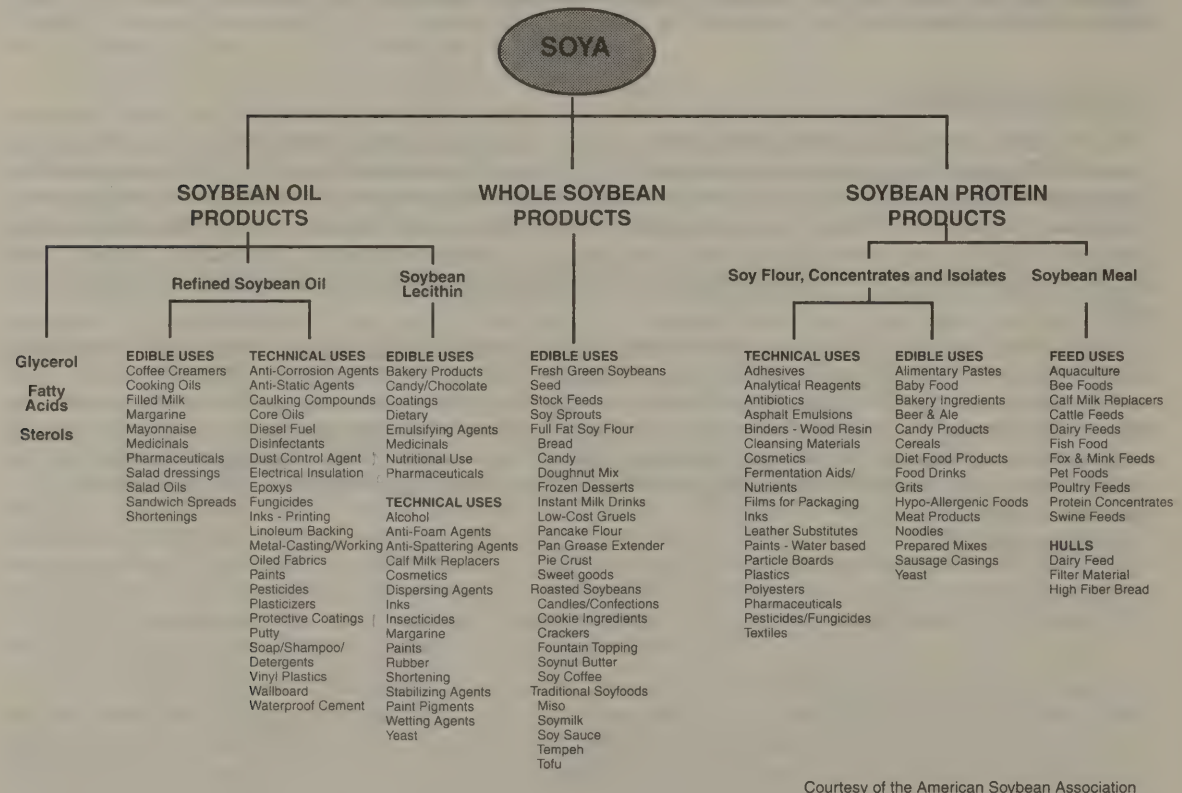
49. We have sought to place evidence before the Committee which will enable it to draw conclusions based on the realities of harvesting and handling large quantities of soybeans. Our perception of these realities leads us to submit that the IP system should be seen as the most practical answer to the question posed by segregation demands. It will, within the limits of standard tolerances in both seed supply and specific delivery obligations freely entered into between producers and their customers, offer a method of responding to a specific demand, at an agreed price, while not depriving the world in general of the clear cost benefits of a new technology.

7 October 1999

Soya Processing with Solvent Extraction — Annex I



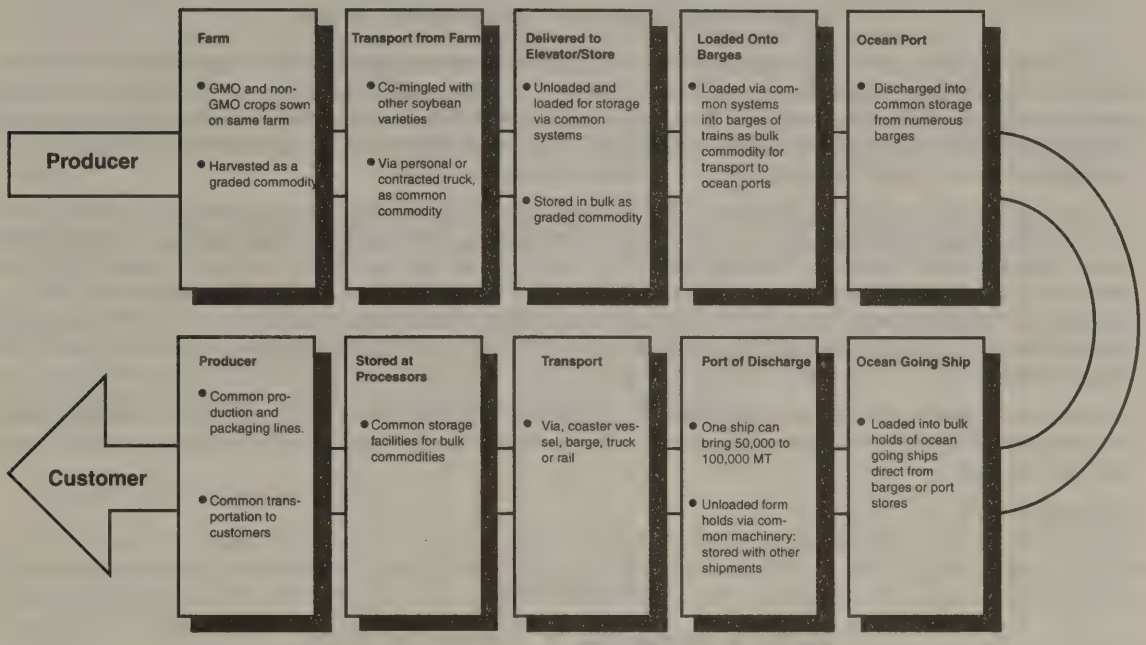
Soya Products and Uses — Annex II



Courtesy of the American Soybean Association

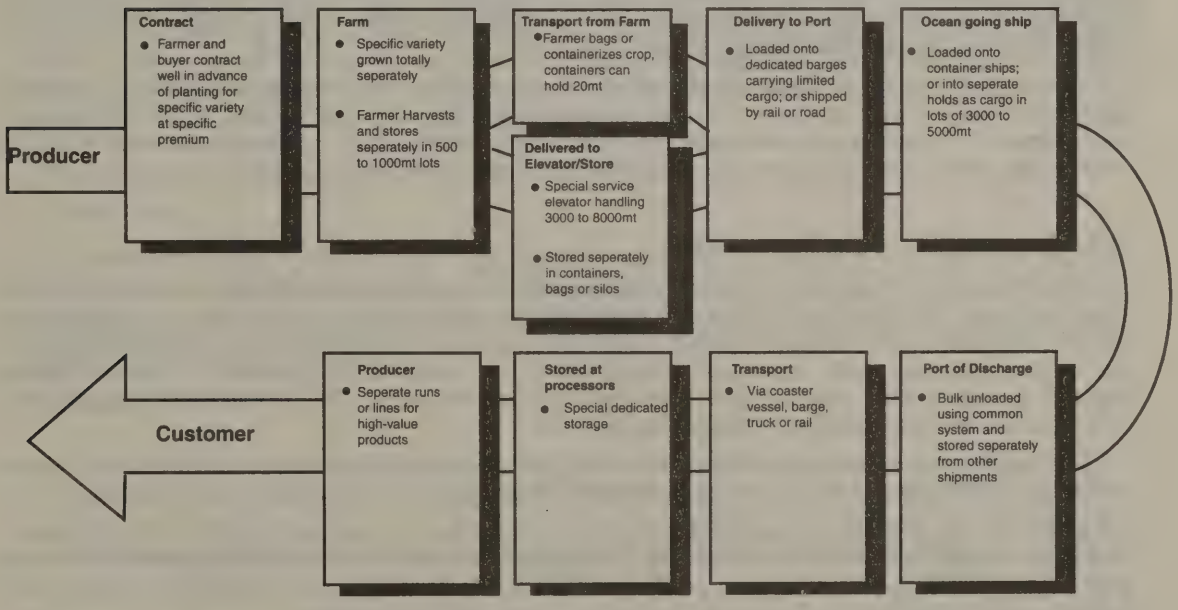
US Soybeans- From Farm to Plate

Annex III



Identity Preserved Soybeans from U.S. Farm to Customer

Annex IV



APPENDIX 15

Memorandum submitted by Monsanto PLC (R 20)

Thank you for your letter of 2 August 1999 alerting us to the above inquiry by the Agriculture Committee. We note that the Committee will be examining "the means of segregation of GM crops on farms, in storage and in transit, the difficulties involved in ensuring such segregation and the implications of these issues for the consumer in terms of labelling and traceability." We also assume that the Committee will examine the existing systems of identity preservation for fulfilling customer demand.

Many of these issues will be addressed by those who are directly involved in the food production chain, such as the farmers, grain traders, shippers, processors and the food industry. Segregation of commodity crops would require large-scale duplication of systems for growing, harvesting, storage, transporting and processing of commodity crops and with limited guarantees as regards the nature of the end product. On the other hand, "identity preservation" (IP) is a known and tried system developed over the past 30 years and operates on a contractual basis with agreed specifications amongst the concerned operators in the specific IP supply chain.

Monsanto's involvement in crop production is limited to the first step of both agricultural supply chains as a supplier of seeds to the farmer. The seeds may be conventional or genetically modified and are clearly identified as such.

13 October 1999

APPENDIX 16

Memorandum submitted by J Sainsbury plc (R 23)

1. Introduction

1.1 J Sainsbury plc is one of the world's leading retailers serving 15 million customers a week. Our largest subsidiary, Sainsbury's Supermarkets, offers over 23,000 products, 40 per cent of which are own brand. Sainsbury's brand products are sourced against our own specifications. Their quality, composition and safety is managed by Sainsbury's 200-strong Technical Division.

1.2 In response to overwhelming customer concern, Sainsbury's has eliminated genetically modified ingredients from all own brand products. This was a considerable task, involving over 10,000 products and was achieved by replacing soya and maize ingredients with alternatives or by using guaranteed non-GM sources. Our policy covers soya proteins, oil and lecithins, and maize proteins, starches, syrups and oil.

2. Sainsbury's GM Tomato Paste: Update

2.1 In February 1996, Sainsbury's (along with a competitor supermarket) were first to introduce an own brand genetically modified food product—a genetically modified tomato paste. It was sold along side a standard equivalent and was clearly labelled "made with genetically modified tomatoes" on the front of the can so that customers could make an informed choice. Its launch was supported by customer leaflets displayed in store and the company gave a full pre-briefing to the media. The product was introduced with minimum fuss and with maximum consumer acceptance.

2.2 From the start, we recognised the need to clearly label the genetically modified tomato puree and thus worked in partnership with the grower and planned for segregation to deliver appropriate labelling.

2.3 Initially the GM tomato paste sold very well as there was a clear cost benefit for the consumer. However, towards the end of last year sales were affected as more and more customers did not want genetically modified ingredients in their products. At the end of June 1999, the supply of our tomato paste finished and in light of customers' wishes we have not sought further supplies.

3. Sourcing Non-GM Foodstuffs: A Retailer's Perspective

3.1 We believe that the low level of consumer acceptance of genetically modified commodity crops is, in part, directly attributable to the way in which they were introduced to the market. Had they been segregated and clearly labelled then, given our experience with the GM tomato paste, we believe that consumer acceptance would undoubtedly have been considerably higher.

3.2 Over three years ago, we tried, but unsuccessfully, to persuade Monsanto and the American Soya Bean Association of the need to segregate genetically modified soya from the standard crop for reasons of consumer choice. We have continued to meet with these organisations' representatives to help them to understand the hostility our customers feel towards their products.

3.3 At the same time, we put a great deal of effort into understanding the structure of the soya ingredients industry and worked to source identity preserved soya and identity preserved soya-protein derivatives for as many of our own brand products as possible. About a year ago, we were in the position that we had reduced

the number of our own brand products containing GM soya or soya-protein derivatives down to about 45 products. These products were clearly labelled so that our customers could make informed buying decisions.

3.4 It became clear to us, however, that the only way we could secure long term supplies was to aggregate demand. In March (1999), in conjunction with Marks and Spencer plc, we helped to launch an international consortium of food retailers and industry experts to establish validated sources of non-GM crops, products and derivatives. The member companies of the consortium provided a long-term commitment to farmers and the commodity industry, guaranteeing them a large market for non-GM raw material both now and in the future.

3.5 We have now found sufficient sources of non-GM soya for all our own brand products and as a result, in July 1999, we completely eliminated genetically modified ingredients from our own brand foods.

3.6 A common technical standard for non-GM verification is essential to achieving an elimination goal. We have been working with Law Laboratories and Genetic ID who have now set up a verification programme called CERT ID. We have advised all our own brand suppliers that all food ingredients which may be at risk of cross contamination with GM variants should ultimately be obtained from non-GM sources which have been audited and tested to the CERT ID or an equivalent standard.

4. Sainsbury's Customer Careline

4.1 Media coverage of GM has been highly charged and has undoubtedly helped to leave the consumer alarmed, confused and sceptical. One of Sainsbury's established mechanisms for communicating with our customers is via our freephone Customer Careline. This is manned by a team of 28 full time staff answering about 10,000 customer calls over a 60 hour period each week.

4.2 During the spring and early summer of 1998, about 50 calls a week related to GM. In August 1998, following a World in Action programme this rose to 900 calls a week for a period of about a month. This then subsided to a base of about 70 calls a week until February 1999 when the Daily Mail, Express and Independent commenced GM campaigns and GM became a topic for Prime Minister's Questions. We immediately opened a dedicated freephone Customer GM information line which took over 300 calls in the first four hours and over 2,500 calls in three days following the Blair-Hague exchange (3.2.99). Calls receded to about 3,000 per month in March. Since July 1999, when we announced our policy of elimination, calls have dropped off to such an extent that we have closed the GM dedicated freephone line and GM calls are once again dealt with by our Customer Careline.

5. Conclusion

5.1 Sainsbury's always wanted GM and standard crops to be separated and we were extremely disappointed when this did not happen with the US soya crop.

5.2 In the absence of segregation, we have had to take it upon ourselves to try to meet our customers demand for non-GM food products.

15 November 1999

APPENDIX 17

Memorandum submitted by the Local Authorities Coordinating Body on Food and Trading Standards (LACOTS) (R 26)

I refer to your letter dated 3 November 1999 addressed to Nick Cull, seeking LACOTS views on the issue of the segregation of genetically modified foods. Our comments are set out below.

General

To enable consumers to exercise pre-purchase choice in relation to genetically modified foods it is important that they can rely on the accuracy of labelling information. It is essential that foods labelled as "GM Free" or similar terms are genuinely GM free. It is equally important that foods which bear no positive declaration but which most consumers would expect to be "GM Free" also do not contain GM ingredients. This reflects the general view of one of our parent bodies, the Local Government Association.

Adequate and effective segregation at all stages in the cultivation, harvesting, storage, packaging, processing, distribution and retail chain is obviously vitally important in ensuring that cross contamination, substitution or adulteration does not take place thus rendering labelling information wholly or partly false or misleading.

Point of Production

The process of segregation must begin at farm level with appropriate systems to prevent cross contamination. If both conventional and GM crops are being grown on the same farm harvesting and storage processes should prevent contamination. Harvesting equipment including trailers should be adequately cleaned between operations involving conventional and GM crops.

Dedicated storage areas should be used so that conventional and GM crops can be clearly identified and segregated. Instructions to staff and record keeping requirements for the movement of harvested crops would be appropriate to ensure that segregated crops are not accidentally mixed or confused.

Dedicated bulk transporters should be used or if the same transport is used for both types of commodities it should be adequately cleaned between consignments.

Processing

At both mills and food production plants practices and processes which ensure that adequate and effective segregation of both types of commodities must be in place. Bulk storage or holding facilities should either be dedicated or if they are used for both types of commodities should be adequately cleaned between these different usages. Instructions to staff and record keeping requirements would be appropriate to ensure that ingredients used in food processing were not accidentally mixed or confused.

If both conventional and GM ingredients are being processed using the same production line it is important that key elements such as conveyor belts, hoppers, mixers, fillers etc are adequately cleaned between each type of operation.

Procedures should also be in place to ensure that the appropriate packaging and labelling is applied to the appropriate products. This is particularly important where two versions of an identical product (one containing conventional ingredients and the other containing GM ingredients) are being produced.

Retail

Multiple retailers commissioning "own label" products from other suppliers should ensure that all the elements referred to above to ensure the authenticity of products are adopted by their suppliers. This is particularly important where numerous suppliers produce the same "own label" product or where suppliers change frequently based, in particular, on purchase price considerations.

Identification

Finished products are required to bear a lot mark to identify a production batch. This information could serve a useful purpose in ensuring proper segregation and could perhaps be further refined and extended. Batch marking of commodities and bulk ingredients prior to packing could also be usefully considered as part of record keeping arrangements.

Contamination/Tolerances

It is impossible given pollen drift to totally guarantee the authenticity of all conventionally grown crops if they are in close proximity to GM varieties. To reflect this the European Commission will be introducing a 1 per cent tolerance for accidental inclusion of GM material in conventionally produced products. LACOTS would wish to see this figure adopted only in extreme circumstances and not universally applied as this may undermine strict segregation procedures.

Traceability

It is important that all the segregation control identification measures highlighted above are linked so that the origin of commodities can be verified as well as the final product labelling. There should be effective traceability throughout the production and distribution chain.

Imported Commodities/Foods

Whilst UK food control officers (trading standard officers and environmental health officers) can exercise control at all stages in the production and distribution chain for commodities and foods cultivated and produced in the UK, control is more difficult in relation to imported commodities and foods.

Much more reliance will need to be placed on the control systems in place in the country of origin. UK companies importing such materials will need to be able to demonstrate that they have taken all reasonable precautions and exercised all due diligence to ensure that consumers interests are protected.

UK companies can seek assurances from their suppliers about the authenticity of the products which they are being supplied with and may wish, as part of this process, to require guarantees about adequate segregation. In addition to analytical checks on products carried out by the UK food control officers, UK companies may wish to consider some form of independent testing.

26 November 1999

APPENDIX 18

Memorandum submitted by Strategic Diagnostics Incorporated (R 30)

SDI would like to offer the following comments as evidence.

1. Feasibility of Segregation and Identity Preservation

The use of GM crops in Canada, USA and South America is now so widespread that GM material is ingrained in the system. It is virtually impossible to produce a truly GM free crop without adding prohibitive cost for any but the most specialist uses.

This is true even in areas such as Brazil which are technically GM free. Cross border flow of commodities from Argentina and Uruguay and illegal planting, ensure that there is a significant rick of GM material being incorporated in the export from Brazil.

While the production of GM free crops is difficult, it is possible to put in place Identity Preservation (IP) systems that can reliably produce material to agreed tolerances. Farmers, distributors and processors are now putting these systems in place throughout the Americas.

Twelve months ago it was clear that there was strong resistance from the processors, particularly of Soya, to the ideas of IP. The view at that time was that the distribution of grain was maximised for efficiency and that margins were so low that economies of scale were needed for any company to remain profitable. This has changed radically in the face of market pressure from Europe and Japan and the biggest processors are now all setting up IP systems.

2. Cost of IP Systems

Because the nature of Identity Preservation means that a commodity material is removed from the mainstream and controlled differently, it is inevitable that this will attract a premium. The level of IP required will define the extent of the premium.

Currently it is possible to buy IP Soya beans for a premium of approximately $16/tonne over the Chicago Board of Trade price. Because IP beans are generally shipped in smaller quantities than commodity beans increased transport costs will add another $10–15/tonne. The tolerance on these beans is generally < 1 per cent GM. For a tolerance of < 0.1 per cent the premium will be greater.

The attitude in Europe is that consumers did not want GM crops and so why should they pay for non-GM material to be segregated. While understandable it is important to put this in context. Over the last 50 years consumers and retailers have consistently benefited from price reductions due to increasing intensity in agriculture. In addition, they have benefited from the economies of scale arising from the distribution system in the Americas. Overall, the real cost of these commodities has been falling consistently.

3. Types of IP Systems

Currently there are two schools of thought:

(a) Complete certification from farm to table.

This is an intensive system where every step of the production and distribution chain is rigorously audited to provide a complete system of traceability. This is both complex and expensive.

(b) Certification and segregation from the primary processor.

This relies on the availability of simple, reliable test methods such as those from SDI. In this situation, it is up to the farmer to ensure that his crops are clean of GMs to an agreed tolerance. Once the crop reaches the processor it can be tested and a premium paid if it is within the agreed limits.

This method dramatically reduces the cost burden on the crop and the ultimate premium that will have to be paid. Both Cargill and ADM, the two largest processors in the US, are adopting this method.

Once in the processor a rigorous audit trail backed up by testing at critical control points will maintain IP status.

4. Testing for GMOs

Two methods exist for the analysis of GMOs. It is possible either to detect the product of the genetic modification (in the case of current Soya or maize varieties, novel proteins) or it is possible to detect specific novel gene sequences.

Gene testing by PCR is time consuming, expensive and unreliable for quantification. This method is totally unsuited to the upstream testing required to maintain an efficient IP system. The cost alone to do statistically valid testing makes premiums unrealistic.

However testing for the gene product can be very easy and cost effective. SDI has developed a number of simple test kits which can detect the presence of specific GMOs either at threshold levels (0.1 per cent, 1 per cent etc) or quantitatively (information on these tests is attached) [*not printed*].

The test kits that SDI produce are now the cornerstone of a number of IP systems in the USA, Canada and Brazil. Test kits exist for both the major GM crop types, Soya and maize. In addition, tests exist for Canola, sugar beet and cotton.

5. IP and the Negative List

Originally EU legislation for labelling GM Soya and maize provided for the development of a "negative list" of ingredients and additives which contain no detectable DNA or protein and hence need not be labelled. This list was to contain oils, modified starches and syrups. However, consumers' organisations across Europe wanted labelling even if an ingredient did not contain any GM DNA or protein but was derived from a GM source.

Because there is no method of reliably detecting whether these refined products are derived from a GM source the only way to ensure customer choice is by IP.

6. Soya for Food and Animal Feed

Of the 30 million tonnes of Soya imported into the EU each year only a fraction is actually destined for direct human consumption the rest goes for animal feed. Estimates from Soyatech in the USA suggest that EU citizens on average directly ingest 2g/day Soya, in Japan this figure is 30g/day.

The vast bulk of Soya goes for animal feed and the current debate is whether meat reared on GM feed should also be labelled. There is a demand for IP animal feed driven by some of the major retailers. The problem lies in the fact that there is strong resistance to paying any premium and given the low margins in the meat industry this is understandable.

There is a potential solution in that there is a very strong demand for IP lecithin. This additive is only a fraction of the total weight of the bean (0.5 per cent) and consequently to produce IP lecithin very large numbers of beans need to be crushed. One of the major lecithin suppliers sells 40,000 tonnes lecithin/year. This implies a total crush of 8 million tonnes beans.

Lecithin is a high value product and in its production can absorb a higher burden of verification and testing than can meal for animal feed. The likelihood is that IP beans crushed for lecithin production will provide a source of cost-effective animal feed.

7. Maize

US exports of dry milled maize to the EU have collapsed from 14 million tonnes to <1 million tonnes because of the GM issue. Domestic production mainly from France now makes up the shortfall. This material is being segregated and tested for possible GM contamination and is likely to be the major source of supply for the foreseeable future.

Wet milled maize products are still imported and this has led to US processors refusing to accept GM maize varieties that the EU has not licensed for import. Because there are many more GM maize varieties grown than Soya, segregation is more difficult. However again rapid tests to detect all the licensed (Bt 176, Bt11, Mon810 and T25) and unlicensed traits are being developed and are either already commercially available or will be early in 2000.

Conclusions

Although totally GM free is extremely difficult and expensive to achieve it is both possible and desirable to Identity Preserve non-GM crops to acceptable tolerances depending on end use. The corner stone of effective IP systems is the availability of rapid reliable test methods. This needs to be backed up by rigorous audit trails such as those being put in place both by Government (FGIS in particular) and by organisations such as SGS.

For the consumer ever to accept GM foods it is necessary for them to have the choice to reject them. It is only by effective labelling and provision of non-GM alternatives that this argument can ever be resolved.

9 December 1999

APPENDIX 19

Memorandum submitted by Mr Peter Lundgren (R 31)

INTRODUCTION

The following is the fruits of research made by a small farmer, struggling to service a mortgage and an overdraft, into the issue of growing GM crops. My initial interest was raised by my neighbour's desire to host a GM field scale trial and the difficulties I encountered in getting information from sources other than those with a vested interest in selling the technology. This is not intended as an attack on the biotech companies but as a genuine attempt to provide more information to British farmers in order to raise the level of debate so that farmers will be able to make a more informed decision as to whether or not they believe GM crops are suitable for their businesses and as to whether or not they believe that the field scale trials should continue.

GM HISTORY

In the late 80s' the GM companies applied to the US Patent Office to patent genetic material. The US Patent Office agreed that new life forms, excluding human, can be patented.

However in 1992 the US Food and Drug Administration decided that GM food was "substantially equivalent" to conventional food. This meant that the GM food did not have to undergo full safety testing as for a new food or drug. The FDA also ruled that the gene is a pesticide, however the EPA ruled that the gene is a food and as such could not undertake safety tests. The GM crops were licensed for commercial use in the USA on the basis of safety tests undertaken by one of the GM companies, with no independent government safety testing. Health Canada accepted the ruling of the FDA and also licensed the GM crops for commercial use in Canada without independent government safety tests.

Professor Philip Regal of the University of Minnesota said that the government "just gave up" because the technical problems of testing were just too difficult.

The Centre for Food Safety is now suing the Food and Drug Administration over its failure to undertake safety testing of GM foods.

Advisors to Health Canada have recently advised the Canadian government to "go slow on GM", citing potential health and environment problems.

European governments are the first to undertake independent safety trials.

The herbicide resistant technology is now eight years old and with genetic science evolving so quickly is now outdated.

GM FIELD SCALE EVALUATIONS

Trials are to test the effect on the environment of the herbicide only, in the case of the AgrEvo trials the herbicide is glufosinate, and does not attempt to assess the impact of the genetic material on the environment.

Trials specifically exclude monitoring the gene flow—fail to assess whether the gene leaves the site and if it does where it goes to and what it gets up to.

The trials are being undertaken to test if GM cropping is safe but in doing so will release GM material into the environment before the results are known.

Scientists working in the genetics field are questioning the validity of the method of the trials and are claiming that any information from the trials is fundamentally flawed from the outset.

Whether or not the science is good, it's got to be seen to be good science. At the end of the trials it will be easy for scientists and environmental groups to rubbish the results of the field scale evaluations.

The Shadow Minister of Agriculture, Tim Yeo, has called for a moratorium of the field scale trials and a Royal Commission to look into the methodology of the trials.

The GM crops will produce viable pollen at flowering.

Trials in England involving honey bees have proved that GM pollen carried by bees can contaminate bee hives at a distance of three miles and the Beekeepers Association now recommend that bees are kept at a minimum six miles away from a GM trial site.

The John Innes Centre concluded that cross-pollination will occur.

In experiments conducted by the University of Wisconsin, cross contamination has been proved between GM crops and conventional crops at a distance of three miles for oil seed rape and one mile for maize and potatoes. Research by the Scottish Crop Research Centre has concluded that cross-pollination can occur at up to four kilometres.

If cross pollination of a neighbouring crop of OSR occurred the contaminated seed could be deemed a GMO and, under current rules prohibiting unlicensed GMOs entering the food chain, the crop would have to be destroyed by incineration or landfill at the farmer's cost.

If contaminated material from unlicensed GM OSR gets into the food chain the farmer may be liable for a £5,000 fine and may be liable for any losses incurred by food manufacturers or retailers. In reality compensation could run into £ millions, even if the farmer did not realise that his crops had been contaminated.

There is no compensation package from government or from the GM companies should contamination or cross-pollination occur or if the value of neighbours land surrounding the trial sites is reduced.

It is currently not possible for neighbouring farmers to insure themselves against cross-pollination or to insure against a reduction in their land value.

Compensation may be available via the courts from the GM host farmer—but if the contamination is extensive the GM host farmer may not have sufficient collateral to cover the liabilities.

If anti-GM protesters trash a neighbour's crop there is no compensation available from the GM company or from government, however it is possible to insure against malignant damage.

The biotech companies do not appear to have liability insurance for GMOs.

Nottinghamshire Police had made contingency plans to handle 2,500 protesters at the Syerston trial site. There has not been a Newbury Bypass or a Manchester Runway type of protest recently and GM crops could become the next target of this type of protester.

The Royal Institute of Chartered Surveyors has advised the government that farmers hosting GM crops risk reducing the value of their land and advise that a register of land that has grown GM, crops should be kept. The Banks have shown an interest in maintaining such a register. In a recent poll of members of the Royal Institute of Chartered Surveyors 58 per cent of members believe that the growing of GM crops will affect the value of land (16 per cent thought that it would not), 64 per cent thought that the previous or present growing of GM crops would make land more difficult to sell (25 per cent said it would not) and 83 per cent said that the issue of GM cropping should be taken into consideration when making a Red Book valuation (9 per cent said it should not).

Forty-three per cent thought that the growing of GM crops on neighbouring land would affect the value of a farmers land (32 per cent did not).

The North American Experience

In 1997 the USA exported 70 million bushels of maize to Europe, last year the USA exported just three million bushels of maize to Europe as a result of European consumers rejecting GM foods.

In 1999 US farmers received $15 billion in direct income support (bailouts) over and above the support for ag products that is allowed under the GATT agreements.

The Clinton administration is "looking again" at the issue of food labelling. In the US the law does not require food labels to show if foods have a GM content.

Europe, Japan, New Zealand and Australia have, or intend to, introduce legislation to label GM foods.

In the US farmers are suing neighbouring farmers for allowing GM crops to contaminate their non-GM crops.

A group of US and English lawyers are suing the GM companies under the American anti-trust laws but also representing farmers from America, Australia and India whose GM crops have not performed as promised and whose non-GM crops have been contaminated by cross pollination.

In Canada, where GM crops are more common than non-GM, canola has fallen to its lowest price in a decade and farmers are desperate. In 1999 $90 million of Canadian canola could not be sold into the EU.

Canadian organic canola (a major crop in Canada) cannot be sold as organic due to cross pollination and contamination in store.

Brazil, a top soyabean producer, has banned the planting of GM seeds pending an environmental review.

Many countries that have licensed GM crops for commercial use are now voting not to approve new varieties of GM crops, these countries include the European Union,Brazil, Australia, New Zealand, Japan, Korea and Mexico.

With so much grain in North America excluded from traditional export markets it is possible that discounting of GM crops may be reducing the world price of grains. In other words, British farmers may be receiving less for their crops.

Agribusiness giant Archer Daniels Midland is to segregate all of its purchased commodities in response to world wide antipathy to GMOs.

Brazil and Argentina are now segregating GM and non-GM crops. US farmers are demanding segregation, but who pays.

The US Secretary of Agriculture is calling for federal funding for on-farm storage facilities as farmers seek to segregate harvest into crops containing genetically modified organisms and those without.

Monsanto is contacting all farmers who planted its GM products in an attempt to help them find markets for their products.

Monsanto, DuPont and Novartis, three of the worlds biggest chemical companies, are now three of the world's five biggest seed companies.

30 farming organisations in the US are now advising their members that if they grow GM crops they risk losing their livelihoods.

Home Markets

Claims that GM technology is needed to feed the world in the mext millennium will not lead to increased exports for farmers in developed countries. Only the technology will be exported potentially leading to a loss of export markets and more countries entering the export market.

European consumers will not accept that food derived from a cross between a plant and a soil microbe is "substantially equivalent" to conventional food.

There is massive distrust of new science by the public after the disaster of BSE—people died and more might still die—no wonder the public is suspicious.

The European Union has become the battleground for the future of GM. The GM companies have massive investments in biotech and a failure to secure the EU market could seriously damage established markets and could seriously damage company profits.

For years the NFU and other organisations have been exhorting farmers to grow for the markets and to listen to their customers. The message from the customer is very clear—they do not trust GM foods.

Sainsbury's and others will not restock with GM products where they have removed the product from their shelves until their customers ask. The price is not an issue.

Iceland and Marks and Spencer are now GM free.

Sainsburys and Marks and Spencers are stocking non-GM fed poultry, eggs and pork—other products to follow—under a premium food banner. Livestock farmers feeding rations that include GMOs could see their produce discounted.

Nestlé, Unilever and Cadbury Schweppes are going GM free.

Heinz and Gerber are producing GM free baby food in the USA.

Even McDonalds are using GM free soya in the UK.

Supermarkets are asking contracted farmers in Kenya and Zimbabwe to agree not to grow GM crops on their farms.

Opinion

The public will not accept "substantially safe" as safe. After the fiasco of BSE, when the public was treated to government scientists saying that beef is absolute safe, independent scientists saying beef is potentially lethal and a Minister of State for Agriculture stuffing a greasy burger into his daughter's mouth, the public do not accept the opinions of scientists. History has proved Professor Lacey and company correct and people have died from new variant CJD (and let's not forget the farmers who could not face collapsing businesses and the thought that their produce was damaging the health of their customers).

The public does not trust new science—and who can blame them.

The public perceives the GM issue as another BSE. On the one hand they see scientists claiming GM is "substantially safe" and on the other they see scientists claiming GM is not safe—what are they meant to believe. Not surprisingly they believe it is wise to err on the side of caution and to reject GM foods.

The GM issue has the potential to cause another massive crisis of confidence amongst the general public similar to that of the BSE crisis. I am not suggesting that GM foods will cause anybody's death but, especially now that the public is beginning to support British farmers and put their faith in British produce, they will not forgive farmers for putting their health or the environment at risk.

There is a real risk, in fact it is likely, that crops and wild plants related to the GM crop will cross-pollinate at a distance of up to three miles away from the GM trail. Should GM contaminated food get into the food chain as GM free food, and be traced back to a British farm, the ensuing furore could be the death knell of British agriculture.

The real problem for farmers lies with the perceived dangers and unless these fears are addressed sensibly there will not be a future for GM technology in Europe. The biotech companies must realise that if they force GM foods on to the public and into the environment before the public are ready to accept it, then the backlash will end GM cropping for good. It may even put an end to the research into genetic engineering that will bring real benefits in new treatments for serious illnesses.

I believe that I will be growing GM crops in the future, not food crops but crops for industrial and pharmaceutical uses, and that these crops will be of benefit to farmers and consumers. But this will only happen if the biotech companies wake up to the reality of the market place.

The only option is to gracefully withdraw GM crops from the market place, stopping the contentious field scale evaluations, and then come back to the market with improved products that fulfil the three basic requirements of:

— firstly, is it absolutely demonstrably safe;

— secondly, will it give growers a better gross margin;

— and thirdly, will customers want to buy it.

Please copy and pass on to another interested party. The more people that are in a position to make an informed decision, whatever that decision may be, the greater the chance that the correct decision is made.

3 December 1999

APPENDIX 20

Letter to the Committee Chairman, from The Rt Hon Michael Meacher MP, Minister for the Environment, Department of the Environment, Transport and the Regions (R 22)

Please find attached a note on the procedures for inspecting GM crop trials and enforcing SCIMAC Guidelines.

Health and Safety Executive Inspections of Genetically Modified (GM) Crops

For all GM deliberate release consents (including those of the farm-scale evaluations), the Health and Safety Executive (HSE) specialist inspectors visit a proportion of sites to ensure that the releases are being conducted in accordance with the specifications set out in the consent. In previous years about half of the active test sites were inspected each year. Since April this year this has increased to include inspection of at least one test site per consent. Repeat inspections are carried out where necessary. From this year onwards, an annual report on inspection activities is to be produced listing the sites which have been inspected. Copies of the report will be placed in the Library as soon as it is published.

SCIMAC's Role

The Industry body SCIMAC (Supply Chain Initiative on Modified Agricultural Crops) is responsible for providing the GM crops for the farm-scale trials and for liaising with farmers to locate sites for the evaluations. All GM herbicide tolerant (GMHT) crops are being grown in accordance with the SCIMAC Guidelines and Code of Practice. The guidelines are enforced by means of an independent auditor who will provide SCIMAC with regular management reports on the progress of the auditing programme and notify them of all non-compliances. SCIMAC has a system of formal improvement notices and penalty points, culminating in complete withdrawal of access to GMHT crop varieties to ensure grower compliance with the Code.

The primary objective of the farm-scale evaluations is to study how the management of GM herbicide tolerant maize and oil seed rape might affect wildlife and biodiversity compared to the management of their non-GM equivalents. A consortium let by the Institute of Terrestrial Ecology has been awarded the contract for this research. In order to make comparisons between the GM and non-GM crops the sites identified for the research in 2000 will be subject to pre-planting sampling and analysis. The research will look at the effects of the management of GM and non-GM crops on the soil as well as the above ground environmental impacts.

The progress of the research is being guided by a steering committee of scientific experts drawn from English Nature, environmental NGOs (including RSPB) and academia. The steering group meets with the contractors three or four times per year and is charged with monitoring the progress of the work, advising on experimental methodologies and design, and reviewing data analysis and conclusions. The monitoring requires that a range of key biodiversity indicator species are repeatedly sampled in and around each field during the growing season.

In addition, a monitoring programme has been running for five years covering all large-scale releases of oil seed rape. The purpose of the monitoring is specifically concerned with gene flow, both to non-GM crops and to wild relatives, and the persistence of GM volunteers. This monitoring programme will be expanded to include all of the commerical scale sites grown in the farm-scale evaluations.

I trust that this information is helpful and that it will prove relevant to the Committee's further evidence sessions on the subject of genetically modified organisms.

2 November 1999

APPENDIX 21

Supplementary memorandum submitted by Dr Philip Dale, John Innes Centre (R 34)

Following further consideration of the subject, I would like to make the following points:

1. GM crops must pass through a rigorous scientific risk assessment before they are accepted for commercial production. Once approved, they are considered to be as safe as conventionally bred varieties for use in agriculture and for food.

2. It follows from this that from a scientific perspective, pollination between GM crops and non-GM crops is considered to present no greater risk than pollination between different conventionally bred crops. In the future, pollination between certain non-food GM crops (eg for industrial processing or biodiesel) and food crops, may need to be minimised by growing under special conditions for reasons of safety. This is already the case for certain conventionally bred industrial crops (eg high erucic acid crop varieties of oilseed rape for lubricant production).

3. The debate about GM and non-GM crop segregation is principally about finding a mechanism to provide maximum choice. This is choice for consumers to buy GM or non-GM foods, for farmers to grow GM and non-GM crops and for society to benefit from future advances in biotechnology.

4. There are various ways in which GM and non-GM crops can become mixed, including volunteer seeds growing in crops, pollination between crops and seed mixing at sowing, harvesting, handling and storage.

5. For any field grown crops, it is virtually impossible completely to prevent some mixing between GM and non-GM crops.

6. The issue of segregation is essentially a matter of finding a compromise between the level of mixing acceptable to the consumer and the level achievable in agricultural practice at an acceptable cost.

7. In order to determine what seed purity is practical in agriculture, it is relevant to draw on the statutory procedures laid down for the production of high quality Breeders or Certified seeds used for sowing by farmers. There have been many decades of experience of crop isolation distances to minimise pollination, and of seed handling procedures to maximise the genetic purity of seed samples. The levels of purity achieved for Certified Seeds in cereal crops (wheat, barley and oats) is 99.7 per cent. The genetic purity achieved for higher quality Breeders Seed is 99.9 per cent.

8. The level of tolerance of GM plant material in a non-GM sample that is practical is within the range 0.1-2.0 per cent. The presence of GM plant material at 0.1 per cent (one GM seed in 1000 non-GM seeds) is near the limits of routine analytical detection. If GM material is below the limits of analytical detection, mixing cannot be verified. The lower the tolerance level that is accepted the higher the cost of crop and food production.

9. The adoption of extreme crop isolation procedures such as a 6-mile distance between organic and GM crops will seriously limit the freedom and choice of neighbouring farmers to follow a diversity of farming systems. Currently organic farmers (1-2 per cent of UK agriculture) and non-organic farmers accommodate each other by accepting a degree of spray and fertiliser drift, pest and disease transfer, cross pollination and crop mixing during harvest and handling.

17 December 1999

APPENDIX 22

Supplementary memorandum submitted by the Supply Chain Initiative on Modified Agricultural Crops (R 35)

I write in response to your letter of 8 December seeking additional information on two specific points raised during the SCIMAC oral evidence session to the Agriculture Committee on 30 November.

1. As requested, please find attached a list of organisations consulted by SCIMAC on the Code of Practice and Herbicide Tolerance Guidelines (see Annex).

2. Q. How will the SCIMAC guidelines allow GM-free or non-GM claims to be made about purchases by the consumer further down the food chain?

A. The written memorandum of evidence submitted to the Committee by SCIMAC in October 1999 called for the urgent establishment of consistent threshold levels within the food industry to define labelling claims relating to "non-GM or "GM-free" products.

Specific management practices within the SCIMAC Code of Practice to safeguard the integrity and identity of harvested GM and non-GM crops are also highlighted in the written memorandum of evidence. They include:

Separate storage of GM and non-GM seed.

Cleaning down of seed drills before and after planting.

Crop separation distances by crop type and species.

Cleaning down of harvesting machinery before and after use.

Separate on-farm storage of harvested GM and non-GM crops.

Onward transfer of information with each GM crop consignment.

As indicated by Dr Turner during the course of the oral evidence session (Q. 73), nothing in life can be 100 per cent guranteed. However, the SCIMAC Code of Practice draws on management practices within the certified seed production sector which in more than 30 years of operation in UK agriculture has consistently delivered levels of varietal purity and identity in excess of 99.5 per cent. This is well within tolerance levels currently applied elsewhere in UK agriculture (eg organic), as well as proposed threshold levels of GM labelling within the EU.

The SCIMAC Code of Practice offers independently audited identity preservation along the farm supply chain from seed stock to harvested crop. This will allow businesses further along the food chain to comply with statutory labelling requirements and to translate these assurances into meaningful information for consumers. SCIMAC has maintained a close dialogue with primary processors, food manufacturers and food retailers to ensure that this onward transfer of information is maintained.

6 January 2000

Annex

ORGANISATIONS CONSULTED AND/OR COMMENTS RECEIVED BY SCIMAC ON GM CROP CODE OF PRACTICE AND HERBICIDE TOLERANCE GUIDELINES

Ministry of Agriculture, Fisheries and Food (MAFF)

Department of the Environment, Transport and the Regions (DETR)

Advisory Committee on Releases to the Environment (ACRE)

Department of Trade and Industry (DTI)

Central Science Laboratory

European Commission (DG III—Industry)

European Commission (DG VI—Agriculture)

European Commission (DG XI—Environment)

European Commission (DG XXIV—Health & Consumer Protection)

National Institute for Agricultural Botany (NIAB)

Scottish Agricultural College

British Crop Protection Council

Pulse Growers Research Institute

Scottish Crop Research Institute

Royal Agricultural Society of England

British Sugar

Scottish Agronomy

Biotechnology and Biological Sciences Research Council (BBSRC)

John Innes Centre

Horticulture Research International

Morley Research Centre

Farming and Wildlife Advisory Group (FWAG)

Maize Growers Association

National Association of Agricultural Contractors (NAAC)

Grain and Feed Trade Association (GAFTA)

British Institute of Agricultural Consultants

Home-Grown Cereals Authority (HGCA)

British Potato Council

Food and Drink Federation (FDF)

Consumers Association

Consumers in Europe Group

Institute of Grocery Distribution

British Retail Consortium

Soil Association

Country Landowners Association (CLA)

Royal Institution of Chartered Surveyors (RICS)

UK Register of Organic Food Standards (UKROFS)

GeneWatch

English Nature

Scottish Natural Heritage

Countryside Council for Wales

Green Alliance

Royal Society for the Protection of Birds (RSPB)

Friends of the Earth

Biodynamic Agricultural Association

Farming and Livestock Concern

The Farm and Food Society

APPENDIX 23

Supplementary memorandum submitted by Professor J M Bainbridge, Chairman of the Advisory Committee on Novel Foods and Processes (R 36)

In response to your request for further data I have pleasure in submitting—

1. Details of approvals of GM Foods by ACNFP prior to September 1997.

2. Some examples of outstanding applications where further information has been requested for European clearance is awaited.

(a) GM Tomato Processed Products—Approval by ACNFP awaiting European clearance.

(b) Insect Protected GM Cottonseed (line 531)—insufficient data provided to ACNFP.

(c) GM Radicchio rosso and green hearted chicory (UK objected awaiting European ruling).

1. Applications to ACNFP under Previous Voluntary Scheme for Safety Assessments of Novel Foods

The following items form part of the list submitted to the European Commission in March 1997, which named all novel foods that had been considered in the UK prior to that time. (Ref ACNFP Annual Report 1996—p 150-151).

Product	*Approval Date*
GM Bakers Yeast	March 1990
* Chymosin I, II, III	January 1991, April 1991, March 1992
GM Brewers yeast	February 1994
* GM Soya (glyphosate resistant)	February 1995
Oil from GM oilseed rape (fertility restorer line) (male sterile line)	February 1995
* Paste from GM tomato	February 1995 (extension February 1996)
Oil from GM glufosinate-ammonium tolerant rape	May 1995
Oil from GM Oilseed rape (2nd fertility restorer line)	September 1995
Oil from GM oilseed rape (glyphosate tolerant)	February 1996
Insect resistant GM maize —processed food products	May 1996
Glufosinate-tolerant GM maize	February 1997
Insect resistant GM maize	February 1997
Herbicide tolerant GM maize	February 1997
Herbicide GM cottonseed	February 1997
Herbicide tolerant and insect resistant GM maize	February 1997

* Products known to have been marketed in UK prior to May 1997. Inclusion in approval list does not imply that products have actually been sold.

Where applications were submitted to the ACNFP prior to 15 May 1997 but their evaluation had not been completed, the committee provided advice on some aspects of these submissions (ACNFP Annual Report 1997—Section 2) but was unable to provide a final opinion until an application was received under the Novel Food Regulation.

If a product had been previously cleared for food use but not marketed within the EU before May 1997 the product required reassessment under the Novel Food Regulation. Where products had been approved under the voluntary safety assessment scheme and do not require reassessment under the Novel Food Regulation (258/97) they are still subject to provisions of the UK Food Safety Act (1990).

2. Examples of Pending Application

(a) Tomato paste from GM tomatoes has been on sale since Feburary 1996 but not all of the processed products (peeled and comminuted) had been on sale prior to May 1997. Therefore in 1998 the company submitted a full application. The committee considered detailed information relating to the modification procedure and were satisfied of no intentional change to molecular level, of the stability of the inserted genetic material over several generations and unchanged compositional analysis compared to non-GM counterparts. Also the data clearly indicated that the processing totally degraded the gene and its protein. Labelling recommendations were made in accordance with Article 8 of 258/97. The committee's report (ref Appendix II ACNFP Annual Report 1998) was forwarded to other member states. However, objections were raised to the initial assessment the European commission subsequently requested advice from scientific committee for food (Application dated 3 March 1998)—SCF has completed its assessment and concluded that the product is safer than the conventional counterpart.

(b) Insect protected GM cottonseed. (Line 531).

A submission, initially received in 1997 sought an opinion on substantial equivalence of processed products (oil and linters) denied from a line of insect resistant GM cotton. The company stated that processing destroyed both intact protein and DNA. The company was asked for further data to demonstrate their absence (1997 Annual Report page 12).

Further information was supplied. It was stated that the linters would not be used as a food but as the source for the production of an additive (hence would need to be assessed outside of the Novel Food Regulation but in accordance with the community legislation on additives).

The data relating to the oil was considered but was found to be inadequate in terms of the genetic data, the analytical data to confirm absence of the novel gene or its protein product in the refined oil and the compositional analyses used. In the absence of this information no decision could be reached by ACNFP.

(c) GM radicchio rosso and green hearted chicory.

Both of these were submitted to the Netherlands competent authority for approval. Previously ACNFP had considered the safety of Radicchio rosso under the voluntary scheme and had requested extra compositional data. Hence the UK objected to a marketing consent under the EC Deliberate release directive (90/220/EC).

Extra information was received but was insufficient to alleviate concerns about possible unintended secondary effects (on phenotype and composition) arising from the genetic modification. A marker gene encoding resistance to streptomycin and spectinomycin used in the genetic manipulation was claimed to be absent the data did not demonstrate this clearly. Futhermore the GM variety was not comparable to the non-GM in the analysis of sesquiterpene lactones, amino acids or biogenic amines. Nor did the application or the Dutch CA address labelling of the products. These concerns were forwarded to the commission (Initial application date 8 April 1998).

10 Janauary 2000

APPENDIX 24

Supplementary memorandum submitted by Professor Alan Gray (R 37)

FARM SCALE EVALUATIONS OF GM CROPS

How is the Study Organised?

The project is being undertaken by a consortium of research institutes, the Institute of Terrestrial Ecology, the Institute of Arable Crops Research and the Scottish Crops Research Institute. It is funded by the DETR, MAFF and the Scottish Executive and is overseen by an independent Steering Committee.

Further information can be obtained from the DETR official website of the project: http://www.environment.detr.gov.uk/fse/index.htm

What Comparisons are Being Made?

The research is evaluating the effects of genetically-modified herbicide tolerant crops on wildlife. GM spring oilseed rape, winter oilseed rape and maize are being grown under conditions that would apply commercially, ie within typical rotations on representative farms. Beet may be included in the experiments, depending on the deliberations of the Steering Committee.

The farms are representative of commercial practice, and so exclude organic farms (which would not grow GM crops). The sample size—a target of 25 farms per crop per year—is that considered sufficient to reveal statistically significant differences with an appropriate power. The fields are split, with one half receiving the GM crop and the other a comparable non-GM variety. The allocation of treatment to field section is at random. Under the present contract the following variables are monitored:

Soil seed bank.

Arable plant diversity, biomass and estimated seed return.

Field margin and boundary vegetation.

Slug and snail abundance, activity and diversity measures.

Arthropods on vegetation, concentrating on plant bugs (Heteroptera), springtails (Collembola) and the caterpillars of butterflies, moths (Lepidoptera) and sawflies; diversity and biomass measures.

Carabid beetles and other ground dwelling arthropods; abundance and biodiversity measures.

Bees and butterflies; preference measures.

A pilot project looking at birds and mammals is due to take place in 2000. Gene flow to neighbouring crops is also being monitored. The project will report at the end of the year 2002.

Has Similar Work Been Conducted Elsewhere?

We know of no other project anything like as comprehensive as this. Much of the data from the USA and Canada is anecdotal and there is very little information on the effects of growing GM crops on farmland biodiversity. There are studies on GM herbicide tolerant beet in Denmark that lack the degree of replication of the UK trials (but which may have some relevance to British agriculture).

10 January 2000

APPENDIX 25

Supplementary memorandum submitted by Marks & Spencer plc (R 38)

Enclosed is the additional information which the Committee asked us to make available:

1. THRESHOLD TOLERANCES

Notes on threshold tolerances for the unintentional presence of GM material describe how the production of maize faces different kinds of risk at the agricultural level in comparison to soya.

2. NON GM ANIMAL FEED

Copies of the labelling / ticketing (not printed) used to identify meat products derived from animals fed on a non-GM diet. This is a comparatively small scale trial and we have avoided high profile promotion—apart from gaining valuable practical experience, the purpose is to understand better our customers' reaction to the offer in relation to the impact on selling price.

3. COMMUNICATION WITH CUSTOMERS

We informed our customers at each phase in the work to remove GM ingredients from our food products mainly by means of large tickets displayed in the food section of our stores. Later this information was communicated by means of advertisements in magazines, radio broadcasts and our Food & Wine magazine.

The back cover of the magazine contains a glossary of terms in which we have defined terms such as "genetic modification" and "non GM". We have consistently avoided the term "GM free".

7 January 2000

THRESHOLD TOLERANCES FOR THE UNINTENTIONAL PRESENCE OF GM MATERIAL

1. INTRODUCTION

1.1 Marks & Spencer gave oral evidence to the House of Commons Agriculture Committee on Tuesday 14 December 1999 and was invited to submit further information concerning threshold tolerances for the unintentional presence of GM material in crops such as maize.

1.2 In our original submission, we commented that, from the perspective of the UK food industry, numerical tolerances are not essential (para 4.4–4.5 page 7). In particular, the absence of numerical standards can allow enforcement to keep in step more easily with technological progress using the "due diligence" defence to provide the basis for effective enforcement. Nevertheless, the latest moves to include a numerical standard have the effect of legitimising the "identity preserved" approach to the supply of non-GM ingredients and are most welcome.

1.3 This legislation requires demonstrable efforts to have been made to ensure segregation of non-GM crops and only then are tolerances permitted for unavoidable contamination in the supply chain. A single figure for a legal threshold tolerance covering all GM crops has the attraction of simplicity but in practice this may not be appropriate. Tolerances must take account of the differing risks from GM contamination that each crop faces and need to be established on the basis of what can be achieved in practice by a well-managed "identity preserved" supply chain.

2. CURRENT EXPERIENCE

2.1 Soya

2.1.1 At a field level, the main experience to date of managing the segregation of non-GM supplies is based on soya. Since this crop is largely self-pollinating, the risk of GM contamination from crops grown in nearby fields is comparatively small. The main thrust of agricultural controls to achieve segregation is to ensure seed stock of high purity supported by disciplines during harvest and subsequent handling.

2.2 Maize

2.2.1 Maize is usually wind-pollinated and vulnerable to cross-fertilisation by plants which may be physically separated by some distance. These risks received attention in 1999 when UK organic farmers expressed their concerns at the proximity to their own production of GM maize field trials. At present, it is not known how great the separation from GM crops should be to maintain a level of contamination below a threshold tolerance of 1 per cent nor the full range of other factors on which such a threshold would depend.

2.2.2 There is some parallel experience not connected with genetic modification which throws light on these questions in the production of speciality starches from specific varieties of maize which need to be

protected from unintentional cross-fertilisation. This is discussed in more detail below but in summary, a tolerance level of up to 5 per cent contamination due to cross-fertilisation has been adopted by the North American Industry.

2.2.3 It should be possible to reduce the tolerance but this requires new measures of control which as yet have not been fully explored. By analogy, control of unintentional cross-fertilisaton between any maize variety and GM types would require a similar approach.

3. Maize

3.1 Maize is widely grown in many parts of the world for food, animal feed and industrial products. Apart from protein and oil, the principal constituent of the traditional or Regular Maize is starch (chemical name amylose). Other types of maize include sweetcorn characterised by its high sugar content.

3.2 Waxy Maize varieties are grown specifically for their high content of a particular type of starch known as amylopectin which is valued for its distinct properties as a thickening agent. Amylopectin is often further processed into a range of modified starches in order to tailor these properties to meet precise food processing needs.

3.3 The kernels on the maize cob are individually fertilised, usually by wind pollination. Waxy maize will also cross-pollinate quite readily with the regular varieties but then produces amylose instead of amylopectin starch. It is possible to find individual kernels on the same cob fertilised either by regular or waxy maize pollen. In order to retain the functionality of these speciality food ingredients, it is important to minimise this cross-pollination and to maintain the segregation of waxy maize varieties at every stage in growing and processing.

3.4 Waxy maize is normally grown under contract which will stipulate measures to minimise the risk of unintentional cross-fertilisation including:

- seed purity;
- field perimeter controls to counter pollen drift;
- controls on crops grown in same field during the previous 3-5 years;
- control or knowledge of plantings in adjacent fields;
- taking account of the prevailing wind direction;
- sowing at time intervals to avoid pollination windows coinciding with near-by plantings of regular maize; and
- documentation and controls.

3.5 The impact of cross-pollination between waxy and regular maize is demonstrated in photograph 1 [not printed] showing the results of a simple test that can be applied at field level. Approximately one quarter of the cob is treated with iodine which stains the individual kernels.

3.6 The kernels coloured black contain amylose starch and have been cross-fertilised with a regular maize variety. The majority of kernels in the photograph contain amylopectin starch and show a red/brown coloration in the absence of amylose. These kernels were fertilised with pollen from another waxy maize plant. Approximately 10 per cent of the kernels have been cross-fertilised with regular maize and place this sample outside the limits of acceptance of the starch processing industry.[11]

3.7 The iodine test is used to estimate the extent to which a field of wax maize has been penetrated by pollen from regular maize. This allows controls to be introduced during harvesting to avoid areas of the field which are likely to contain excessive levels of amylose-containing plants. An isolation zone of 5 to 7 rows is usually created around the perimeter of the field which may be planted with an entirely different crop.

3.8 The starch industry standard tolerates a level of 5 per cent of regular maize in waxy maize kernels for processing. This represents a balance between the impact on the functional properties of the amylopectin starch and the cost to achieve segregation in the field. No doubt it is possible to achieve a lower level of cross contamination but at present there is insufficient experience to set the control requirements or to quantify the impact on cost.

4. Non GM Maize

4.1 Most food ingredients obtained from maize are produced from European grown raw materials—a region which is effectively non-GM and at the moment issues of segregation are comparatively straightforward.

4.2 Some speciality starches from waxy maize of particular importance to Marks & Spencer are produced uniquely in the USA. At present there are no genetically modified varieties of waxy maize but regular maize varieties are grown in the same region and this brings the risk of GM contamination through cross fertilisation.

[11] To avoid confusion it should be noted that the iodine test does not detect the presence of GM maize.

4.3 Working together with the supply chain, we have been able to ensure a reliable supply to meet our current needs of non-GM speciality starches from North America based on the industry's previous experience of segregating waxy and regular maize. Additional controls were introduced such as increasing the extent of the isolation zone at the field perimeter with levels of regular maize pollination being closely monitored using the iodine test.

4.4 We are confident that this comparatively small production volume is within the 1 per cent tolerance level for GM contamination. However, we do not have sufficient experience to anticipate how controls would operate to produce non-GM regular maize varieties grown against a background of significant plantings of the GM types as already takes place in North America and may eventually happen in Europe.

4 January 2000

APPENDIX 26

Memorandum submitted by Professor Bevan Moseley (R 39)

Thank you for your letter dated 1 December 1999 inviting me to comment on the above subject.

Although I was a member of the Advisory Committee on Novel Foods and Processes (ACNFP) from 1988 to 1998, of the Advisory Committee on Releases to the Environment (ACRE) from 1995 to 1999 and am currently a member of the European Union Scientific Committee on Food and Chairman of its Novel Foods Working Group I have no expertise on the practicalities of segregation of genetically modified crops on farms, in storage and in transit.

What it is important to stress is that segregation is not a safety issue which is the main concern of the above Committees. The ACRE spends its time ensuring that individual genetically-modified crops will not cause harm to the environment or human health before recommending that they can be marketed (under the Release Directive 90/220 EC) while ACNFP considers applications for marketing foods for human consumption derived from genetically modified sources (under the Novel Foods and Novel Food Ingredients Regulation 258/97) and recommends only those which are considered at least as safe as their traditional counterparts. There is no evidence that any decision made by these Committees with regard to the growing of GM crops or their use as food causes harm to the environment or consumers' health. Indeed all the evidence to date is that such practices are safe relative to traditional crops and foods.

It should be added that the UK and European approach has been cautious and the total acreage of genetically modified crops in Europe in 1988 (about 22,000 hectares of insect-resistant maize in Spain and France) is less than a tenth of 1 per cent of the GM crops grown worldwide ie the technology is passing us by.

Thus from my perspective segregation is required to address consumers' concerns and their right to know whether they are eating foods with GM components in them. Incidentally all the scientists I know on the Committees described above subscribe to the view that GM foods should be labelled and consumers allowed a choice. But it is not a safety issue.

It would seem inevitable that a requirement to segregate GM from non-GM crops on single farms or in collection areas will increase costs (between 15–30 per cent for raw materials over the next two years, a quoted figure) and that from time to time mistakes will be made and co-mingling (or contamination, depending on your point of view) will occur. On a much larger scale if the whole of the European market requires, say, identity-preserved non-GM soybeans this would be about 30 per cent of the American crop (which is more than 50 per cent GM now) then massive reorganisation of the collection and storage of the beans would be required. On a recent visit to the USA, in conversation with the USDA, biotech companies, and the soya growers, the idea was entertained that perhaps farmers in northern states (Ohio and Minnesota) could grow non-GM and export them to Europe through the Great Lakes while the GM crops could be grown in the other states and exported down the Mississippi and out through New Orleans. The idea of "mixed" farming and keeping the crops segregated was one thought not to be practical.

Of course if the economics becomes tilted in favour of non-GM because of the extra premium attracted, more farmers may revert to growing non-GM and the whole process will go into reverse.

These are some initial thoughts—I won't go further because my comments may not be helpful but if there are any specific points you would like my views on eg "negative" lists, detection methods, please don't hesitate to contact me.

7 January 2000

APPENDIX 27

Supplementary memorandum submitted by the Managing Director, Cargill plc (R 41)

This is to follow up the evidence that my colleagues and I gave to the Committee on 30 November 1999. Mr Mitchell said that we had been reported as offering premiums to farmers who supply non-GM crops and asked whether that was the case.

I replied that there had been a differentiated price put into the US market during the harvest season but that at the time I had no knowledge of how successful that had been. We agreed to provide more information on this point.

Premia did play a part, as they normally do, for speciality soybeans or corn grown under contract to meet specific customer demand. These premia vary widely. Depending on the contract specification they can range up to 300 per cent of the commodity price for very specialised organic crops. The premia relate to special handling and logistics requirements whatever the speciality demanded. About 2.5 million acres of corn and about 85,000 acres of soybeans are known to be grown under contract for their specific properties, eg high oil corn, white corn, waxy corn, high oleic soybeans. These acreages compare with about 73-74 million acres for the commodity corn crop, of which a third were planted with GM corn, and about the same number of acres for the commodity soybean crop, of which between 55 per cent and 60 per cent was GM.

However, aside from these contract-grown crops, I believe the Committee was interested in whether premia were paid at harvest for non-GM crops from the commodity stream and, if so, for what volume. It is important to note that there is no generally accepted definition of "non-GM", so prices and volumes may relate to different specifications. The Japanese market is generally working to a non-GM definition of "above 95 per cent purity = non-GM".

Cargill did offer some farmers premia at some locations based on whether or not their corn and soybean harvests contained GMOs at the time of the 1999 US harvest. Such premia were offered in order to fulfil specific demand from Japan for crops that were at least 95 per cent non-GM. The demand for such crops materialised during the course of the year so little had been contract grown. Meeting a 95 per cent purity standard was feasible at harvest in some areas (whereas meeting a tighter standard would not have been) and the extra handling, storage and transport costs involved could be covered because it was clear that Japenese buyers were prepared to pay premia of up to 50 cents per bushel—up to $18 dollars per tonne (delivered Japan). This amounts to a premium on the market price of corn of over 20 per cent and a premium on soya of over 10 per cent.

Neither Cargill nor other companies offered a general differentiated price across the board because there was no general, consistent demand for higher priced, non-GM crops. There was no consistent two-tier market price for GM and non-GM crops, neither for soybeans nor corn. The market is still in a phase of early price discovery on this issue, at a more tentative stage than I had thought when speaking to the Committee. The demand for non-GM crops, particularly for the feed sector, was clearly not very solid at that stage.

Premia were offered at the farmgate only in a few areas sourcing for export and were of the order of 10-15 cents (5-7 per cent) a bushel for corn and 15 to 35 cents per bushel (3-7 per cent) for soybeans. (Commodity corn was at 210 cents per bushel = $82 per tonne; commodity soybeans at 470 cents per bushel = $172 per tonne). We do not know what tolerances (what percentage of co-mingling with GM material allowable) all these prices relate to, but they are most likely related to the 95 per cent tolerance. As we said in our original written submission to the Committee, premia of 5-20 per cent would be likely to be paid to the farmer for a non-GM crop, depending on the strictness of specification he had to adhere to. However, these premia at harvest time required the farmer only to keep his harvest separated and did not impose other conditions on him. Beyond the premia paid to the farmer, premia would also have been paid on storage and transport to keep these crops separate for export. There are no reports of how much these premia generally were - we believe they varied widely according to circumstance.

We have no knowledge of significant quantities of non-GM soybeans coming to Europe from that US harvest, other than for certain crops specifically contracted for in advance. US corn is not imported as corn into Europe except under the special arrangements applying to Spain and Portugal.

12 January 2000

APPENDIX 28

Memorandum submitted by the Department of Environment, Transport and the Regions (R 42)

INTRODUCTION

1. This Memorandum responds to the Committee's request for evidence on "the issues raised by segregation of genetically modified crops" which fall under the competence of the Department of the Environment, Transport and the Regions (DETR). It complements the separate Memorandum on the agricultural implications of this question being submitted by the Ministry of Agriculture, Fisheries and Food (MAFF).

2. DETR's responsibilities for the regulation and control of genetically modified (GM) crops are an aspect of its wider statutory responsibilities for the prevention or minimisation of any damage to the environment from the release and marketing of any genetically modified organism (GMO). The Memorandum summarises the main features of these responsibilities, and their relationship to EU obligations and to the responsibilities of other governmental bodies, before dealing more specifically with the Department's role in farm scale evaluations of GM crops. The Memorandum also summarises the environmental safety considerations of relevant segregation issues.

Main Features of Control and Regulation of GMO Releases

3. DETR co-ordinates statutory and operational requirements in Great Britain in relation to the release and marketing of all GMOs, including plants, animals and micro-organisms, or preparations or products containing or consisting of GMOs. Similar requirements apply in Northern Ireland, but are controlled under separate legislation.

4. DETR's role in Great Britain is exercised, as appropriate, in co-operation with the devolved administrations, the Ministry of Agriculture, Fisheries and Food, and the Health and Safety Executive. The devolved administrations are responsible for issuing their own consents in appropriate cases. Expert scientific and other advice is provided by the Advisory Committee on Releases to the Environment (ACRE) supported by a secretariat of scientifically qualified officials.

5. "Release" in the context of the regulatory and control system refers to the deliberate removal of any physical, chemical or biological barriers which prevent or limit the contact of a particular GMO or GMOs with the environment. Such deliberate releases are usually for the purpose of small-scale research, development or experimental trials, such as those for new plant varieties. "Marketing" refers to the clearance of products consisting of or containing GMOs for sale and use throughout the European Union.

6. The broad framework for the release and marketing of GMOs in Great Britain and Northern Ireland is based on, and structured in conformity with, EC Directive 90/220/EEC on the Deliberate Release into the Environment of Genetically Modified Organisms. The Directive was implemented in Great Britain by Part VI of the Environmental Protection Act 1990 and the Genetically Modified Organisms (Deliberate Release) Regulations 1992, made under the 1990 Act. EC decisions allowing for the adaptation of the Directive to technical progress were reflected in amendments to the 1992 Regulations made in 1995 and 1997.

7. The main features of this Europe-wide framework for the regulation and control of releases of GMOs to the environment are, in summary:

- all experimental releases of GMOs require a consent from a national competent authority;
- the issue of any consent by a competent authority can only proceed after certain minimum, science-based, information requirements have been satisfied;
- all EU member states have the opportunity to comment on information notified to competent authorities in connection with release consent applications;
- all release consents issued by a competent authority may include general or specific conditions, including requirements for post release monitoring and reports;
- a consent to market products consisting of or including GMOs may only be issued by a competent authority following Community wide clearance; and
- any product for which a marketing consent is issued by a competent authority in accordance with the Directive may be sold and used throughout the EU.

8. The basic principle underlying this framework is that the widespread commercial use of any GMO or GMO-based products should only proceed after it can be shown that the risk of any potentially adverse effects on the environment can be prevented, controlled or minimised.

9. In most cases, this implies a step-by-step approach. In the case of GM crops, for example, the starting point would be contained greenhouse development, followed by small and then larger scale experimental trials, proceeding finally to commercial use. At each stage, progress from one step to the next may only be taken when it is clear that any risks to human health and the environment will be prevented or minimised.

10. In reviewing the operation of Directive 90/220 EU Environment Ministers have agreed that certain changes are needed to strengthen this risk based, step-by-step approach to the release and marketing of GMOs. These changes include better risk assessment procedures, requirements for traceability, post-marketing monitoring and time-limited consents for GMO products, as well as more explicit requirements in relation to public consultation and labelling. Ministers reached political agreement in June 1999 to incorporate these changes in a revised Directive, which is expected to be adopted in the year 2000.

Farm Scale Evaluations of GM Crops

11. At the current time no GM crops have completed all the regulatory requirements necessary for them to be grown unrestricted in the UK for commercial purposes. Three GM crop varieties of maize have received EU wide clearance under the Directive 90/220, but await approval for use under the seeds legislation.

However, as part of the process of reviewing the Directive, EU Environment Ministers took a key decision in December 1998 affecting the evaluation of GM crops for these purposes. This was to use the existing flexibility of the Directive to require that the risk assessment of any new applications for releases of GMOs should include an assessment of all direct, indirect, immediate and delayed effects of on the environment.

12. In order to implement this new risk assessment procedure immediately in relation to GM crops, the Government has reached an agreement with the group of producers, suppliers and users forming the Supply Chain Initiative on Modified Agricultural Crops (SCIMAC). Under the agreement, a programme of Government-funded farm scale evaluations is being conducted in relation to three GM crops nearing approval for general cultivation under the EU scheme for the Europe-wide clearance of the marketing of GMO products described above. The crops concerned are herbicide tolerant oil seed rape, fodder maize and fodder beet.

13. All these crops have already been assessed, under the EU scheme, for potential risks to the environment arising from the plants themselves or from their use as animal feed. The four-year programme of Farm Scale Biodiversity Evaluations will, however, compare the effect on farmland wildlife of growing and managing the GM crops using their companion herbicide with their non-GM equivalents grown conventionally.

14. Plantings for these evaluations are limited to 20–25 fields per crop year subject to the advice and requirement of an independent Scientific Steering Committee. Proposals for any other field scale plantings will be decided by the Committee taking into account the relevance of such proposals to biodiversity. None of the produce from the plantings in the UK will be used in a way which is of direct commercial benefit to the consent-holders during the evaluation period. Should any GM crop grown in the UK receive full clearance during the evaluation period, the agreement with SCIMAC provides that the resulting produce will be used "within identity preserved channels which will ensure that consumer choice can at all times be respected".

15. The effect of the agreement is that there will be no widespread planting leading to general market access of the GM crops concerned until after the evaluations are complete in 2002. Although the evaluations are not themselves directed, in terms of environmental safety, at ensuring the segregation of GM from non-GM crops, this timescale means that it is likely that adoption and implementation of the revised Directive 90/220 will be complete before the evaluations are complete. The more stringent requirements in the proposed revised Directive in relation to labelling, traceability, monitoring and time-limited marketing consents for GMOs products, combined with increasing commercial pressure, is therefore likely to have a significant and increasing influence on the way GM-crops are handled in comparison to their non-GM counterparts.

SEGREGATION ISSUES:

Pollen Transfer and Separation Distances

16. The Advisory Committee on Releases to the Environment (ACRE) fully considers the likelihood of cross-pollination when reviewing the risk assessment of all applications to release GM crops.

17. ACRE accepts that some pollen flow beyond the boundaries of the release sites is inevitable and therefore focuses on the consequences. It is not the purpose of the separation distances between GM and non-GM crops to isolate completely GM crops from the surrounding environment. Separation distances are used purely as a precautionary measure to reduce any cross-pollination. ACRE has advised that current separation distances are sufficient to ensure safety to human health and the environment.

18. The SCIMAC guidelines lay down the separation distances for farm scale trial crops. They use internationally recognised isolation distances based on 50 years experience to maintain seed purity across the world, These distances have stood the test of time, and give a seed purity in excess of 99.5 per cent.

GM Crops as Weeds

19. It is often said that GM crops, particularly those that are designed to be herbicide tolerant, have the potential to become persistent weeds and could be environmentally damaging if they "escaped" from agricultural fields to invade natural habitats.

20. All of our common crops have been bred and selected to grow in well managed agricultural fields but they are not good weeds because they do not compete well with wild plants especially in undisturbed ecosystems. A GM crop plant would only become a weed if something was changed or added to give it a survival advantage or make it more competitive/ persistent in the wild. Herbicide tolerance alone will not do this because in the absence of the herbicide the GM crop has no more advantage than any other crop. It is difficult to see how herbicide tolerance would make a GM plant better at invading natural habitats where herbicides are not used.

21. However, if the crop was made more frost hardy or resistant to insect pests and diseases then it is conceivable that it would have a survival advantage and might become a better weed. The likelihood of this happening is considered in detail by ACRE during the risk assessment of all GM crops before they are released. If there were any reason to believe that the genetic modification would make the crop more invasive or persistent then it would not get approval.

Transfer of GM Characteristics to Wild Relatives by Cross-Pollination

22. The chance of cross-pollination happening will depend greatly on the particular GM crop and whether or not it has any wild relatives in the countryside. For example, GM maize need cause little concern because there are no sexually compatible weed relatives here in the UK but, in contrast, oilseed rape has several wild relatives.

23. The likelihood of genes "escaping" into wild relatives is also considered by ACRE in the risk assessment. Experimental releases of GM crops often have risk management conditions attached that are designed to reduce the spread of GM pollen from the test site. In the case of GM oilseed rape, ACRE will always assume that cross-pollination to wild relatives will occur and then considers what the consequences might be.The transfer of herbicide tolerance to weeds will only give them a survival advantage if the weeds are sprayed with the herbicide. Outside agricultural fields, where the herbicide is not used, they will be no different, or no more "super", than any other weeds.

24. Weeds present in agriculture are already tolerant to a range of herbicides since most herbicides are only active in certain species and this has nothing to do with GM crops. If GM crops did add to the herbicide tolerance already present, then ACRE's view is that this would be more of a farming problem rather than an environmental one. If herbicide tolerant crops no longer gave any benefit they would not be used and this is clearly not in the interests of farmers or the biotechnology companies.

Herbicide Tolerant GM Crops and the Use of Chemicals

25. Within any field of crops, the farmer's objective is to minimise the number of weeds, which occur. Currently this is done by various applications of different herbicides to get the right balance between controlling the weeds but not killing the crop. GM crops that are tolerant to broad spectrum herbicides, such as glyphosate or glufosinate, will allow farmers to spray without fear of damaging their crops.

26. At present, we do not know for sure what GM herbicide tolerant crops will mean for the amount of herbicide used, but in practice, it is most likely that the pattern of herbicides used will change. Less types of product will be used, and probably in reduced quantities. Nevertheless, greater dependence on broad spectrum herbicides has led to fears that farmers may become over enthusiastic in their weed control. Too much weed control could reduce the amount of food available for insects, birds and small mammals, resulting in a reduction in farmland biodiversity. That said, the use of broad spectrum contact and systemic herbicides may reduce the need for ploughing and thus help to conserve soil animals and reduce erosion. More information on these questions will be gained from the programme of farm-scale evaluations.

Segregation and Organic Farming

27. There has been a lot of concern recently that GM crops might interfere with organic farming, particularly by cross-pollination of organic crops. MAFF takes the lead responsibility for looking after the interests of organic farmers. MAFF has brought together organic accreditation bodies (UKROFS—the United Kingdom Register for Organic Food Standards), and GM farming representatives (SCIMAC—the Supply Chain Initiative on Modified Agricultural Crops), to discuss ways in which a consensus can be reached on how organic and GM farming can coexist.

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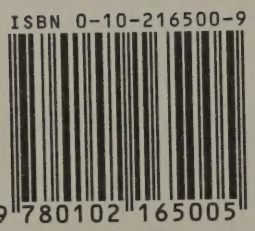

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