GM foods -- evaluating the farm scale trials : Volume I. Report, together with formal minutes.

House of Commons

Environmental Audit Committee

GM Foods—Evaluating the Farm Scale Trials

Second Report of Session 2003–04

Volume I

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The Environmental Audit Committee

The Environmental Audit Committee is appointed by the House of Commons to consider to what extent the policies and programmes of government departments and non-departmental public bodies contribute to environmental protection and sustainable development; to audit their performance against such targets as may be set for them by Her Majesty's Ministers; and to report thereon to the House.

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In the footnotes of this Report, references to oral evidence are indicated by 'Q' followed by the question number. References to written evidence are indicated by page number as in 'Ev12'. 'App' refers to written evidence printed in Volume II, serial number HC 90-II]

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Report

Conclusions and recommendations

1. The benchmark against which GMHT crops were measured was not ambitious, since biodiversity in conventional crops has suffered greatly over the last half-century. (Paragraph 6)

2. We commend ACRE for the speed with which it conducted its work. (Paragraph 9)

3. The advice from ACRE is clear but it is not decisive. We acknowledge that in its limited scope and contingent nature, the ACRE advice accurately reflects the trials themselves. (Paragraph 11)

4. It is regrettable that the Government failed to be transparent about the nature of any deal made with the industry over the inclusion of beet. Given the public's concern and suspicion on matters relating to the GM industry we would expect greater openness. (Paragraph 25)

5. The problems evident in north America have not been taken seriously enough. DEFRA should have advised the SSC to take account of north American experiences with GM. (Paragraph 31)

6. We are unhappy that this work on north American GM experiences has been left until after most of the FSEs have reported. Consequently, the findings from that trans-Atlantic research have not now been factored in to the decisions that are already being reached on those GMHT crops in the UK nearest approval. This is clearly unsatisfactory. No decision to proceed with the commercial growing of GM crops should be made until thorough research into the experience with GM crops in north America has been completed and published. (Paragraph 31)

7. We do not feel that the choice of fields in regard to intensity had any effect upon the results, except insofar as it possibly allowed them to be expressed more clearly:. (Paragraph 35)

8. The north American experience with oilseed rape and the devastation of organic rape production should serve as an impetus to Government to bring in prudent guidelines for separation distances as quickly as possible. (Paragraph 37)

9. We are very concerned about possible contamination by gene-flow and pollen spread of non-GM crops and insist that the issue of liability be settled before any GM crops are allowed to be commercially grown in the UK. The Government should ensure, through primary legislation, if necessary, that it puts into place, before any GM crops may be grown commercially in this country, a clear and comprehensive liability regime to underpin any future regulations dealing with co-existence issues. Moreover, liability should lie with the industry and not with farmers. It would be wrong for the Government to allow farmers to be used as a firewall for the industry. (Paragraph 38)

10. We consider it unfortunate that, as there was no definite yield component to the results of the FSEs, rumours and assertions have been allowed to proliferate concerning how the crops performed. (Paragraph 41)

11. We expect future trials to incorporate robust protocols for formal measurements of yield. (Paragraph 41)

12. We are confident that there was no clear manipulation of the herbicide regime on GMHT crops in order to favour their biodiversity. (Paragraph 43)

13. In the context of public concern about GM crops and the north American experience with GM, we believe that in order to determine the cumulative effect of rotational crops upon biodiversity, the FSEs for those crops should have lasted longer than three years. The trials on forage maize should also have lasted longer. We believe that the Government must take account of this in any future trials (Paragraph 46)

14. We are concerned that the GMHT forage maize trials were based on an unsatisfactory, indeed invalid, comparison. It is vital that the Government permit no commercial planting of GMHT forage maize until that crop is thoroughly re-trialled against a non-GM equivalent grown without the use of atrazine. (Paragraph 50)

15. It is clearly unsatisfactory that no definite statement has yet been made as to what the results were from the 25% of conventional forage maize fields in which atrazine was not used and whether or not this sample constitutes a large enough base from which to extrapolate comparable results for non atrazine conventional maize against GMHT maize. (Paragraph 51)

16. Damage to trial sites should be seen by those responsible for that damage as counterproductive, since it undermines the scientific validity of evidence that could well support their claims. We support the lawful right to protest but feel that future trials should be better protected in order to safeguard scientific evidence that may prove very valuable in domestic and international discussions as to whether the commercial growing of GM crops should proceed. DEFRA must consult with appropriate security bodies about achieving more secure trial sites in future. (Paragraph 57)

17. We are concerned that the industry was responsible for a number of key inputs into the operation of the trials which appear to have been assessed only against very broad or vague criteria, or which were taken on trust. Even if these inputs had no cumulative effect upon the results of the trials, they were sufficiently integral to raise significant concerns as to the extent to which the industry was in practice capable of influencing the results. (Paragraph 62)

18. It is inconceivable that beet or spring-sown oilseed rape will be given consents to be grown if managed under the same regime as applied in the FSEs. (Paragraph 63)

19. It is vital that the Government makes clear in its decision exactly what will be required of applicants in future, and how it will assess whether there is evidence of biodiversity harm from the use of the GM crop and herbicide regime for which the particular application is made. (Paragraph 65)

20. We agree that the industry should pay for any future trials including the future trials we think necessary for forage maize. (Paragraph 65)

21. We recommend that future GM crop assessments of biodiversity impact should be no shorter than four years . (Paragraph 67)

22. We expect to see thorough multi-year and multi-site trials for any new applications. We likewise expect comparative assessment of biodiversity harm to be undertaken on a crop by crop basis. (Paragraph 68)

23. Biodiversity levels have slipped intolerably over the last fifty years and Government has a duty to attempt to regain some of that lost ground. Indeed, the Government, in the light of the Curry Report, should establish a benchmark for biodiversity in conventional crops, at the less intensive end of the spectrum. It is against this benchmark that future trials should assess innovatory practices and regimes in conventional agriculture. This ought to make the benchmark used in the FSEs irrelevant. (Paragraph 72)

24. While we applaud the steps that Government has taken to assess biodiversity in a rational way before permitting an agricultural innovation in the form of GM, we believe that even if some GM crops with some associated herbicide regimes are eventually shown to be less harmful to biodiversity than their conventional counterparts, the Government and its advisory bodies are still guilty of setting too low the level of harm (Paragraph 73)

25. We therefore recommend that in future trials the biodiversity benchmark against which GM crops should be assessed should be that associated with the less intensive and more biodiversity-friendly end of the spectrum found in UK agriculture, such as organic crops. (Paragraph 73)

26. The scope of the trials was very narrow and the results cannot be regarded as adequate grounds for a decision to be taken in favour of commercialisation. (Paragraph 74)

27. It would be irresponsible for the Government to permit the commercialisation of GM crops on the basis of one narrow component of the entire evaluation of GM technology. This would be the case even were there no significant doubts as to the robustness, validity and relevance of the FSE results. (Paragraph 75)

Introduction

1. During the late summer of 2003, it was announced that the first results from the Government instigated farm scale evaluations (FSEs) on genetically modified herbicide tolerant (GMHT) crops would be published on 16th October 2003. At the time that the trials were being set up, in the spring of 1999, our predecessor Committee had been in the middle of its inquiry into GMOs, which concluded with the publication of its Report, *GMOs and the Environment: Coordination of Government Policy.*[1] That Committee had looked briefly at the decision to set up the trials as part of its inquiry and had made a number of recommendations. Our Committee decided on 17th September 2003, in the light of the publication of the first results, to hold an inquiry into the value and relevance of the FSEs.

2. The press release issued the following day, 18th September 2003, made it clear that we desired to examine "both the design and operation of the trials, and the implications for future commercialisation of GM crops in the UK." We deliberately chose narrow terms of reference but did not dissuade those submitting memoranda from touching on wider issues. We hoped our inquiry would address, amongst other things, the adequacy of the design of the FSEs and their ability to answer the questions posed at the outset of the FSE process, the conduct and operation of the trials, and the implications of the trial results for the Government and other decision-makers in terms of how the results of the FSEs will be integrated with policy and decision making.

3. In the course of this inquiry we have received 31 memoranda, for which we are grateful. We also took oral evidence on eight occasions, beginning with the former Minister of State at DETR, the Rt Hon Michael Meacher MP, who was in office at the beginning of the trials, and ending with Elliot Morley MP, current Minister of State at DEFRA. The first public evidence session took place just thirteen days after the first FSE results had been published. The last took place on the very day that the Advisory Committee on Releases to the Environment (ACRE) made public its advice to the Government, in the light of the FSE results, on the future commercial planting of GMHT crops. Altogether, sixteen individuals or organisations were called to give oral evidence. We would like here to record our thanks to all of them.

The FSE trials: results and ACRE's advice

The trials

4. The FSEs were set up to examine the biodiversity impact of GMHT crops and their particular management (herbicide) regime in comparison with the equivalent conventional

1 Fifth Report of Session 1998-99, HC 384.

crops grown under a conventional herbicide regime in order to establish whether the former caused greater harm to biodiversity than the latter. The "null hypothesis", as it was known, against which the trial results were to be assessed was that there would be "no significant differences between the biodiversity associated with the management of the particular GMHT crop and the comparable non-GM crop at the farm scale.".[2] Following a pilot year, full scale FSEs began in 2000: four crops were sown over the three years of the trials—beet, winter-sown oilseed rape, spring-sown oilseed rape and forage maize. The conventional and GMHT varieties of each of these crops were grown in adjoining halves of the same field so as to facilitate the necessary comparisons of biodiversity. It was decided to issue the results on the first three crops first: data is still being assessed on the fourth crop, winter-sown oilseed rape, which was for obvious reasons the last to be sown and grown over the three years. The results for the last crop will be made public later this year. We consider the staggered release of the results to have been far from ideal and will touch on this matter later in the report.[3]

5. The FSEs were, as the Royal Society put it in its evidence to us, "the largest manipulative experiment ever carried out on farmland ecology anywhere in the world, exceeding by more than threefold any comparable experiment undertaken previously." 273 trial fields were planted; evidence was taken from 201 of those fields for the final results.[4] Those results, or at least those relating to the first three of the four crops, were published in October 2003 as a series of papers in a themed issue of the *Philosophical Transactions of the Royal Society*. A commentary on the work of the FSEs was published by the scientists from the research consortium who undertook the trials: and a summary document, *GM Crops: Effects on Farmland Wildlife*, aimed at making a simple but accurate presentation of the results to the wider public, was also published by the Scientific Steering Committee (SSC), which oversaw the trials, together with the research consortium.

The results

6. In short, the FSE results on the first three crops showed that GMHT spring-sown oilseed rape and GMHT beet, with their associated herbicide regimes, resulted in lower levels of field biodiversity than was the case for their conventional counterparts managed conventionally. The opposite was the case for GMHT forage maize with its herbicide regime which resulted in greater levels of field biodiversity than was the case for its conventional equivalent, conventionally managed. These results were widely held to be both consistent and clear within the parameters of the design and operation of the trials. While there is of course a direct link between GMHT crops and their particular herbicide and management regime, these trials were an assessment of the impact upon biodiversity of that herbicide under its particular regime, and not of the GMHT crop itself. Moreover, the trials were very narrow in their remit: they were intended only to provide benchmark assessments of biodiversity in four conventional crops against which GMHT varieties could be measured. **The benchmark against which GMHT crops were measured was not**

2 Ev 143.

3 See below, paras 7-8.

4 Ev 167,3.

ambitious, since biodiversity in conventional crops has suffered greatly over the last half-century.

The release of the results

7. With results made public for only three of the four crops included in the FSEs, there is still a certain unwelcome inconclusiveness to what is an unfinished process. This is particularly the case as the fourth crop for which results are still expected, winter-sown oilseed rape, is the crop of the four grown most commonly across the country. The results from the first three crops have been the focus of much attention: the various bodies involved in the process of reaching a decision on the outcome of the trials (in consultation with the devolved administrations) have already rolled into action, despite the fact that the results from the fourth crop could significantly alter the tenor of the results as a whole. While it is true that decisions as to the commercial future of these crops will be decided on a crop by crop basis, it is also true that the public often consider these things in their totality. Later this year the results for the fourth crop will be published, no doubt once more to considerable public interest: and once again all the various bodies involved will roll into action. The whole process of seeking advice, consultation and reaching a decision will have to be repeated. We regret that the results for all four crops were not issued at the same time.

8. Professor Pollock of the SSC claimed in evidence to us that the results were being made public in this piecemeal fashion out of simple convenience: the results were ready and so should be passed on to ACRE and to the Government.[5] The Minister of State at DEFRA, Elliot Morley MP, echoed this in evidence to us later during the inquiry.[6] However, Dr Colin Church, Head of Chemicals and GM Policy Division at DEFRA, suggested to us that the real reason for delivering the results on the first three crops early was that a decision had to be made as soon as possible "in case the two dossiers that are in the European process come forward for the UK to give its opinion".[7] No doubt, the industry—no longer voluntarily bound by the unofficial 'moratorium'—may also wish to move as quickly as possible to approvals for their GMHT crops and associated herbicides. Interestingly, it was originally envisaged that a summary of the first year's results could be produced significantly earlier in order to permit managed development of commercially grown GMHT crops should the null hypothesis be upheld.[8] By November 1999 it was expected that the results for all the tests would be known in time for possible commercial plantings of GM crops in Autumn 2003.[9]

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5 Qq304 & 322.

6 Q546.

7 Q546.

8 *ENDS Report 345*, October 2003, p28.

9 Ev.138,(iv).

ACRE's advice to Government

9. Once the results were published it was for ACRE to advise the Government upon the next steps. The results were forwarded to ACRE on the day of their publication and two presentations were made before it by the research consortium in mid—and late October 2003. Written submissions were made to ACRE and two open meetings were held in late November and early December 2003 in London and Edinburgh respectively as part of the process of its coming to a decision as to what should constitute its advice to Government. ACRE published this advice to the Government on Tuesday 13th January 2004, the day on which we held our last evidence session with the Minister of State, Elliot Morley MP. **We commend ACRE for the speed with which it conducted its work.**

10. In summary, ACRE reported that "if GMHT maize were to be grown and managed as in the FSEs this would not result in adverse effects [...] compared with conventionally managed maize"; that "if GMHT beet were to be grown and managed as in the FSEs this would result in adverse effects on arable weed population [...] compared with conventionally managed beet"; and that "if spring-sown GMHT oilseed rape were to be grown and managed as in the FSEs this would result in adverse effects on arable weed populations [...] compared with conventionally managed spring-sown oilseed rape." The advice added with emphasis that "these conclusions only apply to the management regime used in the farm scale evaluations" and went onto say that "alternative management strategies may have different impacts which may be either beneficial or adverse".[10]

11. As ACRE pointed out, these conclusions were only applicable to the management regimes used in the FSEs. A good deal of ACRE's advice is dedicated to dealing with the implications of the trials for GMHT crops grown under different regimes. At this point in the advice, a number of conditions and contingent factors come into play, and the guidance with regard to other management regimes becomes nuanced. In particular, as we explain later, the general position on the lack of adverse effects upon biodiversity of GMHT forage maize in the light of the controversial employment of atrazine in the FSEs is conditioned by a number of important recommendations. Professor Jules Pretty, acting Chairman of ACRE for the purposes of this advice on GM, explained to journalists: "This is neither a green light nor a death knell for GM [...] it is not yes, no, no. The buts are very important.".[11] **The advice from ACRE is clear but it is not decisive. We acknowledge that in its limited scope and contingent nature, the ACRE advice accurately reflects the trials themselves.**

Origins of the trials

12. In looking at the trials and their results, we were aware that we would have to examine the nature of the criticisms raised about them, as well as the trials themselves. In order

10 *ACRE advice on the implications of the farm-scale evaluations on genetically modified herbicide-tolerant crops:* A:3.

11 *BBC News Online*: 13th January 2004

better to understand the factors that influenced the design of the trials, we also realised the need to examine the context in which the trials had developed. We were aware, too, that many of the issues likely to be raised during the inquiry by those concerned about the commercialisation of GM crops would fall outside the terms of reference of the inquiry.

The origin of the trials

13. The background from which the FSEs sprang was a complex one. To begin with, the multi-tiered regulatory system under which GM crops could be given eventual permission for commercial growing was necessarily complicated and, based in part as it was on a European Directive, 90/220, involved other European countries as well as the various UK regulatory bodies. However, during the mid-1990s a number of GM crops began to approach their final permissions. GMHT forage maize, of the same variety as was later to be grown and tested in the FSEs, was at the forefront of these crops approaching clearance. If the agreement with the industry to proceed with the FSEs had not been reached earlier, commercial growing of GMHT forage maize in the UK could have started in the spring of 1999.[12]

14. However, even setting aside public unease with the technological phenomenon of genetic modification, there was concern in and around Government about the possible effect of GM crops upon the environment, and in particular upon biodiversity. In their Annual Report for 1996-7, ACRE had raised the need for an assessment to be made of the environmental impact of the widespread cultivation of GMHT crops. As Elliot Morley MP, Minister of State at DEFRA, admitted to us in oral evidence in January 2004, "there was some unhappiness amongst ministers about what we felt was a rush to commercialisation".[13] English Nature first expressed its concerns to Government in 1997: by early 1998 it was involved, along with other bodies, in discussions with DETR over policy development relating to biodiversity and GM crops. In June 1998 the then Minister of State in the Department for the Environment, Transport and the Regions (DETR), the Rt Hon Michael Meacher MP, hosted a meeting to discuss biodiversity issues with experts from English Nature, RSPB, the Green Alliance, MAFF and ACRE.[14] A draft paper was prepared as a result of these meetings, which included the expressed need to investigate the potential adverse effect on farmland biodiversity of GM crop management. It seems that the Government now saw an opportunity to negotiate a sensible pause in this perceived "rush to commercialisation".

15. Similar concerns were playing themselves out elsewhere in Europe. Austria, then holding the Presidency of the EU, had decided to lead moves to strengthen the then current EU Directive governing GM crops, 90/220/EC. In the light of its concerns, the UK Government decided to involve itself heavily in assisting the adoption by the EU of a stronger Directive which would expressly take into consideration the indirect effects of GM

12 Ev 141, Section 2, and Ev 152-3, Annex D.

13 Q518.

14 Ev 78, para 2.7.

crops upon the environment and upon biodiversity. The decision to go ahead with such a strengthened directive was formally taken by EU Environment Ministers in December of 1998, and the new Directive, 2001/18/EC, was finally adopted in February 2001, coming into effect in the UK in October 2002.[15]

The first agreement

16. The GM industry was aware during 1998 that the Government had concerns about the environmental impact of GM crops. Certain NGOs and environmental pressure groups were calling at that time for a moratorium on all GM crops (the legality of which under EU law was a matter of some debate). In October 1998 the Government consulted again with its advisory agencies and concerned NGOs, and then separately held meetings with the industry. Under pressure to halt the commercial growing of GM crops but unable to enforce a moratorium, the Government reached an agreement with the Supply Chain Initiative on Modified Agricultural Goods (SCIMAC), the body representing the interests of the GM industry, plant breeders, and farmers. This agreement was announced by the Rt Hon Michael Meacher MP, then Minister for the Environment, and Lord Rooker, then Mr Jeff Rooker., Minister of State at the Department of Health, at their appearance before the Lords' Select Committee (which was undertaking an inquiry into GMOs at that time) on 21 October 1998. [16] Amongst the principal elements of that agreement were:

(i) approval for a programme of managed development of commercial plantings of GMHT crops to limit their introduction whilst ecological monitoring was carried out;
(ii) a three year pause on the introduction of GMIR (genetically modified insecticide resistant) crops; and
(iii) the establishment of farm-scale evaluations to assess the biodiversity impact of the agricultural management of GMHT crops as opposed to conventional crops. [17]

17. GMHT forage maize was the only crop that had already passed the final approvals for planting. Having been given consent for Europe-wide cultivation under the existing Directive in August 1998, only its related herbicide required authorisation.[18] The Government was forced to acknowledge that even with a new strengthened Directive due to come into force, this approval still stood unless there was new evidence of harm. For its own part, the industry felt that unless forage maize could also pass under the more stringent terms that would in future apply under the new Directive, there was little point in proceeding with this crop, as existing consent would run out in 2006 and not be renewed. The agreement was a reasonable compromise between the Government and the industry. The Government was keen to insist on the higher benchmark for GMHT maize, but in law the industry could have made do with the benchmark it had already reached.

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15 Ev 144, section 8.

16 Ex 147-8.

17 Ev 142-3, Section 5.

18 Ev 136.

Towards the FSEs

18. Following this announcement, DETR—in conjunction with its advisory bodies—began to move towards setting up the FSEs. During the first months of 1999, scientists in the DETR GM team along with experts from MAFF, English Nature, RSPB and the Natural Environment Research Council (NERC), met to set the objective for the FSEs and to plan their specification. The finally agreed objective of the FSEs was "to assess the effects on farmland wildlife due to the agricultural management of GMHT crops as compared with the growing of equivalent non-GM crops": this expressed itself in the hypothesis to be tested, the "null hypothesis", that there are "no significant differences between the biodiversity associated with the management of the particular GMHT crop and the comparable non-GM crop at the farm scale.".[19] In February 1999, fifteen major research organisations were invited to tender for the research contract investigating the effects of the management of GMHT forage maize and spring-sown and winter-sown oilseed rape. GMHT forage maize, spring-sown and winter-sown oilseed rape were the three crops nearest to commercialisation. In April 1999, the contract for the research was let to a consortium of three research organisations. Throughout this period, SCIMAC were involved in discussions with officials from DETR to discuss the practical arrangements for the trials, such as the provision of GMHT seeds and herbicide, and the arrangements for identifying sites with appropriate fields and willing farmers. At this point, the issue of carrying out FSEs on beet had not arisen.

19. Once the consortium was appointed and discussions with SCIMAC well advanced, the Government appointed an independent Scientific Steering Committee (SSC) to oversee the research programme and advise on the outcome. Once appointed, the SSC (chaired by Professor Chris Pollock of ACRE and assisted by, amongst others, Dr David Gibbons of the RSPB and Dr Alastair Burn of English Nature) "took responsibility for the oversight of the evaluations" and, with the research consortium, agreed "the final design, methodology and protocols for the conduct of the evaluations".[20]

20. It was, however, deemed important to carry out a pilot phase during 1999 with a small number of fields in order to ascertain how well the planned evaluations would work and whether or not the results would prove sufficiently robust to confirm or refute the "null hypothesis". During this period of the pilot phase a number of decisions were reached which influenced the final shape and scale of the FSEs. Initially, it had been planned for the GMHT crops and conventional crops each to be grown in adjoining fields. For a variety of reasons, principal amongst which appears to have been the concern that even neighbouring fields would introduce troubling ecological dissimilarities into the results, it was decided that when the FSEs proper were to commence in 2000, a 'split field' rather than a 'paired field' protocol would obtain. It was also decided that in order to magnify the effect of herbicide use on either crop, farms which grew their crops less intensively than others would be favoured as sites of the trials in order to produce a higher level of detailed information in which variations and dissimilarities could more easily be measured.

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19 Ev 143, section 6, para 2.

20 Ex 143, section 6, para 8.

Furthermore, it was decided that the trials would have to proceed over three years, in order to take account of climatic and other changes from year to year which otherwise might overly influence the results in any one particular growing cycle.[21]

Inclusion of beet

21. In November of 1999, a new agreement was made with SCIMAC at which a change—or rather addition—to the planned FSEs was announced: namely, that beet would be included as the fourth crop in the trials. We have found it difficult to establish how and why beet was so added. Even at the end of the inquiry the exact nature of the negotiations between Government and the industry by which beet was added to the FSEs remained unclear. Dr Brian Johnson of English Nature suggested that beet was a late addition because there had been a shortage of seed which meant that it had to be incorporated later than the other crops, although the original plans had included it.[22] In evidence to us, Professor Pollock of the SSC seemed to believe it had been fully in the programme of FSEs from the very beginning.[23] Dr Nick Brickle (a member of DEFRA staff acting as secretary to the SSC) suggested that the funding stream for beet came later than its inclusion in the trials under other funding.[24]

22. In the light of this confusion, we asked DEFRA to supply a memorandum setting out the reasons for and timing of the inclusion of beet in the FSEs.[25] The memorandum explained that the industry had been keen to include beet from the outset and had approached the SSC to request that it oversee industry-funded trials on beet similar to the FSEs on oilseed rape and forage maize. In June 1999 the SSC had agreed to do this on the basis that the trials for beet follow exactly the same protocols as determined for the FSEs on forage maize and oilseed rape. Dr Colin Merritt, the Biotechnology Manager for Monsanto in the UK, then seemed to muddy the water in his oral evidence by suggesting to us that Monsanto had never agreed to fund the FSEs on beet itself.[26]

23. What passed in the months between this agreement by the SSC in June 1999, and November 1999, when the new agreement was reached between the Government and SCIMAC on GM crops, is unclear. The November 1999 agreement renewed the voluntary agreement on the FSEs through until the harvest of the crops planted in 2002, thus effectively setting in stone the period of restricted cultivation. There was to be no unrestricted cultivation of any GM crops until the FSEs were complete, and none of the produce from GM crop plantings in the UK was to be used in a way that would be of direct commercial benefit to consent holders during the FSE period: the crops could therefore no longer be considered as being under "managed development". Undoubtedly this was a toughening up of the agreement made in October 1998, in the light of what the SSC and

21 Ev 75, Annex A.

22 Q283.

23 Q272.

24 Q280.

25 Ev 141-6.

26 Qq373-6.

research consortium had told Government would be the necessary duration of the trials. The Government, however, agreed to pay for the trials on beet.

24. We are aware that the cost to the taxpayer of the FSEs approximated to £6 million.[27] Given that there were four crop trials included within the FSEs, each crop cost approximately £1.5 million to trial. The industry was initially happy to pay for beet itself under the FSE protocols. However, the Government-funded crop trials already placed a cost upon the industry for seed, herbicide, and payment for farmers for non-saleable crops: Elliot Morley in evidence insisted that "the trials did put a cost on industry".[28] In the light of these factors, combined with the fact that the effective moratorium on GM crops was to last until 2003 (and was far from the "managed development" envisaged in ministerial announcements of October 1998), it seems clear that the industry only accepted this toughened-up agreement on the basis that the Government take over funding the beet trials – which indeed the Government consented to do. This decision was made formal under SSC advice in February 2000.

25. In oral evidence, it was put to the Minister of State, Elliot Morley MP, that this had been a clear trade-off between Government and industry. Mr Morley made it clear that the Government felt that the industry deserved some credit for its co-operation.[29] Dr Church of DEFRA, who accompanied Mr Morley, added that beet had "accelerated in the approvals process"—effectively catching up with the other FSE crops—by November 1999.[30] We remain concerned that the exact nature of the deal underpinning the publicised agreement of November 1999 remains obscure. That the Government agreed to cover the cost of the beet trials in return for the continued cooperation of the industry, especially in the light of the fact that beet was racing up the approvals process, seems reasonable. **It is regrettable that the Government failed to be transparent about the nature of any deal made with the industry over the inclusion of beet. Given the public's concern and suspicion on matters relating to the GM industry we would expect greater openness.**

The design and operation of the trials

26. There are those who feel that the FSEs should not have taken place at all in the form that they did, and that GM crops should not have been planted on the scale they were in the FSEs with all the attendant risks of possible gene flow and contamination.[31] However, most of those who took issue with the FSEs in memoranda to us did so on the basis not of their very existence but of their design and operation. In a sense, the design and the operation of the FSEs are inseparable since the latter relies almost entirely on the parameters and protocols established by the former. A number of issues recurred in

27 *ENDS Report 345*, October 2003: p28.

28 Q522.

29 Qq521-2.

30 Q522.

31 Ev 14-15 and 25-33, for example.

relation to the trials which formed the principal substance for criticism. As all of this criticism was necessarily concerned with whether or not the results of the trials were valid, we felt that it was very important to consider each one in some detail.

The north American experience

27. One of the points made in many of the memoranda that we received, and in oral evidence, was that the Government should examine the evidence with regard to the growing of GM crops in north America. Commercial cultivation of GM crops had been taking place there for a number of years, indeed, even before the FSEs began. Experiences with GM have been predominantly negative. Indeed, one of the memoranda received by us was from the Canadian National Farmers' Union which painted a lamentable picture of the potential effect upon biodiversity and agriculture in general of the contaminatory effect of GM wheat cultivation.[32]

28. Another north American issue pointed out in memoranda was the increasing amount of herbicide used on GM crops as the incidence of herbicide-resistant weeds rose. Dr Benbrook, agronomist and Director of the Northwest Science and Environmental Policy Center in the USA, published a paper at the beginning of 2004 on this experience in the United States, drawing on official US Department of Agriculture figures.[33] The problem had also been evident in Canadian agriculture. In some areas farmers had had to dose their GMHT herbicide with the more potent herbicide atrazine in order to cope with the number of herbicide-resistant volunteers in their crop.[34] As the Rt Hon Michael Meacher MP said in evidence us: "the Canadian NFU [...] were gung-ho for GM in 1996 because they had been told that it would increase their yields [... and] reduce the use of herbicides, and contamination containment could reasonably easily be dealt with. All of those [...] were not now believed by their farmers, [...] yields had actually gone down [...] herbicide use was more than companies said it was going to be, [...] and containment was a very real problem".[35]

29. The Canadians also have a significant problem with GM canola (oilseed rape) cultivation, particularly in relation to the prevalence of GM volunteers in successor crops. As these volunteers are herbicide-resistant, they pose a great challenge to the herbicide regime on the crops that follow. In one Province, volunteers from GMHT rape have become one of the top ten agricultural weeds.[36] Moreover, there is a particularly acute problem with the contamination of conventional or organic rape with GMHT rape. Following a visit to Saskatchewan, the Rt Hon Michael Meacher MP was reported as saying of GMHT rape pollen: "It gets everywhere [...] that's what Canada shows. And if you can't separate crops out here in the Canadian prairies, what hope do you have in a tiny country

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32 Ev180-2, Appendix 7.

33 *Impact of Genetically Engineered Crops on Pesticide Use in the United States: The First Eight Years.* Available at www.biotech-info.net/technicalpaper6.html.

34 Volunteers are seeds or tubers that have been left behind in the field after harvest and have not been killed by winter conditions: thus they grow up again the following year.

35 Q28.

36 Ev50, 1(i).

like ours?".[37] Mr Meacher repeated his concerns as to contamination in evidence before the Committee.[38] Lord Melchett of the Soil Association also raised fears of contamination of organic crops by GMHT varieties in evidence before the Committee.[39] In parts of Canada, there was now no possibility of growing organic canola because GMHT volunteers and pollen were too widespread. The Soil Association had expressed fears that the FSEs might contaminate organic farmers in the UK: it carried out risk analyses at organic sites within 6 miles of FSE sites, but no contamination was found.[40]

30. In evidence before us, Professor Pollock claimed that the north American experience was of little direct relevance to the FSEs. He said that the GM crop which appeared to show most problems in terms of increasing herbicide applications in north America—maize—was not the same as the forage maize being trialed in the UK.[41] He also insisted that differences in agronomy between the US and UK made comparisons particularly odious[42]: "the main agronomy in the US was sufficiently distinctive that we did not feel there was a great deal of cross-talk". Significantly, Professor Pollock added that "that was the argument put forward by SCIMAC".[43] The Minister of State told us: "We do look at the experiences of other countries where GM crops have been established for a very long time... I am aware of concerns that have been expressed by some Canadian farmers and farming organisations. These are concerns that need to be taken seriously. They need to be taken into account".[44] Interestingly, Dr Church added that ACRE "are looking at the ... Canadian and American stuff [and] actively considering what implications it has for us".[45]

31. We note the opinion that the agronomies (and, in some cases, crop types) of north America and the UK FSEs were sufficiently distinctive that no direct account need be taken of perceived problems with GM crops in Canada and the United States for the narrow scientific purposes of the trials. **The problems evident in north America have not been taken seriously enough. DEFRA should have advised the SSC to take account of north American experiences with GM.** We agree with Mr Morley that north American experiences with GM should be taken into account. We note that the Government claims that some work is now being done to examine Dr Benbrook's findings, and to look into other aspects of how GM has been grown and managed in north America. The precise nature of this research is unclear, and, in any case, **we are unhappy that this work has been left until after most of the FSEs have reported. Consequently, the findings from that trans-Atlantic research have not now been factored in to the decisions that are already being reached on those GMHT crops in the UK nearest approval. This is clearly unsatisfactory. No decision to proceed with the commercial growing of GM crops**

37 *The Daily Mail*, 5 September 2003.

38 Qq28 & q37.

39 Q204-6.

40 Q206.

41 Q289.

42 Qq289 & 318.

43 Q318.

44 Q527.

45 Q539.

should be made until thorough research into the experience with GM crops in north America has been completed and published.

Choice of farmers, farms and fields

32. The process by which farmers, farms and fields were selected for the trials has been a source of concern and suspicion in some quarters.[46] First of all, it was felt that the sites chosen and their geographic spread were not properly representative of the growth of that crop across the UK; it was also felt that only farmers enthusiastic about GM crops would have put themselves forward to take part in the trials, thus providing the industry with willing cohorts in what should have been an independent and unbiased series of trials; and it was feared that in signing up for the trials, and signing the contract with the industry to participate and receive seed, herbicide and advice, the farmers would be bound in some way to be complicit with industry to the detriment of objective results. It was further felt that payment of farmers would increase the likelihood of their handling the crop trials in a way which would benefit the industry.

33. There was concern and a lack of clarity about the process by which farmers and farms were selected for the trials. Essentially, this process was in its first stage left to SCIMAC. The NFU, members of SCIMAC, advertised for volunteers and put the word out on the grapevine that farmers were being sought for to take part in the FSEs. The farmers obviously had to be willing to grow GM crops and had to have had experience in growing the conventional variety of the GM crop they were to grow. More importantly, perhaps, than the work of the NFU, representatives of the industry companies themselves went around to locate possible participants. As Dr Colin Merritt of Monsanto explained to us: "The NFU did help but we did the donkey-work of going around and making the first face-to-face calls with farmers".[47] As Dr Turner of SCIMAC further explained, this was because SCIMAC had "a network of contacts [...which] was subsequently offered on to the scientific consortium to make their pick from".[48]

34. The industry was at some pains, however, when giving evidence before us, to stress that not all the participating farmers were "pro-GM": Dr Rylott of Bayer Cropscience said that "an awful lot of them were very sceptical of the technology [...] a number of them had very serious concerns about GM [...] but they wanted to see it for themselves".[49] The industry explained the reason for individual contact with farmers: "we had to make them aware of some of the implications of doing the trials [...] to make sure farmers were aware of the potential interest by the media [and] the potential for intimidation".[50] Moreover, it is clear that the decision as to which of those farmers selected should actually participate was left to the research consortium. Indeed, the SSC on one occasion made known its concern at the range and number of farms and farmers available for selection which at that point was

46 Ev 25-33, for example.

47 Q382.

48 Q379.

49 Q380.

50 Q382.

evidently unsatisfactory.[51] Otherwise, the selection made available to the consortium was sufficient. The industry claimed that they chose substantially more sites than were actually used.[52] The geographic spread of farms has been were questioned by Friends of the Earth who claimed, for example, that no FSEs with forage maize were grown in Cornwall, Devon or Somerset which are the top three counties for growing that crop.[53] It is not clear why this was so, and it does appear rather unsatisfactory, suggesting that there was a lack of effort put in to ensuring a more appropriate geographic spread for FSE sites.

35. There is also an issue about the sort of farms selected from the spread offered by SCIMAC. It seems that the SSC and the research consortium between them decided that, in the interests of highlighting any possible biodiversity dissonance, it was expedient to show a preference amongst those sites selected for the ones less intensively managed: in other words, for those farms which had a higher biodiversity background noise.[54] It appears that the industry was originally unhappy with this preference and perhaps felt that the pitch was being queered against them in some way: "we wondered... whether they may have had an effect [on the results]" admitted Dr Rylott of Bayer Crospscience.[55] Dr Merrrit of Monsanto suggested that this was the preference of English Nature rather than the SSC *per se*.[56] **We do not feel that the choice of fields in regard to intensity had any effect upon the results, except insofar as it possibly allowed them to be expressed more clearly:** the industry itself admitted in evidence that despite their hesitation, "it would appear that the selection is constant" and had no effect upon the results.[57]

36. The contracts between the industry and individual farmers have also been criticised in memoranda to us, largely on the basis that they are supposed to contain all manner of things that might, if seen by the public, appear damning to the GM industry. Sample contracts have been made available to us and we confirm that these fears and suspicions are unfounded. On the question of the payment of farmers, it is clear that they needed in some way to be recompensed for their labour and time and for a GMHT crop that they could not sell. And while the Government bore the majority of the costs of the trials, it was the industry that recompensed the farmers for the GMHT crop and for that portion of the field on which no conventional crop could be grown owing to the requirement to leave an unplanted separation distance—for beet, for example, a six metre non-cultivated strip—between the two trialling halves of the field. We are content that there appears to have been no financial incentive for farmers to assist in helping the industry influence the operation of the trials. Nor were the amounts offered in the contracts unreasonably large.

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51 Q290.

52 Q384-5.

53 Ev 30, para 4.10.

54 Q291.

55 Q390.

56 Q388.

57 Q390.

Contamination and liability: pollen spread and gene flow

37. Another area of concern was the threat the trials posed to conventional or organic crops on account of possible contamination by gene flow or pollen spread.[58] Many of those critical of the trials appeared unaware that DEFRA was using the trials as an opportunity also to assess gene flow as an additional piece of research.[59] The Minister of State, Elliot Morley MP, assured us that work on the studies of gene flow was still under way.[60] Criticisms that the trials did not formally include such research are therefore beside the point. Pollen spread and the calculation of separation distances so as to prevent contamination is a subject still heavily debated by scientific experts. It is a particular cause of anxiety to organic farmers in this country who would lose their organic accreditation if their farms because contaminated by GM pollen. The Soil Association, in its written and oral evidence, was understandably apprehensive about the possibilities of pollen spread. It was aggrieved that the Government in the FSEs had accepted the separation distances posited, as it put it, by the GM industry rather than those put forward by the Nation Pollen Research Unit (200-600 metres as opposed to 1-6 kilometres, depending on crop type). [61] **The north American experience with oilseed rape and the devastation of organic rape production should serve as an impetus to Government to bring in prudent guidelines for separation distances as quickly as possible.**

38. Although no contamination by pollen of organic farms took place as a result of the trials, the disparity in recommended separation distances is a cause for concern.[62] We are aware that, along with gene flow, the Government is examining this issue.[63] The Government is keen to tighten up the current liability regimes in case contamination were to occur in the future. As Elliot Morley MP said to us: "We are currently reviewing the whole statutory framework with a view to whether we should make it tighter and more robust [...] We are considering the AEBC report which had addressed the issue of co-existence and liability".[64] The Minister went on to tell us to expect some decisions on these issues by the summer.[65] While the possibilities of contamination may be slight, its effect could have enormous consequences for those so contaminated. **We are very concerned about possible contamination by gene-flow and pollen spread of non-GM crops and insist that the issue of liability be settled before any GM crops are allowed to be commercially grown in the UK. The Government should ensure, through primary legislation, if necessary, that it puts into place, before any GM crops may be grown commercially in this country, a clear and comprehensive liability regime to underpin any future regulations dealing with co-existence issues. Moreover, liability should lie**

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58 Ev 25-33 and 49-53, for example.

59 Ev 179-80, for example.

60 Q517.

61 Ev 50, 1(iii).

62 Q206.

63 Q524.

64 Q565.

65 Q575.

with the industry and not with farmers. It would be wrong for the Government to allow farmers to be used as a firewall for the industry.

Yield

39. One of the major criticisms of the trials was that they had not been designed to permit a full assessment of the commercial yield of the GMHT crops. Failure to measure yield was seen as an impediment to ensuring that the regimes under which the crops were grown were realistically approximate to those that would be used in commercial farming. The Rt Hon Michael Meacher MP, Minister of State for the Environment at the time that the trials were set up, gave evidence to us at our first hearing into the FSEs and said categorically that "these trials... did not realistically assess what would actually happen in the field".[66] At no point had the issue of yield itself been considered central to the FSEs. Dr Avery remarked that it was probably inappropriate for Government-funded trials to assess something as commercially relevant as crop yield.[67] However, while yield had not been measured as part of the trials, as Professor Pollock of the SSC explained, "a large number of measurements were made upon what is known as the crop phenology [...which] is a much more reliable indicator of crop performance than absolute yield.".[68] The SSC—and the peer-review process that studied the trials—accepted that there was no marked difference in the phenology of the GMHT crop compared to the conventional crop.

40. However, this has not put a stop to claim and counter-claim concerning the yield of the crops. The industry itself encouraged participating farmers to make informal yield measurements where possible.[69] Bob Fiddaman of the NFU, who was a participating farmer and who measured the yield of his own oilseed rape crop, said in oral evidence to us that all farmers "want to see what the potential profitability [of a crop] is".[70] The Policy Director of the Soil Association, Lord Melchett, reported to us that the industry published its own assessment of FSE GMHT yields in *Farmers' Weekly*, in which it asserted that they were greater than for the same conventional crops in the trials.[71] The industry were however reticent on the subject of yield when they gave oral evidence to us.[72] Professor Pollock of the SSC suggested that yield measurements, for forage maize in particular, would have been very difficult to assess.[73] In contradiction to the evidence about GMHT yields being higher, Friends of the Earth reported anecdotal evidence that GMHT maize "performed extremely poorly" in terms of yield, which "would have been apparent" if yield had been measured. They further complained that one of the phenological measurements of maize—namely height—is a "very poor indicator of yield".[74] Photographs included with

66 Q7.

67 Q295.

68 Q288.

69 Q208.

70 Q234.

71 Qq208-9.

72 Q423.

73 Q288: phenology is the study of the relations between climate and periodic biological phenomena such as the development or flowering of plant.

74 Ev 28-9, paras 4.1-4.5.

written evidence from GREENPEACE also claimed to show the poor performance of GMHT maize against conventional maize.[75]

41. **We consider it unfortunate that, as there was no definite yield component to the results of the FSEs, rumours and assertions have been allowed to proliferate concerning how the crops performed.** While yield measurements themselves may have no bearing upon the scientific results of what was a biodiversity audit of GMHT and conventional crops, the Government should ensure in any future trials that yield measurements are made so that some official figures can be produced. This is particularly important since it is our understanding that one of the principal sources from which farmers would glean information as to potential crop yield, the National Seed List trials, would not necessarily be managed under the same regime as obtained in the FSEs, and consequently might reflect a more intense herbicide regime which would benefit yield but harm biodiversity. **We expect future trials to incorporate robust protocols for formal measurements of yield.**

Herbicide regimes

42. Doubts have been raised as to the realism of the herbicide regimes employed in particular on GMHT crops. The protocol insisted upon by the SSC in the trials was that the herbicide regime should be based upon "cost effective weed control", hardly a precise concept. Consequently, given that the SSC happily accepted the guidelines given by the industry to the farmers on the advised levels and frequency of application of herbicide upon their GMHT crops, it has been argued that the industry had designed the herbicide protocols for use on its GMHT crops so as to favour biodiversity, even if yield (unmeasured in its absolute sense) were to suffer. A number of different organisations made this accusation. [76]

43. The SSC assured us that careful comparative study was made of the regimes employed on conventional and GMHT crops in the trials to ensure not only that they met the condition of providing "cost effective weed control" but also that they were not too dissimilar, the one from the other. As the herbicides employed on the GMHT crops were not commercially available in the UK, the label specifications for their use were specially written for the FSEs by the industry. There appears to have been a presumption that the label specification that would finally accompany the herbicides if approved for wide-scale commercial use in the future would have to be identical to that drafted for the FSEs.[77] The industry seems therefore not to have been in a position deliberately to advise on the under-use of its herbicides in order to maximise biodiversity without compromising the yield benefit of their crops if commercially approved following the trials. The industry itself evidently felt that, by insisting that farmers followed the labels, the herbicide regime for their crops was restricted and opportunity to amend the advice in order to promote

75 Ev 46-8 – photographs not published.

76 Ev 14-15 and 25-33.

77 Qq293 & 317.

biodiversity—as, the industry said, some farmers might desire to do—denied. Setting aside some anecdotal evidence that industry advisers kept some farmers from applying as much herbicide as often as they would like[78], it is clear that the industry was in a cleft stick, having to abide by a regime that, in their view, underplayed the capacity for GMHT crops and their herbicides to be employed in an environmentally beneficent way. **These factors, combined with the careful oversight of the trials by the consortium and the SSC, make us reasonably confident that there was no clear manipulation of the herbicide regime on GMHT crops in order to favour their biodiversity.**

Cumulative effect

44. The Soil Association expressed great concern to us, that in the vast majority of cases, GMHT crops were, during the trials, grown in any given field for only one year. As Lord Melchett put it to us, "the problems with a new technology in agriculture tend to emerge over a period of time. Herbicide resistance in weeds tends to take several years to develop [...]. Problems in a rotation can take longer. We feel that the one year nature of the trials was always going to fail to answer some fundamental questions".[79] Again, this issue touches upon the north American experience where it seems clear that the cumulative effect of GMHT crops and associated herbicide use has led to increasing weed resistance and to yield and other problems associated with increased herbicide dosing. Failure in the FSEs to test crops and regime susceptibility to this sort of unwanted development was seen by some as marking a weakness in the applicability of the trials.

45. We put this point to Professor Pollock of the SSC. He first of all pointed out to us that within the scope of the three year trials, given that three out of the four crops were grown in rotation in the UK, there was no capacity for testing cumulative rotational effects—in other words, there was no capacity to see how GMHT beet, for example, grown in rotation with other crops had an effect on biodiversity once it was used for a second or third time. To plant a field with one of these GMHT rotational crops for two successive years would not be realistic.[80] Furthermore, Professor Pollock added that for forage maize (the one GMHT crop in the trials that was not generally rotational) a number of fields had been used more than once during the three years[81], although they were few in number, and he regarded the fact as "a bit of a bonus"[82] rather than as a necessary component of the trials. Dr Church of DEFRA told us that ACRE considered that the work done on those fields where GMHT maize had been grown one year after another "gives a good indication of cumulative effect". [83]

46. We broadly accept the contention of the SSC that it would have been unrealistic within the scope of three year trials to measure the cumulative effect of GMHT rotational crops.

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78 Ev.51, 2(i) , for example.

79 Q198.

80 Q299.

81 Q299.

82 Q302.

83 Q536.

We are, however, surprised that the SSC (and ACRE and DEFRA following it) has been keen to rely upon the small numbers of sites where forage maize was grown one year after another to defuse concerns about what has happened in north America when we were told by the SSC that a similar size of sub-set was seen as too small properly to assess the comparison between non-atrazine commercial forage maize and its GMHT variant.[84] There is ample evidence from north America that only after three years does the requirement for more or stronger herbicide become apparent. **In the context of public concern about GM crops and the north American experience with GM, we believe that in order to determine the cumulative effect of rotational crops upon biodiversity, the FSEs for those crops should have lasted longer than three years. The trials on forage maize should also have lasted longer. We believe that the Government must take account of this in any future trials.**

Atrazine and the FSE results for maize

47. Atrazine is a very powerful broad spectrum residual herbicide. Various groups, including Friends of the Earth[85], have for a number of years been opposed to its use on the grounds of its potent effect upon biodiversity and its possible threat to human health. Opposition to the use of this herbicide was not just a UK issue: it led to moves in Europe in the late 1990s which culminated late in 2003 with an EU agreement to phase out its use by April 2005.[86] In the UK, one of the conventional crops on which it is predominantly used is forage maize. Consequently, when the FSEs were set up, GMHT forage maize crops (for which the herbicide was Bayer's "Liberty", glufosinate ammonium) were to be grown and compared against conventional forage maize crops on 75% of which atrazine was to be used. This predominant use of atrazine was certainly reflective of the then current herbicide regime for forage maize.

48. The use of atrazine on the non-GM forage maize crop was the focus of the most widespread criticism of the FSEs that we came across. Even bodies happy with every other element of the trials were unhappy about the fact that the conventional benchmark for GMHT maize was largely an atrazine-dosed crop. Since atrazine was such a devastatingly efficient herbicide, almost any other herbicide used, however potent, might still appear beneficial when in comparison. As Dr Brian Johnson of English Nature put it to us: "atrazine turns a maize field from what was once a diverse grass field... into a wildlife desert. It is really ground zero as far as wildlife is concerned. It is not surprising that a herbicide-tolerant system is better for biodiversity.".[87] Effectively, it could be argued that given the predominant use of atrazine in the conventional forage maize crop, GMHT forage maize had too easy a time of it in the FSEs.

49. The phasing out and replacement of atrazine casts serious doubt on the value of the forage maize trial results. Since any predominant successor herbicide to atrazine may be

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84 Q311.

85 Q169.

86 ACRE guidance: para 32.

87 Q323.

less potent than atrazine and consequently may have reduced harm on biodiversity, indeed less harm than "Liberty" has on biodiversity in the GMHT crop, the level of biodiversity that will in future be found in conventional forage maize crops may be higher than it is at present. In other words, while the atrazine benchmark is valid for an agronomy in which atrazine is used, it is not valid for the agronomy in which GMHT forage maize, if commercially licensed, will be grown. The Rt Hon Michael Meacher MP claimed in evidence to us that the use of atrazine invalidated the whole maize component of the trials. Dr Mark Avery said that as a result of the banning of atrazine, "the relevance of the study…is much reduced by the fact that the comparison... is now outdated".[88] In other words, the maize results may be scientifically valid but are completely irrelevant as a benchmark because atrazine has been banned.

50. **We are concerned that the GMHT forage maize trials were based on an unsatisfactory, indeed invalid, comparison. It is vital that the Government permit no commercial planting of GMHT forage maize until that crop is thoroughly re-trialled against a non-GM equivalent grown without the use of atrazine.**

51. An element of the future benchmark may however already reside in the results from the 25% of fields in which the conventional forage maize was grown using some other herbicide than atrazine. Professor Pollock of the SSC stated that evaluation work on the data from these sites was still ongoing.[89] He did however emphasise that, given the small number of non-atrazine maize sites, "it would be very difficult on its own to extrapolate significantly" with regard to harm to biodiversity.[90] The number of sites involved was indeed small over the three years of the trials. The Minister suggested in evidence to us that "there were no noted differences of effect in the trials which suggests that atrazine is not having the effect that is claimed",[91] i.e., acting in a more virulent and harmful way on biodiversity than other herbicides in use on conventional forage maize. It may indeed have been the case that work on the 25% was completed in the period between Professor Pollock and the Minister of State giving evidence, but if so we would have expected an announcement to that effect. **It is clearly unsatisfactory that no definite statement has yet been made as to what the results were from the 25% of conventional forage maize fields in which atrazine was not used and whether or not this sample constitutes a large enough base from which to extrapolate comparable results for non atrazine conventional maize against GMHT maize.**

52. Another issue was also raised in relation to atrazine use that again touched upon the north American experience with GMHT crops. A number of organisations in their memoranda to us commented upon the fact that after a number of years of GMHT crop use in north America, farmers had begun to add a proportion of atrazine to "Liberty" to deal with the increasing number of herbicide tolerant weeds they were encountering. This unofficial 'spiking' of "Liberty" was noted by the manufacturer who consequently

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88 Q308.

89 Q309.

90 Q311.

91 Q542.

developed a product, "Liberty ATZ", which included atrazine. It was suggested that the same phenomenon might well occur with regard to possible future commercial growing of GMHT forage maize. In other words, the herbicide regime used on GMHT maize in the trials was realistic only in terms of the first few years of commercial use, after which a more intense form of residual herbicide would have to be used, (evidently not atrazine, as that would be banned) the effect of which upon biodiversity would be proportionately more harmful. In a sense, this argument is similar to that raised earlier with regard to atrazine use. The trials, examining "Liberty" use on GMHT maize, would therefore not be relevant to how the crop might eventually have to be managed.

53. As Professor Pollock pointed out to us, this argument of course only stands if atrazine were not about to disappear from the EU agricultural scene. After all, farmers in the UK after April 2005 will no more be in a position to have atrazine added to "Liberty" than will conventional forage maize farmers be able to use atrazine on their own crop. Given that the trials did not properly assess follow-on use of GMHT maize, it may be that forage maize crops in the UK will mirror north American maize crops in allowing the development of more and more herbicide resistant weeds. Professor Pollock admitted that the contention that the UK agronomy was sufficiently distinctive from that of north America that experiences there need not be factored into trials here was a contention put forward by the industry.[92] It is conceivable that "Liberty" use on GMHT forage maize might lead to the development of such an amount of herbicide resistant weeds that "Liberty" alone is not enough to deal with them effectively. In that case, there could be a temptation, indeed, a need, for GMHT maize farmers here to increase herbicide strength, or the number of its applications, with all the invidious consequences of that for biodiversity.

54. The detail of ACRE's advice with regard to forage maize is bound up with the whole issue of atrazine use. It recommends to ministers that "studies are initiated immediately that consider the validity of the conclusions of the FSE results in the light of this phasing out of atrazine and the introduction of new weed management regimes for non-GM maize".[93] It also recommends the implementation of a scheme "to monitor changes in conventional management practice" of non-GM maize, as well as recommending that "herbicide usage on both non-GM and GMHT maize be monitored during this period [before the expiry of the current GM maize consents in October 2006]"[94]. It further recommended that maize only be permitted to be grown "limited to the conditions under which it was grown in the FSEs, or conditions that have been shown"—presumably in a future trial—"not to result in adverse effects".[95] It was clear when we took evidence from the Minister that he accepted this advice. He implied that consent for GMHT maize would be conditional on further work on the effects on biodiversity of whichever chemicals were to replace atrazine as the predominant weedkiller used on non-GM forage maize.[96] He also

92 Q318.

93 ACRE advice: para 39.

94 ACRE advice: para 40.

95 ACRE advice: para 38.

96 Q506, reiterated at Q513.

emphasised that the growing amount of north American research into the harmful effects on biodiversity of GM crops and their associated herbicides "need[s] to be taken seriously".[97] Dr Church stressed the need for post-market monitoring of the cumulative effects of GMHT maize and "Liberty" use.[98]

Vandalism of FSE sites

55. One of the issues of concern to the GM industry and to farmers which did indeed have some impact on the trials, which could have endangered the quality of their results, and which necessarily has implications for future trials and for the future of GM commercialisation, was the vandalism of FSE sites. Some individuals and groups opposed in principle to the growing of GM crops were evidently prepared to take the law into their own hands and attempt to sabotage the trials by destroying or damaging some of the crops on FSE sites. The NFU was dismayed by such activity and stated that "there must be sufficient protection for any trial sites and participating growers. If the trials are sponsored by government then government has a responsibility to ensure the trials can be conducted and that scientists and farmers can carry out their legitimate business without threats or harassment."[99] Such activity was not unique to these trials. In evidence before us, Dr Merritt of Monsanto UK, revealed how GM National List trials had been targeted by activists and "over the last three or four years the Government has not actually got any results from these trials because they have been systematically taken out".[100] Consequently, there was no planting in 2003 and the trials have been abandoned.

56. DEFRA decided, in the interests of openness and transparency, to identify the sites by grid reference. Even in the light of acts of vandalism the Government are not keen to pull back from disclosing sites for future trials.[101] SCIMAC told us that it is "committed to the principles of openness and transparency which had underpinned the FSE programme"[102] but also accused DEFRA of failing in its statutory duties to protect sites.[103] The Minister refused to accept this.[104] It is regrettable that the Minister and the NFU and GM industry do not see eye to eye over this. We are aware that many of those carrying out these activities are fundamentally opposed to the trials on the grounds that they constitute a release of GM crops into the environment. However sincerely held these views may be, we deplore intimidation and vandalism.

57. Moreover, we are concerned that if such activities continue unabated then future trials on other varieties of GM may be compromised. Although Professor Pollock re-assured us that the validity of the FSEs were never threatened by vandalism or damage to crops, this

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97 Q527.

98 Q536.

99 Ev 71, para 10.1.

100 Q354.

101 Q 541.

102 Ev. 103, para 2.5.

103 Q 353.

104 Q541.

was largely due to the fact more fields were planted than were needed for results to be robust. Although just under 5% of the sites were damaged (approximating to 14 sites in total), the number of productive and undamaged sites never dropped below the level that had been set by the scientists. Presumably, however, that was to some degree because those sites damaged were divided proportionately amongst the four crops grown. If all the sites damaged had belonged to one crop, it could have had serious repercussions for the validity of the trials with regard to that crop. There is no room for the Government to be complacent with regard to the vandalism of GM sites. Smaller trials, for a single GM crop, for example, could be invalidated by such activities. **Damage to trial sites should be seen by those responsible for that damage as counterproductive, since it undermines the scientific validity of evidence that could well support their claims. We support the lawful right to protest but feel that future trials should be better protected in order to safeguard scientific evidence that may prove very valuable in domestic and international discussions as to whether the commercial growing of GM crops should proceed. DEFRA must consult with appropriate security bodies about achieving more secure trial sites in future.**

Responsibility for design and operation: the influence of the GM industry

58. Some anxieties were expressed during our inquiry concerning the independence of the various bodies involved in the FSEs. This was itself a reflection of the connected suspicion that the GM industry had been heavily involved in the design of the trials in order to influence the results. The null hypothesis upon which they were based was drawn up by DEFRA in collaboration with its advisory agencies and other interested bodies like the Green Alliance and the RSPB: dealings between DEFRA and SCIMAC or the GM industry focussed upon the agreements that would accompany the announcement of the trials, and those inputs for which industry assistance was necessary—the GM seed, the relevant herbicide, and the selection of willing and appropriate farmers. We were presented with an array of different opinions as to the influence of SCIMAC or the industry on the trials.[105] DEFRA's recollection of events appears to sustain the view that SCIMAC's involvement was very limited[106]. However, while this may have been largely the case with regard to the design of the trials, operationally the industry appears to have been deeply involved.

59. The industry was of course responsible for providing the seed for the GM half of each field for each of the four crops and gave advice—since that information was unavailable in National Seed Trial Results—on the density at which to sow the fields. Also, as the herbicide to be used with the GMHT crops, glufosinate ammonium for the two oilseed rape crops and for forage maize, and glyphosate for beet, were not yet approved for use in their particular forms in the UK, the industry also had to produce labels advising farmers on how and when and in what quantities to apply their herbicide. Although these were frequently referred to as draft labels, it is clear that they will have to stand as the final label

105 Q21, Q216 : the Soil Association conditioned this answer in a follow-up reply a week-or-so later (Ev 61), it was then negatived by Dr Johnson of English Nature and Dr Avery of the RSPB (Q261) and then robustly denied by SCIMAC (Ev 102).

106 Ev 142-3.

should any GMHT crop and its associated herbicide be given consent for commercial growing. The industry, together with the NFU, assisted in selecting farmers and farms from which the research consortium then drew those that matched their criteria. Moreover, the industry had representatives available to guide farmers in growing a crop that was inevitably new to them. All this was vital to the practical operation of the trials: they could not have happened as they did without these inputs. We were concerned throughout the inquiry to ascertain to what extent these inputs were monitored by the SSC or the consortium in order to ascertain whether the industry influenced the trials inappropriately.

60. However, between the three operating levels of the FSE hierarchy – the SSC, the research consortium and the GM industry – there does appear to be a lack of clarity about responsibility for the substance of some of these inputs. An example is the GMHT herbicide regime as set out on the draft labels. It was of course for the industry, as experts, to offer what they felt was the correct regime of application for what were their products, which were to be used on their products. The SSC stressed that the consortium considered this regime to represent "cost effective weed control" (the principal criterion for the regime under the trials) and that no significant differences in application on the GMHT as opposed to the conventional halves of the field were noted by those monitoring the trials.[107] Yet the fact is that only the industry could have been expected to know what regime should be applied. After all, these crops had not been grown in the UK before: agronomies elsewhere are often distinctive and consequently regimes applied in one country would not necessarily be applied in the UK. It seems clear to us that in this instance there was an element of benefit of the doubt given to the industry: the GMHT regime was the one proposed by the industry and not by the SSC or the research consortium.

61. However, the inputs were not all one way. The industry was initially perplexed by the consortium's decision, backed by the SSC, to include a significant proportion of less intensive farms in their mix of sites. It would appear that the industry at first thought that this might prejudice their GMHT crops and regime in some way. And, as sites of the less intensive sort were not as abundant in the industry's selection as the consortium wanted, the SSC had to intervene to encourage the industry to select more sites at the less intensive end of the agricultural scale.[108] Moreover, the industry were clearly not content with the inflexibility of the herbicide regime, and knew that they would probably be bound in terms of possible future commercial use of the herbicide by the protocols on the draft labels. The industry for this reason (and others) considered the FSEs "a worst-case scenario" for GMHT crops.[109] Farmers followed the draft labels to the letter when they could have used them with greater flexibility to the benefit of the yield or of biodiversity.[110] Indeed, throughout the inquiry, the industry and those doing research on their behalf were keen to

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107 Q285.

108 Q290.

109 Ev104, para 3.3.2.

110 Q 418.

inform us of the Broom's Barn study where, they contend, herbicide was applied more flexibly in order to benefit biodiversity.[111]

BROOM'S BARN

Broom's Barn Research Station is the national centre for sugar beet agricultural research and development in the United Kingdom. It is funded largely through a sugar beet levy, but has received funding from DEFRA and from the biotech industry. The Station played a role as one of the research contractors for the FSEs. It was also responsible for research cited frequently by the industry - and by others - which suggested that growing GMHT crops with a different management regime than obtained under the FSEs could result in biodiversity gain for no apparent yield loss; and that by leaving a very small proportion of a GM field fallow (under 1%), the small biodiversity loss under the FSE regime could be made up.[112]

62. Despite this, **we are concerned that the industry was responsible for a number of key inputs into the operation of the trials which appear to have been assessed only against very broad or vague criteria, or which were taken on trust. Even if these inputs had no cumulative effect upon the results of the trials, they were sufficiently integral to raise significant concerns as to the extent to which the industry was in practice capable of influencing the results.**

The Government's decision and the future

63. The advice from ACRE for beet and spring-sown oilseed rape as given under the FSEs was not conditional in the same way as was that for forage maize. Effectively, **it is inconceivable that beet or spring-sown oilseed rape will be given consents to be grown if managed under the same regime as applied in the FSEs.** Indeed, it has been reported that Belgium has very recently rejected Bayer Cropscience's application to grow oilseed rape on the basis of the FSE results in the UK.[113] It is more than likely that any similar approach with regard to the type of GMHT beet use in the FSEs will likewise be turned down by one of those countries dealing with the relevant applications, Belgium for sugar beet and Denmark for fodder beet: FSEs were carried out on both these varieties of beet which the SSC considered as a single crop type for the purposes of the trials. However this does not mean that no GMHT beet or rape will ever be grown in future in Europe or in the UK.

111 Ev 106, para 5.6 and Ev 164-6.

112 Ev 164-6.

113 *The Guardian*, Tuesday 3rd February.

64. Before, during and after the FSEs it has always been maintained by the Government that consent to be grown could be given only on a case by case basis. This still remains the case. We re-iterate that the FSEs have simply provided some useful benchmark assessments on biodiversity ranges in conventional crops against which future GM applications can be measured. Even for the varieties of GMHT beet and oilseed rape grown in the trials, it is clear that if the industry were to come up with sufficiently robust evidence that, under a different herbicide regime, their growing could prove beneficial to biodiversity then an application for consent would have to be considered on the basis of that evidence. As the ACRE advice pointed out with regard both to beet and spring-sown oilseed rape, "it may be possible to manage weeds using GMHT beet [or spring-sown oilseed rape] such that the impact on biodiversity is less than or comparable to that of conventionally managed beet [or spring-sown oilseed rape]".[114] ACRE went on to say that they had already been presented with suggestions as to how that could be done with both crops. For example, the industry was keen to emphasise to us how, in its opinion, work on beet at the Broom's Barn Research Station has shown that, with a different management regime, GMHT beet could be grown to benefit biodiversity. Some parties before us were sceptical about the Broom's Barn research, Dr Avery suggesting that it was "interesting [...] but I do not think the study was very compelling [...] much more work would need to be done along the lines of [...that] study to approach the certainty that the farm scale evaluations have reached". This was also the finding of the Government's GM Science Review Panel in its first report.[115] The Minister insisted to us that any work to show that the growing of GMHT beet could in fact benefit biodiversity would have to be "new information".[116] It is clear, however, from the memorandum received by us from the Broom's Barn Research Station[117] that they consider that there are options open for GMHT beet to benefit biodiversity without any yield loss.

Future trials and evaluations

65. Since the grounds for definitively turning down consents for GM crops apply only with clarity to two particular GMHT crops if they were to be grown as they were grown in the FSEs, it is clear that the way is wide open for applications for consent to come in for other sorts of GM crops. This applies even to GMHT beet and oilseed rape of the same variety as grown in the FSEs, if the application were to stipulate a different management regime to that used in the trials. In a sense, the FSEs categorically answered the case for only a very small proportion of possible applications. **It is vital that the Government makes clear in its decision exactly what will be required of applicants in future, and how it will assess whether there is evidence of biodiversity harm from the use of the GM crop and herbicide regime for which the particular application is made.** Moreover the Government must also take into account other considerations: conclusions drawn from other component areas of the Government's GM debate, from overseas and from public

114 ACRE advice, paras 49 and 58.

115 Q298.

116 Q571.

117 Ev 164-6.

opinion. ACRE's advice made clear that, for the crops which could be said to have "failed" the FSEs, "it is for those applying for consent to market [those crops] to propose alternative management strategies (mitigation measures), and such proposals should be supported by appropriate evidence".[118] This transfers the financial and research onus from Government onto the industry for future assessments of GM crops and their associated herbicide regimes. **We agree that the industry should pay for any future trials including the future trials we think necessary for forage maize.**

66. In evidence to us the Minister of State clearly accepted ACRE's advice and its direct applicability to all new applications for consent to grow GM crops. With regard to those crops which ACRE said had effectively failed the FSEs, the Minister said "it is for the biotech companies themselves to demonstrate that there could be another chemical regime that could be more beneficial.".[119] He added that the costs of this would have to fall upon the industry, unlike the cost of the FSEs which had been born by the taxpayer.[120] With regard to all future applications for GM consents, the Minister was clear that the industry would have to go through a similar evaluation process as was represented by the FSEs at industry cost.[121]

67. The FSEs were set up to last over three years so as to ensure that differences in climate and other factors were equalised over time. It would be rash to reduce the length of the trials when this requirement was seen as integral to the validity of the FSE results.[122] **We recommend that future GM crop assessments of biodiversity impact should be no shorter than four years .**

68. No doubt, when the Government gives its verdict on the FSEs, it will announce the framework for future trials. It is essential that rigorous standards of evaluation are maintained. The Minister assured us that "there are no shortcuts in this process".[123] **We agree and expect to see thorough multi-year and multi-site trials for any new applications. We likewise expect comparative assessment of biodiversity harm to be undertaken on a crop by crop basis.**

69. We are now facing a period of some uncertainty: uncertainty about exactly what the Government will say in its decision following on from ACREs' advice; uncertainty as to what it will stipulate for future biodiversity assessments; uncertainty because the FSEs are only one part of the broader GM debate, and may well be overtaken by other events or decisions unrelated to them; uncertainty over the stipulations for the new assessments; and uncertainty over whether the biotech companies will think the game worth the candle. It may well be that the hoops that GM crops now will have to go through will prove too much trouble for the benefit to be clear, especially in the light of continuing adverse public opinion and little evident demand.

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118 ACRE advice, para 59.

119 Q506.

120 Q508.

121 Q548.

122 Also, see para 46.

123 Q548.

Wider issues

70. These trials have helped highlight the wider issue of the impact of agricultural practices on biodiversity. There seems to have been a general awakening of interest not just in the effect of pesticides and herbicides upon crops and food but also in the various biodiversity trends naturally associated with different crops. The proximity in time to these results of the Curry Report may have helped those involved to focus upon the idea of comparative biodiversity harm. Papers in the Royal Society's themed volume make clear in their introductory and background notes the downward trend in biodiversity over the last half-century, and also make it evident that the new benchmark for conventional biodiversity in farming is much lower than it would have been in the middle of the twentieth century.

71. During the inquiry it became evident to us that the trial results were important not just for GM cops but for the whole of conventional farming. In a sense, they were applicable to all systems, whether GM or otherwise, which use herbicide, or to those which involve innovation. Dr Brian Johnson observed that "this is the first time that we have actually looked at the impact of a farming system before it has been introduced. I have seen winter cropping coming in, I have seen lots of other technological changes coming into the arable landscape with absolutely no scrutiny whatsoever as far as the impact on the environment is concerned. What I have seen is a lot of very late crying over spilt milk.". Professor Pollock added "if you were to look further west there is an agricultural practice that has had equally as big an impact and this is the shift from hay to silage, which has [...] had an equally large effect on the countryside". Dr Avery noted that "the challenge ahead scientifically [...] is to develop a form of agriculture that continues to deliver cheap, safe food but in a more environmentally friendly way.".[124]

72. We accept that much may well have been known before the trials about declining and comparative biodiversity in conventional crops.[125] Nonetheless, it is quite clear that there was a lamentable failure in Government to rectify this decline, and the march towards "efficient" farming at the expense of biodiversity continued for many years. It seems that, along with the Curry Report, the FSEs may mark a watershed, a point at which many people have for the first time been confronted with a blunt assessment of the damage done to biodiversity by conventional farming. We certainly hope so. These trials may be regarded as a wake-up call which could in the future have as much impact upon conventional as on GM farming in the UK. Moreover, **biodiversity levels have slipped intolerably over the last fifty years and Government has a duty to attempt to regain some of that lost ground. Indeed, the Government, in the light of the Curry Report, should establish a benchmark for biodiversity in conventional crops, at the less intensive end of the spectrum. It is against this benchmark that future trials should assess innovatory practices and regimes in conventional agriculture. This ought to make the benchmark used in the FSEs irrelevant.**

73. In looking at GM we must not lose sight of the fact that a lot of conventional farming is too pesticide intensive and damaging to the natural environment. **While we applaud the**

124 Q343.

125 Q214 & Ev 60, section 2.

steps that Government has taken to assess biodiversity in a rational way before permitting an agricultural innovation in the form of GM, we believe that even if some GM crops with some associated herbicide regimes are eventually shown to be less harmful to biodiversity than their conventional counterparts, the Government and its advisory bodies are still guilty of setting too low the level of harm. To grow GM crops that might possibly have a marginal edge in terms of biodiversity impact over conventional crops which also do biodiversity no favours would hardly be a great step forward towards more environmentally sustainable agriculture. It would amount to a step backwards. **We therefore recommend that in future trials the biodiversity benchmark against which GM crops should be assessed should be that associated with the less intensive and more biodiversity-friendly end of the spectrum found in UK agriculture, such as organic crops.**

74. **The scope of the trials was very narrow and the results cannot be regarded as adequate grounds for a decision to be taken in favour of commercialisation.** As Professor Pollock of the SSC told us: "I do not think the trials were ever central to the regulatory process".126 The FSEs were but one discrete part of more widespread study and public debate on GM, and should be seen in the context of the Economic Review (which showed little economic benefit for UK agriculture for GM crops), the Science Review (which highlighted areas of deep public concern and gaps in the science), the public debate, GM Nation (which showed that people are deeply sceptical about GM), the co-existence and liability debate (which could not agree on co-existence and liability) and the as-yet unfinished FSA research into the effects of GM on human health.

75. Bearing in mind the fact that once the door is opened to GM it will prove very difficult to close, **it would be irresponsible for the Government to permit the commercialisation of GM crops on the basis of one narrow component of the entire evaluation of GM technology. This would be the case even were there no significant doubts as to the robustness, validity and relevance of the FSE results.**

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126 Q325.

Table of Acronyms

ACRE	Advisory Committee on Releases to the Environment
AEBC	Agriculture and Environment Biotechnology Commission
DEFRA	Department of Environment, Food and Rural Affairs
DETR	Department for the Environment, Transport and the Regions
FSEs	Farm-Scale evaluations
GM	Genetically modified
GMHT	Genetically modified herbicide-tolerant
GMIR	Genetically modified insecticide-resistant
GMOs	Genetically modified organisms
MAFF	Ministry of Agriculture, Fisheries and Food
NERC	National Environment Research Council
NFU	National Farmers' Union
SCIMAC	Supply Chain Initiative on Modified Agricultural Goods
SSC	Scientific Steering Committee

Formal minutes

Tuesday 2 March 2004

Members present:

Mr Peter Ainsworth, in the Chair

Mr Colin Challen	Mr Malcolm Savidge
Mrs Helen Clark	Mr Simon Thomas
Sue Doughty	Mr David Wright
Mr Paul Flynn	

The Committee deliberated.

Draft Report (GM Food – Evaluating the Farm Scale Trials), proposed by the Chairman, brought up and read.

Ordered, That the Chairman's draft Report be read a second time, paragraph by paragraph.

Paragraphs 1 to 75 read and agreed to.

Resolved, That the Report be the Second Report of the Committee to the House.

Ordered, That the Chairman do make the Report to the House.

Several papers were ordered to be appended to the Minutes of Evidence.

Ordered, That the provisions of Standing Order No. 134 (Select Committees (reports)) be applied to the Report.

Ordered, That the Appendices to the Minutes of Evidence taken before the Committee be reported to the House.

The Committee deliberated further.

* * *

[Adjourned till Wednesday 3 March at 3.30pm.

Witnesses

Wednesday 17 December 2003

Mr Richard Ali, Director of Food Policy, British Retail Consortium, and **Mr Ian Burgess**, Group Quality Assurance Manager, Co-op Group. Ev. 122

Tuesday 13 January 2004

Mr Elliot Morley, Minister of State for Environment and Agri-Environment, and **Dr Colin Church**, Head of Chemicals and GM Policy Division, Department for Environment, Food and Rural Affairs. Ev. 154

List of written evidence

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2002-03 Session

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First	Departmental Responsibilities for Sustainable Development, HC 326 (*Reply, Cm 5519*)
Second	Pre-Budget Report 2001: *A New Agenda?*, HC 363 (*HC 1000*)
Third	UK Preparations for the World Summit on Sustainable Development, HC 616 (*Reply, Cm 5558*)
Fourth	Measuring the Quality of Life: The Sustainable Development Headline Indicators, HC 824 (*Reply, Cm 5650*)
Fifth	A Sustainable Energy Strategy? Renewables and the PIU Review, HC 582 (*Reply, HC 471*)
Sixth	Buying Time for Forests: *Timber Trade and Public Procurement*, HC 792-I , (*Reply, HC 909, Session 2002-03)*

2000-01 Session

First	Environmental Audit: *the first Parliament*, HC 67 (*Reply, Cm 5098*)
Second	The Pre-Budget Report 2000: *fuelling the debate*, HC 71 (*Reply HC 216, Session 2001-02*)

1999-2000 Session

First	EU Policy and the Environment: An Agenda for the Helsinki Summit, HC 44 (*Reply, HC 68*)
Second	World Trade and Sustainable Development: An Agenda for the Seattle Summit, HC 45 (Including the Government response to the First Report

	1998-99: Multilateral Agreement on Investment, HC 58) (*Reply, HC 69*)
Third	Comprehensive Spending Review: Government response and follow-up, HC 233 (*Reply, HC 70, Session 2000-01*)
Fourth	The Pre-Budget Report 1999: pesticides, aggregates and the Climate Change Levy, HC 76
Fifth	The Greening Government Initiative: first annual report from the Green Ministers Committee 1998/99, HC 341
Sixth	Budget 2000 and the Environment etc., HC 404
Seventh	Water Prices and the Environment, HC 597 (*Reply, HC 290, Session 2000-01*)

1998-99 Session

First	The Multilateral Agreement on Investment, HC 58 (*Reply, HC 45, Session 1999-2000*)
Second	Climate Change: Government response and follow-up, HC 88
Third	The Comprehensive Spending Review and Public Service Agreements, HC 92 (*Reply, HC 233, Session 1999-2000*)
Fourth	The Pre-Budget Report 1998, HC 93
Fifth	GMOs and the Environment: Coordination of Government Policy, HC 384 (*Reply Cm* 4528)
Sixth	The Greening Government Initiative 1999, HC 426
Seventh	Energy Efficiency, HC 159 (*Reply, HC 571, Session 2000-01)*
Eighth	The Budget 1999: Environmental Implications, HC 326

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Second	The Greening Government Initiative, HC 517 (*Reply, HC 426, Session 1998-99*)
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