May 2006

Friends of the Earth

Briefing

Genetically modified animal feed

Friends of the Earth, 26-28 Underwood Street, London N1 7JQ
Tel: 020 7490 1555 Fax: 020 7490 0881 Email: info@foe.co.uk Website: www.foe.co.uk

Friends of the Earth Limited company number 1012357
♻ Printed on paper made from 100 per cent post-consumer waste

Introduction

Animal feed accounts for a huge proportion of the world's harvest – estimates range from one third to nearly half[i]. A range of crops can be used in animal feed, the most common are soya, maize, oilseed rape and cotton seeds. Ninety per cent of the world's soya is used to feed animals[ii], and vast quantities are exported around the world - the European Union imported some 23.6 million tonnes of soya in 2003/04[iii].

The two crops used in European animal feed that are most likely to be genetically modified are soya and maize, and almost all is imported. Imported soya and maize by-products account for about 20 per cent of raw materials used by UK feed manufacturers and farmers[iv]. The table below shows the worldwide percentages of soya, maize, cotton and oilseed rape crops that are GM[v]:

Crop	Total global cultivation	Percentage of crop that is GM
Soya bean	86 million hectares	56
Maize	140 million hectares	14
Cotton	34 million hectares	27
Oilseed rape	23 million hectares	19

Although widespread consumer concerns have forced major supermarkets and food manufacturers to eliminate GM ingredients from human foods, GM crops continue to be fed to farm animals on a large scale.

A list of GM crops with approval for use in animal feed in Europe can be found in the Appendix.

Soya

Use of soya in animal feed has grown significantly in the UK since meat and bone meal (MBM) was banned from animal feed following the emergence of BSE. 1.9 million tonnes of soya beans and soya meal were imported into the UK from the USA, Canada, Brazil and Argentina in 2004[vi]. Soya is one of the major sources of protein for both ruminants (cows and sheep) and non-ruminants (pigs and poultry)[vii]. Sixty per cent of soya used for animal feed is fed to poultry[viii]. Soya is mainly imported from the USA, Argentina and Brazil. GM soya is widely grown in the USA and Argentina; Brazil is still the main source of non-GM soya, although the Brazilian government legalised the cultivation of GM soya in March 2005.

Maize

Maize is used in animal feed in several ways. 'Fodder' maize is fed directly to cattle without processing, and is often grown on-farm or nearby. Fodder maize is mostly produced within Europe so is unlikely to be GM (only Spain grows GM fodder maize in any significant quantity). Derivatives such as maize gluten, a by-product of the alcohol and starch processing industries, are largely imported from the USA, where there is little segregation of GM and non-GM maize. The UK imported 850,000 tonnes of maize gluten feed from the USA in 2004[ix]. Maize by-products are staple feeds in many ruminant livestock production systems, and may be used to supplement home-grown forages for cattle and sheep[x].

Does GM animal feed have to be labelled?

Any animal feed that contains more than 0.9 % of an approved GM ingredient or derivative (highly processed substances such as vegetable oils, lecithin etc) must be labelled as containing GM. This law has been in place since April 2004. Unapproved GM ingredients or derivatives with a favourable risk assessment must be labelled if more than 0.5% is present.

Each operator in the food chain (from farmers, through processors and up to retailers and restaurants) must also keep and pass on records of any GM products or ingredients they are using via a detailed traceability system.

But although animal feed (along with human food) now has comprehensive rules for traceability and labelling, these rules do not apply to the produce of GM-fed animals such as meat, milk and eggs. This is a major loophole in the legislation – human foods derived from GM-fed animals simply do not have to be labelled.

This means that consumers have no way of knowing whether or not the animal produce they are eating comes from GM-fed animals or not, and so cannot choose to avoid it unless they pay a price premium for organic produce, which must be derived from animals fed a non-GM diet.

Unfortunately, many consumers are completely unaware that they are eating the produce of GM-fed animals, so retailers continue to get away with exploiting this loophole in labelling.

Enforcing the regulations

New research by the GM Freeze has found that the UK authorities charged with enforcing regulations on traceability and labelling are struggling to ensure that only approved GMOs enter the food chain. The research also reveals that current enforcement activity does not provide adequate guarantees that labelling of food and animal feed for authorised GM content is accurate and reliable.

The survey of UK authorities found that minimal activity was reported by some regulators, suggesting enforcement of the regulations has a low priority with some local authorities. The low level of enforcement activity is to a large extent due to the tight budgets which local authorities have for carrying out all monitoring of food and animal feed across the range of regulations they have to enforce. This limits the number of samples that can be taken. As a result there is over reliance by regulators on monitoring traceability paper trails without verifying the GM content of food and feed by independent analysis.

The Food Standards Agency has failed to provide additional finance to local authority Trading Standards Departments, Environmental Health Departments and Port Health Authorities to enable them to fulfil their duties. This is despite the FSA estimating that enforcement costs will rise by 78% because of the additional need to monitor animal feed and derivatives of GM crops in the 2004 Regulations. There is an immediate need for the FSA to increase their commitment to the enforcement of the 2004 Regulations with further funding and support.

Source: GM food and Crops: Maintaining Consumer Choice [xi]

Why are farmers still using GM animal feed?

Before April 2004, GM animal feed did not require labelling, so most farmers did not know whether they were feeding their animals GM feed or not. Now that GM animal feed must be labelled, it is easier for farmers to identify non-GM feed. Unfortunately it is also slightly more

expensive than GM animal feed. Many UK farmers are working to very small, or non-existent, profit margins, and so cannot afford to bear the extra cost of non-GM animal feed.

But supermarkets and major food retailers have very large profit margins, so should easily be able to absorb the extra cost involved. They should be able to specify non-GM animal feed for their suppliers and purchase their produce at a price that gives the suppliers a decent margin. The premium for non-GM dairy feed in 2004 was between £8-16 per tonne. This translates to a final cost increase for those buying non-GM fed milk of between 0.23 and 0.46 pence per litre[xii]. While dairy farmers who are already struggling to make a profit would find it hard to absorb such a cost, the highly profitable retail sector should easily be able to cope with it – Tesco's pre-tax profit for 2005 was £2.03 billion[xiii]. Furthermore, fluctuations in the commodity price of soya tend to be much greater than price premiums for non-GM soya and the market is able to absorb these fluctuations without the final price of food to consumers being affected.

Supermarkets have already made varying degrees of commitments to guarantee specific own-brand animal products are from animals fed a GM-free diet. For example, most major supermarkets ensure their chicken is not GM-fed, but only Marks and Spencer source all their fresh milk from non-GM fed cows.

Consumers don't want it!

An ICM opinion poll[xiv] carried out for Greenpeace in August 2003 found that 95% of those questioned believed people should be given a choice about whether or not they wanted to eat meat and dairy products derived from animals fed on a GM diet. 77% stated they would prefer to eat and buy dairy, meat and fish products derived from animals fed on a non-GM diet. 95% thought food products derived from animals reared on a GM diet should be labelled as such.

What's the problem with GM animal feed?

An end to GM-free chocolate?

If demand for non-GM animal feed doesn't rise, food companies could find non-GM ingredients for human food becoming more scarce. Although the vast majority of soya is used for animal feed, the by-products of the soya crushed for feed are used for food ingredients such as lecithin and oils. These are commonly used in processed foods such as ready meals, biscuits and chocolate.

Brazil has always been a reliable source of non-GM soya, but a change in Brazilian law in 2005[xv] now means many larger farms are growing GM. If retailers don't take action and specify non-GM animal feed from their suppliers, Brazilian farmers won't be getting orders for non-GM soya, and so may decide to grow GM instead. This could leave us with little or no non-GM soya, for both animal feed and for food ingredients. The British Retail Consortium (BRC) has now added its support, calling on the Brazilian soya industry to "resist further growth of GM planting" because "it will be enormously difficult to maintain trust in the food chain should Brazil's supply of non-GM soybean dry up."[xvi]

Safety

The effect on livestock of GM feeds could be very serious. The US Government's Center for Veterinary Medicine has said that "unlike the human diet, a single plant product may constitute a significant proportion of the animal diet...therefore, a change in nutrient or

toxicant composition that is considered insignificant for human consumption may be a very significant change in the animal diet"[xvii]. Yet there has been little long-term safety testing for GM animal feeds, and there are concerns that the European Food Safety Authority (EFSA), which provides scientific advice to the European Commission and member states on food and feed safety, has failed to address genuine concerns over the safety of GMOs [xviii].

For example, during the approval process for Pioneer/Mycogen's 1507 GM maize, European member states requested evidence of long-term, chronic safety tests. But the EFSA's GMO Panel did not support these requests and gave a positive opinion for the approval of the maize[xix]. A similar criticism was made about the approval of Monsanto's NK603 GM maize[xx]. Both GMOs were subsequently approved for import by the European Commission.

In some cases, testing has revealed potential problems with GM crops, but these findings have been ignored and the crops approved regardless.

- Testing of Monsanto's GT73 oilseed rape revealed consistently higher levels of an anti-nutritional factor, but this was not investigated further. Feeding trial results were contradictory, with one study feeding GM meal to rats finding significant decreases in body weight, one finding an increase in liver weights, and one finding no differences. The only one which was submitted to the EU authorities was the one finding no differences[xxi].
- Testing of Monsanto's MON863 maize on rats revealed significant differences in factors such as white blood cells, kidney weights and kidney structure. Monsanto initially refused to publish the rat study and had to be forced to do so in a court ruling in a case brought by the German Government. Member State concerns were again disregarded by EFSA's GMO Panel who delivered a positive opinion on the maize[xxii].

Syngenta's slip-up

Emergency measures were introduced in Europe in April 2005 after it was discovered that biotech company Syngenta had accidentally sold hundreds of tonnes of an unapproved GM maize seed to US farmers. The new measures only permitted shipments of maize gluten feed and brewers' grains from the US that were certified free of the unapproved GM variety, called Bt10, to enter the EU.

Syngenta admitted in March 2005 that they had sold unapproved Bt10 GM seeds to US farmers for four years, mistaking them for the approved variety Bt11. They initially claimed that the Bt10 maize was *"physically identical"* to Bt11. But Bt10 also contains a controversial antibiotic resistance gene, which confers resistance to an important group of antibiotics. Syngenta finally admitted this was indeed the case.

It was estimated that around 1000 tonnes of the illegal GM maize had entered the European food chain. The incident raised concerns over the complacency of the biotech industry, lack of regulation in the US and breakdown in Europe's monitoring of food imports. Shipments of US maize contaminated with Bt10 have been found and impounded in Japan[xxiii] and Ireland[xxiv].

Outdated approvals

Some of the crops currently available for use in animal feed were approved under older, less stringent legislation. For example, Bt11 maize was approved under old regulations which did not consider long-term effects, allowed no public access to dossiers submitted by the biotech industry, and did not require the assessment of safety for use as an animal feed[xxv].

Many GM products that can be used in animal feed did not even require approval at the time they were put on the market. The European Commission published a list of 26 GM products on the EU market before new legislation on authorising GM food and feed entered into effect in April 2004. These so called "existing products" were either approved under old EU legislation, or did not require approval at the time. They are legally permitted to be sold in the EU for a set period of between 3-9 years, after which an application must be re-submitted for renewal of the authorisation[xxvi].

Environmental impacts

There are a number of negative environmental impacts associated with growing GM crops. Many of the currently approved GM products for animal feed are for import into the EU only, but this simply means that the environmental impact is felt outside of Europe instead. Yet these environmental impacts are not considered when such crops are approved for import. Furthermore, accidental spillages of imported GM grains and seeds along transport routes could also lead to direct negative environmental impacts in the EU.

Biodiversity

The UK Government's four-year Farm Scale Evaluations looked at the impact of growing herbicide tolerant GM crops on farmland wildlife, and found negative impacts associated with growing GM beet and oilseed rape. GM maize came out better than its conventional equivalent, but the comparison was flawed because the conventional maize in the trials was grown using the extremely damaging weedkiller, atrazine, which is now being phased out in Europe[xxvii].

Insect resistant crops also have associated environmental problems. There are concerns about the impact of such crops, which produce an insecticide throughout the plant, on non-target organisms, such as butterflies, moths and other invertebrates[xxviii]. There is also little research on this impact that is relevant to European farming and species[xxix] and little evidence on the impact on soil organisms. Yet when these issues were raised by Member States in relation to the approval of such crops, the EFSA GMO Panel failed to take such concerns seriously[xxx]. However, EC documents forming part of the EC's defence in the GM dispute at the World Trade Organisation state that "it is a reasonable and lawful position" that insect-resistant crops should not be planted until all the effects on the soil are known[xxxi].

Cross pollination

Cross pollination between GM and non-GM crops, wild crop plants or weed crop plants in following crops, as well as wild relatives, causes gene escape. Contamination of non-GM crops causes economic losses for farmers, wild plants may incorporate several GM traits creating so called 'superweeds'[xxxii], and traditional crop varieties can be contaminated. In Mexico, where only food and feed imports of GM maize were allowed, local varieties of maize still became contaminated with GM constructs, probably due to inadvertent planting of GM maize grains sold as food or feed[xxxiii].

Impacts abroad

There are many wider social and environmental problems associated with intensive soya production – whether GM or not. These include forest and other habitat destruction, removal of local communities from their land and threats to food sovereignty[xxxiv] [xxxv]. Intensive farming of animals for meat and dairy products depends on, and fuels the growth of, vast

amounts of high protein soya. There is currently enough non-GM soya being grown in Brazil to satisfy European demand, but growing demand for meat from countries like China means that the current system is simply not sustainable.

Case study: Argentina and GM soya

Argentina has adopted GM soya on a large scale – more than 14 million hectares of 'RoundUp Ready' glyphosate-resistant soya was planted in 2003-4. Monsanto was given a licence to grow RoundUp Ready soya in Argentina in 1996, at a time when international soya prices were high and Monsanto was selling GM soya seed without royalty charges. The glyphosate herbicide was also available more cheaply to farmers in Argentina than in the USA. Farmers were offered packages of seeds, herbicides and fertiliser by seed and chemical distributors to be paid for after the harvest.

But small farmers found it increasingly difficult to compete. Small farmers can't afford the massive machines used for direct drilling, and little manual labour is required so many people have sold or rented their land and left. Peasants have been illegally expelled from their land, and it is almost impossible for them to reverse the situation through legal channels.

Soya is also seriously threatening food sovereignty in Argentina. In recent years, soya has replaced the production of food staples which are now being imported, leading to higher food prices for the population. Ironically, soya is now being widely promoted as a solution to hunger in Argentina.

Communities living near to soya cultivation have been seriously affected by the spraying of herbicides. One study in Loma Senés described how a small community surrounded by large areas of land rented out for soya production found their crops and livestock destroyed by aerial spraying of glyphosate.

The increase in the area cultivated for soya has been responsible for deforestation in provinces all over the country. In Entre Ríos almost 1.2 million hectares of forest has been removed in the last few years, in part due to a doubling of the area cultivated for soya between 1994 and 2003 to 1,200,000 hectares in 2003.

Source: Argentina: A case study on the impact of genetically engineered soya[xxxvi].

What are the alternatives to GM animal feed?

In the short term, food companies should phase out their use of GM animal feed and switch to existing non-GM feed ingredients sourced from countries where GM crops are not grown or where they are segregated. Food companies must also ensure that the soya used in their food chains does not come from areas where communities have been driven off their land or where pristine habitats have been cleared.

The increase in global demand for meat and other animal products means that reliance on imports of high protein animal feeds, primarily soya, is unsustainable. In the longer term, a drastic increase in domestically produced animal feed ingredients is needed. A range of alternatives have potential in this area, including crops such as white lupins – a grain legume increasingly widely grown in the UK with a comparable level of protein to soya[xxxvii].

But a sustainable long-term solution to the problem would be to reverse current trends of intensive production, and move to a more extensive approach using on-farm feed production based on cultivation of high protein forage. This would require something of a revolution in farming practices, and so would require the support of both Government and retailers[xxxviii].

Actions needed

Food companies

- Urgently place firm orders with their suppliers for products from animals fed a non-GM diet. They should absorb any extra cost involved, rather than pass it on to farmers or consumers
- Ensure that their supply chains are fully transparent and provide information to their customers which allows them to choose non-GM fed animal products
- Support farmers in finding sustainable alternatives to dependence on soya in animal feed
- Ensure that food and feed ingredients are fully traceable and do not come from areas where their production has lead to negative environmental and social impacts.

National and European decision-makers

- The UK Government and European institutions must fund research into alternatives to soya for animal feed such as home grown and regionally sourced feeds
- The UK Government and European institutions must put in place financial support and advice to encourage farming systems which are less reliant on high levels of imported, manufactured, feeds
- The European Food Safety Authority GMO Panel needs to identify scientific uncertainty, take into account differing scientific opinion and take seriously the potential long-term negative effects of eating or growing GM foods and feeds
- European food labelling rules need to be revised to include labelling of GM-fed animal products to give consumers the choice.

Consumers

- Ask supermarkets and food manufacturers to stop sourcing GM-fed animal products and provide you with clear information about which of their products come from animals fed GM feed.
- Avoid GM-fed animal products by shopping at local farmers' markets where you can question the farmers directly about how the food was produced.
- Buy organic milk and animal products – organic standards prohibit the use of GM at any stage of production.
- Eat less meat, eat better meat - see Compassion in World Farming's campaign at www.eatlessmeat.org

Appendix

The following GM crops have approval for import for use in animal feed in Europe. Some may not be currently available on the market, but all can legally be sold in Europe.

Name of GM crop	Type of crop	Type of modification	Biotech company	Date of authorisation	Cultivation authorised?
MON863x MON810	Maize	Bt insect resistant	Monsanto	January 2006	No
1507	Maize	Glufosinate tolerant and Bt insect resistant	Pioneer/ Mycogen	November 2005	No
GT73	Oilseed rape	Glyphosate tolerant	Monsanto	August 2005	No
MON863	Maize	Bt insect resistant	Monsanto	August 2005	No
NK603	Maize	Glyphosate tolerant	Monsanto	October 2004	No
Bt11	Maize	Glufosinate tolerant and Bt insect resistant	Syngenta	April 1998	No
Topas 19/2	Oilseed rape	Glufosinate tolerant	Bayer	April 1998	No
MON 40-3-2	Soya	Glyphosate tolerant	Monsanto	April 1996	No
MON863x NK603	Maize	Glyphosate tolerant and Bt insect resistant	Monsanto	September 2003*	No
MON15985	Cotton	Bt insect resistant	Monsanto	January 2003*	No
MON15985 xMON1445	Cotton	Glyphosate tolerant and Bt insect resistant	Monsanto	January 2003*	No
NK603x MON810	Maize	Glyphosate tolerant and Bt insect resistant	Monsanto	September 2002*	No
MS8xRF3	Oilseed rape	Glufosinate tolerant	Bayer	January 2000*	No
GA21	Maize	Glyphosate tolerant	Monsanto	September 1998*	No
GA21x MON810	Maize	Glyphosate tolerant and Bt insect resistant	Monsanto	September 1998*	No
T45	Oilseed rape	Glufosinate tolerant	Bayer	January 1998*	No
MS1xRF2	Oilseed rape	Glufosinate tolerant	Bayer	June 1997*	No
MS1xRF1	Oilseed rape	Glufosinate tolerant	Bayer	June 1997*	No
1445	Cotton	Glyphosate tolerant	Monsanto	January 1997*	No
531x1445	Cotton	Glyphosate tolerant and Bt insect resistant	Monsanto	January 1997*	No
531	Cotton	Bt insect resistant	Monsanto	January 1996*	No
Bt176	Maize	Glufosinate tolerant and Bt insect resistant	Syngenta	January 1997	Yes†
MON810	Maize	Bt insect resistant	Monsanto	April 1998	Yes
T25	Maize	Glufosinate tolerant	Bayer	April 1998	Yes‡

The Community Register of GM Food and Feed can be found at http://europa.eu.int/comm/food/dyna/gm_register/index_en.cfm

Lists of GM food and feed approved or pending approval under various directives can be found at: http://europa.eu.int/comm/food/food/biotechnology/authorisation/index_en.htm

* These products currently only have approval as "existing products" on the Community Register, dating from April 2005. They were either approved under old EU legislation or did not require approval at the time. They are legally permitted to be sold in the EU for a set period of between 3-9 years, after which an application must be re-submitted. Many of these products are also in the pipeline for full approval for import and/or cultivation.

† Bt176 maize was only grown in Spain. Spain withdrew the crop from the market in April 2004 following concerns over the antibiotic resistance gene it contains – no planting should have taken place after January 2005.

‡ T25 maize was withdrawn by Bayer in March 2004 before any commercial cultivation occurred.

References

[i] Goodland R (1999). Livestock sector environmental assessment, in Sustainability in agriculture: agriculture at the crossroads between ecology, economics and social science. Hardtlein M, Kaltschmitt M, Lewandowski M & Wurl H (eds). German Federal Environment Foundation Press, Berlin. Cited in The Global Benefits of Eating Less Meat. Gold M (2004). Compassion in World Farming Trust.

[ii] Brown L (1999). The United States and China, The Soybean Connection. Worldwatch Institute press notice 9 November 1999. Cited in The Global Benefits of Eating Less Meat. Gold M (2004). Compassion in World Farming Trust.

[iii] Toepfer International (2004). Statistical information about the grain and feedstuff market. Edition 2004/05.

[iv] Food Standards Agency (2005). GM material in animal feed. http://www.foodstandards.gov.uk/gmfoods/gm-animal

[v] Taken from Food Standards Agency (2005). GM material in animal feed. http://www.foodstandards.gov.uk/gmfoods/gm-animal

[vi] Food Standards Agency (2005). GM material in animal feed. http://www.foodstandards.gov.uk/gmfoods/gm-animal

[vii] Advisory Committee on Animal Feedingstuffs (2003). ACAF Review of On-Farm Feeding Practices: Recommendations on identifying hazards and minimising risks. Food Standards Agency. http://www.food.gov.uk/multimedia/pdfs/farm.pdf

[viii] NFU briefing on soya, undated.

[ix] Food Standards Agency (2005). GM material in animal feed. http://www.foodstandards.gov.uk/gmfoods/gm-animal

[x] Advisory Committee on Animal Feedingstuffs (2003). ACAF Review of On-Farm Feeding Practices: Recommendations on identifying hazards and minimising risks. Food Standards Agency. http://www.food.gov.uk/multimedia/pdfs/farm.pdf

[xi] GM Freeze (2006) Food and Crops: Maintaining Consumer Choice - A report of a survey on the enforcement of the EU GM Traceability and Labelling Regulations http://www.gmfreeze.org/admin/uploads/report_doc.pdf

[xii] Greenpeace (2004). GM and dairy cowfeed: Steps to a GM-free future for the UK dairy industry. http://www.greenpeace.org.uk/MultimediaFiles/Live/FullReport/6364.pdf

[xiii] Tesco profits break through £2bn. BBC News website http://news.bbc.co.uk/1/hi/business/4435339.stm

[xiv] ICM Research Limited (2003). GM Food Survey. August 1st-3rd 2003.

[xv] Associated Press (3 March 2005) http://www.msnbc.msn.com/id/7079425/

[xvi] British Retail Consortium Position on Brazilian non-GM soybeans

[xvii] Memorandum from Gerald B Guest, DVM Director, FDA Centre for Veterinary Medicine to James Maryanski, FDA Biotechnology Policy Coordinator. 5 February 1992.

[xviii] Friends of the Earth Europe (2004). Throwing Caution to the Wind: A review of the European Food Safety Authority and its work on genetically modified foods and crops. November 2004. http://www.foeeurope.org/GMOs/publications/EFSAreport.pdf

[xix] Friends of the Earth Europe comments on 1507 maize: Response to EFSA GMO Panel opinions for Commission questions EFSA-Q-2004-072 and EFSA-Q-2004-087. http://www.foeeurope.org/GMOs/pending/FOEE%20comments%20-1507%20maize.pdf

[xx] Friends of the Earth Europe (2004). Questions remaining over Monsanto's NK603 maize. http://www.foeeurope.org/GMOs/pending/nk603briefing.pdf

[xxi] Friends of the Earth Europe (2003). Provisional comments by Friends of the Earth Europe to the notification by Monsanto for the placing on the EU market of Roundup Ready (glyphosate tolerant) oilseed rape, event GT73 (notification number C/NL/98/11). http://www.foeeurope.org/GMOs/pending/MonsantoGMO_oil_seed_GT73.pdf

[xxii] Friends of the Earth Europe (2003). Provisional comments by Friends of the Earth Europe to the notification by Monsanto for the placing on the EU market of maize grains derived from insect-protected maize lines MON863 and MON863 x MON810 (notification number C/DE/02/9). http://www.foeeurope.org/GMOs/pending/MonsantoGM_Maize863.pdf

[xxiii] Japan finds 9th cargo tainted with Bt10/Japan Bt10 update. GM Watch, http://www.gmwatch.org/archive2.asp?arcid=5643

[xxiv] Bt10: Ireland notifies contaminated consignment stopped in port. Europa Press Release 25 May 2005. http://europa.eu.int/rapid/pressReleasesAction.do?reference=IP/05/608&format=HTML&aged=0&language=EN&guiLanguage=en

[xxv] Friends of the Earth Europe (2004). Genetically Modified Sweet Corn: 10 reasons not to approve Bt11 sweet corn. http://www.foeeurope.org/GMOs/pending/bt11_briefingapril04.pdf

[xxvi] Register of existing GM food and feed products published. Europa Press Release 18 April 2005. http://europa.eu.int/rapid/pressReleasesAction.do?reference=IP/05/439&format=HTML&aged=0&language=EN

[xxvii] GM Crop Trial Blow to Biotech Industry. Friends of the Earth Press Release 21 March 2005

[xxviii] See, for example, Felke M, Lorenz N & Langenbruch GA (2002). Laboratory studies on the effects of pollen from Bt-maize on larvae of some butterfly species. Journal of Applied Entomology 126(6):320., Hilbeck A, Baumgartner M, Fried PM & Bigler F (1998). Effects of transgenic Bacillus thuringiensis corn-fed prey on mortality and development time of immature Chrysoperla carnea (Neuroptera: Chrysopidae). Environmental Entomology 27(2):480-87., Jesse LCH & Obrycki JJ (2000). Field deposition of Bt transgenic corn pollen: lethal effects on the monarch butterfly. Oecologia 125(2):241-8., Prütz G & Dettner K (2004). Effect of Bt corn leaf suspension on food consumption by Chilo partellus and life history parameters of its parasitoid Cotesia flavipes under laboratory conditions. Entomologia Experimentalis et Applicata 111(3):179

[xxix] Greenpeace (2005). Bt11 maize – C/F/96.05.10 notification for cultivation. http://eu.greenpeace.org/downloads/gmo/Bt11reportOct05.pdf

[xxx] Friends of the Earth Europe comments on 1507 maize: Response to EFSA GMO Panel opinions for Commission questions EFSA-Q-2004-072 and EFSA-Q-2004-087. http://www.foeeurope.org/GMOs/pending/FOEE%20comments%20-1507%20maize.pdf

[xxxi] Friends of the Earth and Greenpeace (2006) Hidden Uncertainties: What the European Commission doesn't want us to know about the risks of GMOs http://www.foeeurope.org/publications/2006/hidden_uncertainties.pdf

[xxxii] Friends of the Earth (2004). GM Contamination Briefing 3: Gene Escape. http://www.foe.co.uk/resource/briefing_notes/gene_escape.pdf

[xxxiii] Friends of the Earth Europe (2003). Provisional comments by Friends of the Earth Europe to the notification by Monsanto for the placing on the EU market of maize grains derived from insect-protected maize lines MON863 and MON863 x MON810 (notification number C/DE/02/9). http://www.foeeurope.org/GMOs/pending/MonsantoGM_Maize863.pdf

[xxxiv] Joensen L, Semino S & Paul H (2005). Argentina: A case study on the impact of genetically engineered soya. Gaia Foundation. http://www.econexus.info/pdf/ENx-Argentina-GE-Soya-Report-2005.pdf

[xxxv] Greenpeace (2006) Eating up the Amazon http://www.greenpeace.org.uk/MultimediaFiles/Live/FullReport/7555.pdf

[xxxvi] Joensen L, Semino S & Paul H (2005). Argentina: A case study on the impact of genetically engineered soya. Gaia Foundation. http://www.econexus.info/pdf/ENx-Argentina-GE-Soya-Report-2005.pdf

[xxxvii] Greenpeace (2004). GM and dairy cowfeed: steps to a GM-free future for the UK dairy industry.

[xxxviii] Greenpeace (2004). GM and dairy cowfeed: steps to a GM-free future for the UK dairy industry.