

Animal Feed and GM

November 2008

This briefing outlines why UK companies should drop the use of GM animal feed and switch to sustainable alternatives in the interest of human and animal health and to avoid the further harm to health and the environment of intensive GM crop production.

GM crops used in animal feed

Four GM crops are used in the production of animal feed: soya, maize, oilseed rape and cottonseed.

Table 1 shows the significance of GM crops in the total global production of these crops. Globally large amounts of land are taken up to produce forage, grain or meal to feed farm animals and poultry (rather than human food).

Table 1 area of GM crops grown in 2007 as a percentage for each cropⁱ.

Global Cultivation	Total million hectares	GM Varieties (Percentage of total)
Soya beans	86	58.6 (68%)
Maize	140	35.2 (25%)
Cotton	34	13.4 (39%)
Oilseed rape	23	5.5 (24%)
Total	283	112.7 (40%)

These data should be put in the context of the total amount of productive agricultural land globally. There are over 4.8 billion hectares of agricultural land in the world growing forage crops (including grass) and harvestable crops, such as cereals and soya. GM crops occupied a mere 114 m hectares in 2007 representing just 2.4% of global farmland.

Between 66%ⁱⁱ and 90%ⁱⁱⁱ of global soya production is used to feed livestock and poultry. The remaining portion largely comprises of vegetable oil and other byproducts of soya milling. A small percentage is consumed as whole beans or in processed form (eg tofu and veggie mince) by humans.

Maize is fed to most livestock and poultry in large quantities. Milled maize or maize gluten is often part of the feed used to boost milk yield along with soya meal.

Crushed cottonseed and oilseed rape (after the oil has been extracted) are also used for animal feed.

Where they are grown and how much do we import?

The main countries exporting soya for animal feed to the EU are Argentina and Brazil. Paraguay is also increasing production with major environmental, health and socio-economic consequences. In Argentina most of the soya (99%) is GM RR soya tolerant to Monsanto's herbicide RoundUp. Brazil grows RR soya (around 60% of the soya area) but is also the main source of non-GM soya for Europe. Smaller amounts come from the USA where RR soya also dominates (91% of the total crop)^{iv}. Paraguay is dangerously dependent on RR soya with 85% of its arable land under that one crop in 2007^v - an extreme example of monocultural agriculture. The experience in Argentina where RoundUp resistance in the arable weed Johnsongrass is spreading suggests such monocultures will be unsustainable in a short period of time.^{vi}

GM maize for animal feed is grown more widely than soya, including in some EU countries. France and Spain were the main GM maize producers in 2007. Both have grown one type of GM maize (Mon810), but the latter has by far the largest areas under GM cultivation (around 50,000 ha). France banned the Mon810 maize in 2008 pending a safety review^{vii}. Austria, Greece, Luxemburg, Romania, Hungary and Poland have also banned this crop. The European Commission has so far failed to overturn these bans. The main GM

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maize exporting countries are the USA, Argentina and Brazil. GM maize dominates in the USA (73% of the total planted) with one state, North Dakota, with over 90% GM. Data on the planting of GM maize in South America do not give percentages for GM.

GM cotton in the USA makes up 87% of the cotton crop in 2007. Elsewhere statistics on the cotton planting are not sufficiently reliable to give an accurate GM percentage.

Canada and the USA are the only countries where oilseed rape (known there as canola) is grown commercially. GM crops make up around 79% of the total planted in Canada in 2007^{viii}. Canola is relatively a minor crop in the USA grown on over one million hectare in three main states. Figures for GM planting are not available. The EU is a major source of non-GM oilseed rape. There is a major debate currently raging in Australia as to whether or not to grow GM oilseed rape there.

Is GM feed safe for health?

There are many concerns about the long-term safety of GM feeds for farm animals and poultry and for people eating the products. Genetic modification of a crop plant can cause unexpected changes to the receiving plant. These can change the chemical composition within the plant so that it could become allergenic, less nutritious or produce entirely novel products of unknown health risks. The ability of plant DNA to survive the digestion process and pass into animal tissue and milk has been demonstrated in a number of studies involving GM feed (for example see Mazza et al^{ix}). Studies of the potential health impacts of such low level exposure to transgenic DNA have not so far been carried out.

There have been numerous studies of laboratory animals fed on GM crops that have found potentially harmful changes to the intestines and other organs. There is also real concern about the use of antibiotic marker genes, which are used to select genetically modified individual plants. Despite an EU ban^x on antibiotic resistant marker genes because of their potential to have an adverse effect on health by risking a further antibiotic resistance in human and veterinary medicine, their use persists despite real alternative markers being available to the biotech industry.

A team of scientists in France re-examined the data provided by Monsanto in support their application for their GM Maize Mon863, which is designed to be fed to animals. Their conclusions cast doubt the thoroughness of the approval process:

However, specific in vitro tests should be stimulated before, and one can note that there is very large room for still improvements in GMO files, i.e. more tests with the Bt artificial Cry3Bb1 toxin extracted from the maize and incubated with human cells in this case. In the case of MON863 maize, it should be noted that the 90 day toxicology study appears to be the best one and the longest one that has been performed with mammals. It shows significant effects in comparison to control laboratory animals, and in some instances in comparison to the so called very large "reference group", the existence of which may be questioned^{xi}.

There is also concern about the levels of herbicide residues in GM animal feed, which could find its way into consumer products. The Maximum Residue Limit for glyphosate (the active ingredients in RoundUp) was increased 200 times to accommodate the introduction of RR soya by Monsanto. No monitoring of animal products for glyphosate residues has taken place in the UK.

Worryingly, there is very little research into unexpected harmful effects of eating GM over the long term, so no one really knows what the risks are. This is complicated by the fact that places like the US where GM is widely present in food do not require labelling and GM content is not traced, so there is no way to monitor any health effects that may arise or attribute them to the presence of GM in any part of the diet.

Is GM feed safe for the environment?

The growing of GM animals feed can potentially harm the environment in a numbers of ways: direct toxic effects of GM proteins on non-target would species (for instance Bt proteins have been shown to cause harm to predator of plant pests, such as lacewings and ladybirds^{xii}) and the indirect impact on food chain for wildlife on GM herbicide tolerant crops which reduce arable weed seeds and cover^{xiii}. The use of glyphosate has an impact on the soil and the ability of the crop to take up the essential mineral manganese, which has to be added as a fertiliser to compensate^{xiv}. Industrial scale monocultures, the system for which GM is designed, are in general damaging to the environment and biodiversity.

GM feed undermines non-GM food

Although the bulk of the Brazilian soya crop is used for animal feed, there are important byproducts, such as vegetable oil and soya lecithin, which are used as ingredients in a wide range of processed foods in the EU. If GM soya becomes as dominant in Brazil as it has in Argentina, then sourcing of these non-GM ingredients

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for the human food chain would become more difficult. Soya lecithin is an ingredient of chocolate and thus non-GM chocolate could ultimately be under threat unless the EU's supermarkets actively specify that all their animal feed must be non-GM.

Why are feed and food prices rising?

The price of food and feed crops has rocketed since the beginning of 2007 and peaked in summer 2008. Since then they have declined. The rising price of animal feed, regardless of whether it was GM or not, has forced some UK pig producers out of production because of lack of profitability.

Some commentators are attempting to attribute part of the price rise on the slowness of the EU's GMO approval process, which is claimed can take 2.5 to 10 years to give a GMO commercial approval for import or cultivation in the EU (compared with 15 month in the USA^{xv}). In addition the EU policy of zero tolerance for unapproved GMOs is said to deter exporters from sending products to the EU for fear of rejection because the cultivation of varieties not approved is increasing and contamination events continue to occur.

However, despite the attempts to link increasing feed prices to EU GMO policies, there is little evidence to support it.

Monsanto's RR soya was the only GM soya available for commercial production up until 2007 season. It has full EU approval for import and sale for animal feed since 1996, and yet the price of Argentine soya meal (an important part of EU animals feed) rose 112% for the year until May 2008. GM maize varieties are more numerous, and there are 8 GM maize varieties approved for import into the EU. There are around 28 more awaiting approvals, which are mostly grown in the USA and cannot be legally imported into the EU. This has been the case for many years, and the perceived delays in approvals in the EU formed one strand of the complaint by the USA, Argentina and Canada to the WTO in 2003 when they claimed loss of exports totalling £1 billion^{xvi}.

It is clear that the restrictions on unapproved GMOs date back long before the current price increases, and this suggests that the EU regulatory process has had little if anything to do with the current feed price inflation. Other factors likely to be far more significant are:

- Diversion of feed crops to produce biofuels.
- Increasing fuel and agricultural input costs.
- Poor harvests in some grain belts due to drought, eg Australia.
- Speculators in the commodity markets putting profit before feeding people and animals.

Who Controls of the markets?

Trade in the main animal feed crops – soya, maize, wheat, oilseed rape and cotton seed – is controlled by a handful of global companies who in turn supply a larger number of feed manufacturers. The big four companies are Archer Daniels Midland (ADM), Bunge, Cargill and Louis Dreyfus. Many of these companies are vertically integrated along the whole food chain owning seeds companies as well as feed companies as well as food companies, for example Cargill^{xvii}. Large quantities of commodity crops are traded through the futures markets in Chicago where speculators gamble on small increases in prices per tonne in the hope of making huge profits when they are sold on. Recently the amount of money entering the food commodity markets has greatly increased as a result of the poor performance of the financial markets.

GM free sources

GM-free animal feed is available from countries like Brazil. However, to avoid GM contamination, these crops need to be certified as not containing detectable GM presence and consequently command a premium price. The price difference between GM soya and non-GM soya is currently around £15-20 per tonne. To maintain a reliable supply of non-GM feed ingredients it is vital that growers receive premium payments for their non-GM crops. This has not always been the case, as the premiums have been creamed off by companies further along the supply chain and never reach the farmers. Sainsbury's reason for not adopting a non-GM policy was, "*we found that moving to non-GM animal feed would significantly add to farmers' costs.*"^{xviii} This is typical of the comments received from other retail companies who have proved to be very reluctant to bear the relatively small costs of adopting a completely non-GM policy on animal feed. In 2007/08 the combined profits of the big four UK supermarkets (Tesco, Asda, Sainsbury's and Morrisons) were £3.985 billion.

What about contamination/labels?

Under EU regulation 1831/2003 all animal feed ingredients from GM crops have to be labelled if they exceed 0.9% of the total content of that ingredient. Below this level the GM content does not have to be labelled if the presence can be shown to be "adventitious or technically" avoidable. The meaning of "adventitious or technically unavoidable" has not yet been tested in a UK court, but it is widely believed this means wholly

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accidental and the companies must make every effort to avoid GM finding its way into their products.

Yet the products of animals fed on GM animal feed (ie milk, other dairy products, eggs, poultry, meat and fish) do not have to be labelled. Therefore, it is not possible for consumers to make an informed choice about avoiding products from GM-fed animals. The Soil Association have reported that unlabelled animal feed is frequently found to be contaminated with GM (20% of samples)^{xx}. Supermarkets need to be much more diligent about insisting that feed across all their animal products is non-GM and have labelling schemes to show which products are fed on non-GM feed. The majority of consumers (87%) want such labels to help them avoid GM in the food chain.

What about home grown animal feed?

Home grown feed is an alternative to GM feed in some circumstances. Barley, wheat, field beans and high quality grass and fodder can replace some soya and maize. However, most modern breeds of pigs, dairy cows and poultry have been bred to respond to the high protein feed provided by soya, in particular. Changes to breeds and farming methods will be needed to remove the reliance on soya altogether, but it can be reduced more quickly. Austria is currently working on a national policy towards eliminating reliance on soya.

Current Availability of non-GM feed products

There is sufficient non-GM maize and soya in the world to meet EU demands for non-GM animal feed. However, supplies will come at a premium if they are certified GM-free. Typically such premiums are around £20 per tonne (2008 prices). At these differentials non-GM fed meat and poultry would be less than 2p/kilo for pork more expensive, 4.5p/bird for a standard broiler and less than 0.5p/litre more expensive for milk from non-GM fed cows. This is considerably less than the inflation rate for food up until September/October 2008, which was 9.1% on the 12 months to end Sept and 7.5% to end October.

Can we rely on Government and the Food Standards Agency?

Serious questions have been asked about the thoroughness of the approvals systems for GM animal feed. In 2000-03, the long running Chardon LL GM maize hearing raised many concerns about the robustness of safety assessments. These included:

- significant changes in feed composition^{xx} (which had been ignored)
- poor quality experimental design of chicken feeding studies
- a failure to repeat them when higher normal death rates were observed^{xxi}
- Chardon LL would have been fed to dairy cows had it not been withdrawn by Bayer CropScience, and yet had not been tested in feeding studies of cows. The only feeding study results which were submitted in support of the application were for rats and chickens. In the case of the former the only the GM protein was fed and that did not come from Chardon LL but from oilseed rape genetically modified with the same gene.

Since the Chardon LL hearings no major changes have taken place in how GM feed is assessed by the Government, the Food Standards Agency (FSA) or the European Food Safety Agency all of whom continue to assume that GM proteins are equivalent to those of the parent materials. The case of a harmless bean proteins becoming allergenic when genetically engineered into peas demonstrates the dangers of such a policy^{xxii}. Gaps have been identified in the EU's system for testing allergens^{xxiii}.

Government track record on approving GM imports

Despite many concerns about the potential impacts of GM animal feed imports, the UK Government has consistently voted in favour of approvals for all GM maize imports for the last decade^{xxiv}. Other member states have decided to ban certain crops (for instance Monsanto Bt Maize Mon810 is currently banned in Greece, France, Austria, Luxemburg, Hungary, Romania and Poland).

FSA's approach to GMO food/feed

The FSA is the competent authority for food safety in the UK. It provides the secretariat for the Advisory Committee on Novel Foods and Processes, which advises ministers of food safety. Since its formation in 2000 the FSA has been supportive of GM crops and food and lobbied against the labelling of GM fed animal products and GMO derivatives, such as oil and lecithin, in food.

The FSA are supportive of the EFSA's position on whether transgenic materials can find their way into animals products destined for the human food chain:

There have been some concerns that functional transgenes from GM-derived feed material might be incorporated into livestock products for human consumption (milk, meat and eggs). However, in a

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statement published on 20 July 2007, EFSA advised that 'Biologically active genes and proteins are common constituents of food and feed in varying amounts. After ingestion, a rapid degradation into short DNA or peptide fragments is observed in the gastrointestinal tract of animals and humans. To date, a large number of experimental studies with livestock have shown that recombinant DNA fragments or proteins derived from GM plants have not been detected in tissues, fluids or edible products of farm animals like broilers, cattle, pigs or quails.'^{xxv}

What supermarkets should do

Supermarkets need to listen to the view of their customers who overwhelmingly want to know if their meat, dairy product and fish have been fed on GM feed. A GfK/NOP poll in 2006 revealed 87% of the public wanted labelling of animals products^{xxvi}.

Supermarkets need to proactively work towards replacing GM feed in their supply chains. To secure supplies in the immediate future they need to place orders with growers for non-GM soya and maize now. They need to ensure that premiums for non-GM crops reach the growers and do not get lost further down the chain. The scale of supermarket profits compared to the size of the retail increases in price should mean that most of the additional costs can be absorbed by the company and not passed to consumers. They need to commit to long term and secure agreement to make it worthwhile for farmers and seed companies to maintain non-GM seed lines and to work with farmers to look at alternatives to soya and maize in the longer term.

Supermarkets need to label their animals products honestly so it is clear if the animals and birds have been fed on GM feed or not. A positive label saying "fed on non-GM feed" is helpful for consumers wanting to make an informed choice and is entirely legal.

What Farmers Should Do

Farmers also need to listen to the public who are ultimately their customers and opt for non-GM feed whenever possible. They need to co-operate with supermarkets and feed suppliers to source non-GM feed. They should seriously consider growing more of their own feed or aiming for better quality forage.

What consumers can do

Consumers can influence supermarket policy by lobbying the stores where they shop to only stock animal products from animals and birds fed on a non-GM diet. They should also demand clear labelling so that is easy to see if products are GM or non-GM fed.

Some companies such as M&S, Sainsbury's, The Co-op and Waitrose have gone furthest to removing GM feed from their supply chain, so it is possible for consumers to buy elsewhere if their regular store does not respond positively to their demand. None of the major retail chains are 100% non-GM or GM free for animal feed. Consumers need to tell their usual supermarket that they are going elsewhere and why they are not satisfied.

Time Table for Action by the Supermarkets

Supermarkets should be aiming to phase out GM feed by January 2010 with their initial plans announced May 2009.

ⁱ www.food.gov.uk/gmfoods/gm/gmanimal

ⁱⁱ The Dutch Soy alliance, 2008 *Soy- Big Business, Big Responsibility*. The Dutch Soy Coalition.

ⁱⁱⁱ www.worldwatch.org/node/1665

^{iv} National Statistical Service 2007 Acreage <http://usda.mannlib.cornell.edu/usda/current/Acre/Acre-06-29-2007.pdf>

^v GM Freeze 2008, GM Crops Around the World – an accurate picture

^{vi} CASAFE & CIAFA, 16 August 2006. Se confirma la resistencia de un biotipo de Sorghum halepense a glifosato en Tartagal, Salta.

www.monsanto.com.ar/h/biblioteca/informes/AlepoResistComunicado2006.pdf

^{vii} <http://uk.reuters.com/article/environmentNews/idUKL1775647420080319>

^{viii} www.grdc.com.au/director/events/groundcover?item_id=E875E53EFF6AA51EA55177E7F527CCBA&article_id=E921F029DCE3624CB640331BDBAIBED1

^{ix} Mazza R., Soave M., Morlacchini M., Piva G. and Marocco A., 2005 "Assessing the transfer of genetically modified DNA from feed to animal tissues", *Transgenic Res.*, vol. 14, pp. 775–784.

^x Under EC Directive 2001/18 Article 4.2 "antibiotic resistance markers in GMOs which may have adverse effects on human health and the environment" should have been phased out in commercial crops by the end of 2004 and in experimental crops by the end of 2008. However, which antibiotic resistant makers cause "adverse effects" is a matter for political and scientific debate.

^{xi} Seralini FE, 2005, *Report on Mon 863 GM maize produced v=by Monsanto Cle., June 2005*. Available at www.criigen.org/index.php?option=com_content&task=view&id=107&Itemid=47

^{xiii} Hilbeck, A. and J.E.U. Schmidt. 2006. Another view on Bt-proteins - how specific are they and what else might they do? *Biopesticides International* 2: 1-50.

^{xiii} Burke M 2003, Managing GM crops with herbicides Effects on Farmland Wildlife, FSE Research Consortium and Scientific Steering Group.

^{xiv} Gordon B, 2007 Manganese Nutrition of Glyphosate Resistant and Conventional Soybeans. *Better Crops* Vol Number4 April 2007 pp12-13.

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- ^{xv} Ferrier H, 2008. *EU GM approvals and policy: impacts on livestock sectors*. Paper to NFU Council 15th April 2008.
- ^{xvi} Brown P 2004, US seeks £1billion from EU over GM ban Guardian 27th April 2004 www.guardian.co.uk/science/2004/apr/27/gm.wto
- ^{xvii} archive.corporatewatch.org.uk/publications/GEBriefings/controlfreaks/cargill1.html
- ^{xviii} personal communication from Sainsbury to a customer
- ^{xix} Soil Association 2007, *Silent Invasion the hidden use of GM animal feed in the UK*.
- ^{xx} www.foe.co.uk/resource/evidence/analysis_safety_chardon11.pdf
- ^{xxi} www.foe.co.uk/resource/evidence/analysis_chicken_study.pdf
- ^{xxii} www.tft.csiro.au/files/files/pi3u.pdf
- ^{xxiii} www.foe.co.uk/resource/briefings/gm_allergies.pdf
- ^{xxiv} The UK's voting record on GMO approvals in Europe has been positive except in the case of two oilseed rape applications, which they either abstained or voted against.
- ^{xxv} www.food.gov.uk/gmfoods/gm/gmanimal
- ^{xxvi} www.foe.co.uk/resource/press_releases/supermarkets_supporting_gm_06092006.html

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