

Labeling Genetically Engineered Foods The science and the facts

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Overview

- What is genetic engineering (GE)?
- IS GE FOOD SAFE?
- Where is GE used in Animal Agriculture?
- Does GE feed affect animal products?
- What do the data show regarding animal performance and food safety?
- What is being proposed for labeling?
 - Implication if products made with GE ingredients are labeled
 - Implications if products from animals eating GE feed are labeled





What is genetic engineering?

 The USDA's current definition of genetic engineering is "manipulation of an organism's genes by introducing, eliminating or rearranging specific genes using the methods of modern molecular biology, particularly those techniques referred to as <u>recombinant DNA (rDNA)</u> techniques."

• Also known as genetically modified, GMO, transgenic, bioengineered, biotech, made with modern biotechnology



Is GE food safe? YES 600+ published safety assessments



An estimated 2 trillion meals containing GM ingredients have been eaten around the world over the last 16 years without a single substantiated case of ill-health.

Some summary statements of leading science organizations include:

- "There is no scientific justification for special labeling of bioengineered foods. Bioengineered foods have been consumed for close to 20 years, and during that time, no overt consequences on human health have been reported and/or substantiated in the peer-reviewed literature." (American Medical Association)
- "No effects on human health have been shown as a result of the consumption of such foods by the general population in the countries where they have been approved." (World Health Organization)
- "No adverse health effects attributed to genetic engineering have been documented in the human population." (National Academy of Sciences)
- "No scientific evidence associating GMOs with higher risks for the environment or for food and feed safety than conventional plants and organisms." (European Commission)
- "The science is quite clear: crop improvement by the modern molecular techniques of biotechnology is safe." (American Association for the Advancement of Science)



Professional Scientific and/or Medical bodies with an opinion on safety of GMOs

As safe as conventional food

Unsafe or less safe

- ✓ The U.S. National Research Council (NRC)
- ✓ U.S. National Academy of Sciences (NAS)
- \checkmark The American Medical Association, (AMA)
- ✓ U.S. Department of Agriculture (USDA)
- ✓ U.S. Environmental Protection Agency (EPA)
- \checkmark U.S. Food and Drug Administration (FDA)
- ✓ European Food Safety authority (EFSA)
- ✓ American Society for Plant Biology (ASPB)
- ✓ Federation of Animal Science Societies (FASS)
- ✓ World Health Organization (WHO)
- ✓ Food and Agriculture Organization (FAO)
- ✓ Royal Society (London)
- ✓ Brazil National Academy of Science,
- ✓ Chinese National Academy of Science
- ✓ Indian National Academy of Science
- ✓ Mexican Academy of Science
- ✓ Third World Academy of Sciences



Where is GE used in Animal Agriculture?

GE products are used in animal feed, vaccines (chickens, pigs, horses, dogs, cats), pharmaceuticals, food processing aids, and food



GMO food & ingredients



Currently no GM animals in market



GE rennet, and other food processing aids





Global Area of Genetically Engineered DAIRY (GE) crops million hectares (1996-2013)



A record 17.3 million farmers, in 28 countries, planted 170.3 million hectares (420 million acres) in 2012, a sustained increase of 6% or 10.3 million hectares (25 million acres) over 2011. Source: Clive James, 2012 ISAAA Brief 44-2012 <u>http://www.isaaa.org</u>



Global livestock populations are DAIRY the major consumers of GE crops 2014

70-90% of harvested GE biomass is fed to food producing animals



Flachowsky G, Schafft H, Meyer U: 2012 Animal feeding studies for nutritional and safety assessments of feeds from genetically modified plants: a review. (Journal of Consumer Protection and Food Safety) :179–194.

There have been many independent DAIRY animal feeding studies using GE crops

Animal species/ category	Number of experiments	Nutritional assessment
Ruminants Dairy cattle Beef cattle Others Pigs	23 14 10 21	No unintended effects in composition (except lower mycotoxin concentration in Bt-plants)
Poultry Broilers Laying hens Other poultry Others (fish, rabbits etc.)	48 12 1 8	No significant differences in digestibility and poultry health as well as no biological relevant unintended effects on performances of animals and composition of food of poultry origin

Flachowsky G, Schafft H, Meyer U. 2012. Animal feeding studies for nutritional and safety assessments of feeds from genetically modified plants: a review. *Journal fur Verbraucherschutz und Lebensmittelsicherheit (Journal of Consumer Protection and Food Safety)* 7:179–194.



FASS maintains a list of the hundreds of animal feeding studies with GE crops; and transgenic DNA and protein in livestock products



Updated April 2012



Does GM feed affect animal products? NO



- No GE rDNA or the proteins encoded have ever been found to be present in the milk, meat, or eggs from animals that have eaten GE feed.
- It is not possible to distinguish any differences in the nutritional profile of animal products following consumption of GE feed
- Labeling of such animal products is not currently required in either US or Europe.



Safety of Meat, Milk, and Eggs from Animals Fed Crops Derived from Modern Biotechnology

Animal Agriculture's Future through Biotechnology, Part 5

Freely available publication from Council for Agricultural Science and Technology (http://www.cast-science.org/ http://www.cast-science.org/download.cfm?PublicationID=2910&File=1e30ecea828a9b1ea77c6773b63647251564TR



The majority of the more than <u>180 billion food animals raised in the US and EU</u> between 2000-2011 consumed varying levels of GE feed.

Animal ^a	U.S. ¹	EU-27 ⁶	Total	
Broiler	105,426,000,000	70,611,000,000	176,037,000,000	
Hogs	105,000,000	3,005,000,000	3,111,000,000	
Beef cattle	410,000,000	359,000,000	770,000,000	
Dairy Cows	35,000,000	101,000,000	136,000,000	
Total	105,976,000,000	74,076,000,000	180,052,000,000	

^a Numbers for broilers, hogs (barrows and gilts) and beef cattle (steers) are for slaughtered animals during calendar year. Dairy animals are number of dairy cows in a calendar year divided by three to account for 3 lactations per animal. *Data from USDA. 2013. The USDA Economics, Statistics and Market Information System (ESMIS). FAOSTAT. 2013. FAOSTAT Domains / Production / Livestock primary.*



What is being proposed for labeling? DAIRY POINT 20 Implication if animal products made with GE ingredients are labeled

Food containing ingredients derived from GE plants will have to be labeled unless....

EXEMPTIONS THAT WERE INCLUDED IN THE 2013 WA STATE LABELING INITIATIVE

- Animals fed GE feed or treated with GE drug (e.g. rBst)
- Any processed food made with GE processing aids
- Certified Organic food
- Until July 1, 2019, threshold of 0.9% (0.5% in CA Prop 37) of the total weight of the processed food; the tolerance after that time is unclear

http://sos.wa.gov/_assets/elections/initiatives/FinalText_285.pdf



In 2013 six states (MA, MO, NM, OR, TN, and WV) considered bills without the GMO feed consumption exemption (none progressed through their state legislatures); and some retailers plan to label animal products from GE-fed animals

Broiler and livestock production in U.S. during 2011 reported for organic and conventional production.

Туре	Number of organic farms	Organic ¹	Total ²	Organic as a % of Total
Broiler	153	19,654,307	8,683,067,000	0.2%
Beef cows	488	35,367	31,400,000	0.1%
Dairy cows	1,848	213,376	9,200,000	2.3%
Hogs	97	12,125	110,860,000	<0.1%

¹USDA. 2011 Certified Organic Production Survey.

http://usda01.library.cornell.edu/usda/current/OrganicProduction/OrganicProduction-10-04-2012.pdf

²USDA. 2011. The USDA Economics, Statistics and Market Information System (ESMIS).

http://usda.mannlib.cornell.edu/MannUsda/homepage.do.

Global Adoption Rates (%) for Principal GE Crops, (Million Acres, Million Hectares) 2012



53% of the global area (conventional and GE) of these crops are GE (50% in 2011)



Share of global crop trade accounted for by GE crops 2011/12 (million tonnes)



- $\checkmark~$ 90% of all **cotton** planted in U.S. was some form of GE in 2013
- ✓ 93% of all **soybeans** planted in U.S. was some form of GE in 2013
- $\checkmark~$ 90% of all **cotton** planted in U.S. was some form of GE in 2013
- ✓ 90% of all **alfalfa** seeds sold in US were GE in 2013



Non GE feedstuffs

- Wheat
- Sorghum
- Rice
- Oats
- Barley

	Soybeans	Corn	Cotton	Canola
Global production	238	883.5	27.0	61.6
Global trade (exports)	90.4	103.4	10.0	13.0
Share of global trade from GE producers	88.6	70.0	7.15	9.9
Share of global trade that may be GE	96.7%	67.7%	71.5%	76%

Brookes G, Barfoot P: 2013 *GM crops: global socio-economic and environmental impacts 1996–2011.* PG Economics Ltd: UK;. <u>www.pgeconomicscouk/pdf/2013globalimpactstudyfinalreportpdf</u>.



China and the EU are large importers of GE soybeans



Production Imports Exports Soybeans - 2013 Soybean Meal - 2013 100000 60000 90000 50000 80000 thousand tonnes 70000 thousand tonnes 40000 60000 50000 30000 40000 20000 30000 20000 10000 10000 0 0 China Indonesia Thailand Argentina Brazil EU US Argentina Brazil China EU Mexico US

Oilseeds world market and trade. September 2013 http://www.fas.usda.gov/oilseeds/Current



Why does the EU not label products from animals that have eaten GE feed?



- 80% of all livestock feed in the European Union (EU) is imported
- 98% of EU soybean meal is imported from Brazil, the USA, and Argentina; ~ 80% of this imported soybean meal animal feed is GE
- If the EU were not able to import soybean protein from outside the EU it would only be able to replace 10-20% of imports by high protein substitutes, resulting in a substantial reduction in animal protein production, exports and consumption, and a very significant increase in animal protein imports and cost in the EU*

* Directorate-General for Agriculture and Rural Development. 2007. Economic impact of unapproved GMOs on EU feed imports and livestock production. <u>http://ec.europa.eu/agriculture/envir/gmo/economic_impactGMOs_en.pdf</u>



Summary



- Science shows safety of GE feed and food
- No difference in milk, meat, or eggs from animals that have eaten GE feed and no way to detect it (i.e. no traceable "residue")
- Labeling of food containing ingredients derived from GE crops would not be trivial; but pales in comparison to tracking products from animals that have (or have not) eaten GE feed – how much, how often, how could this be tracked/traced/enforced?
- Costs will depend on how market responds ubiquitous GE labeling or reformulation with non-GE ingredients and/or feed
- Currently insufficient non-GE feed being grown globally to supply an expanded market demand for non-GE feed