Food Integrity: A Consumer Perspective

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Food: Perceptions, Practices and Policies
University of Wyoming
Laramie, WY
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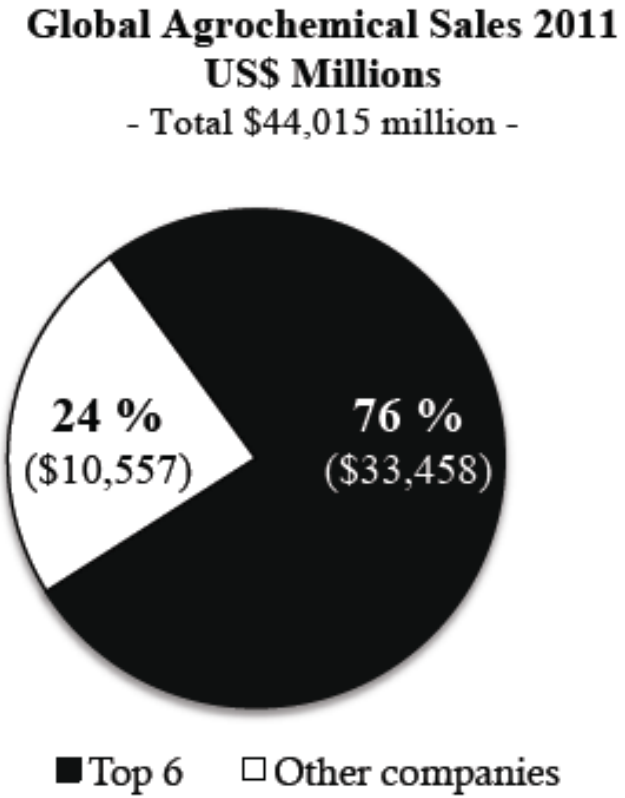
Outline

- A. Concentration in the food processing and agricultural input industries
- B. Plant agriculture—GE crops
  - Increase pesticide use?
  - Unanswered safety questions
- C. Animal agriculture—CAFOs
- D. Ecolabels

Concentration in farm inputs: pesticides



The Big Six:

Syngenta

Bayer

BASF

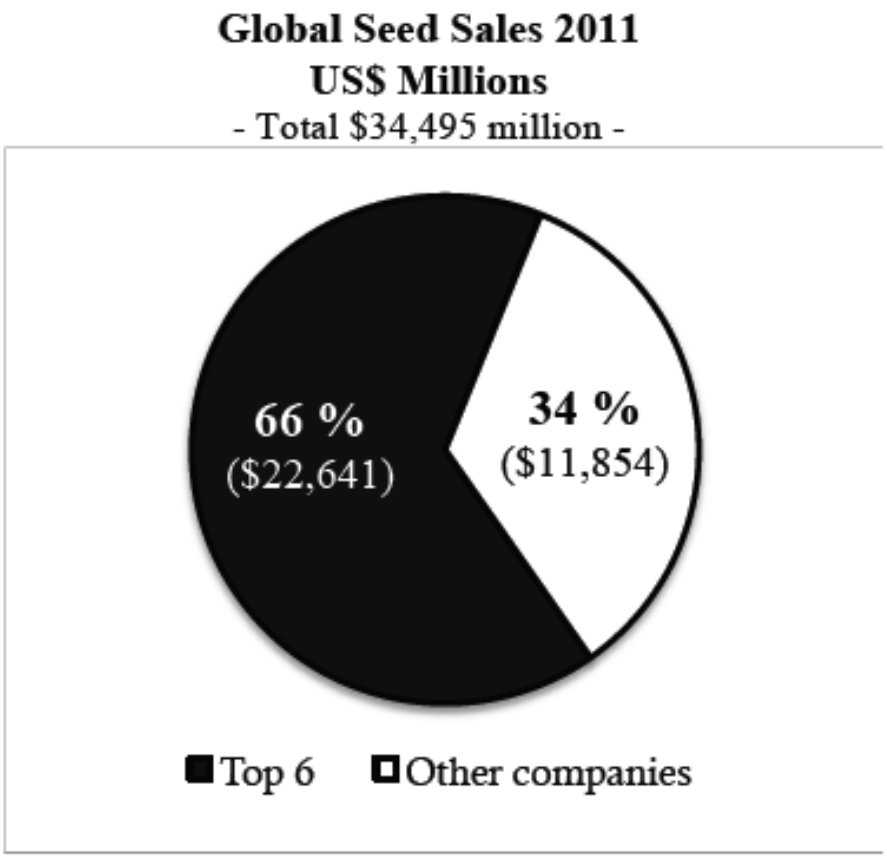
Monsanto

DuPont

Dow

Global share of top 3:
1996: 33%
2011: 52.5%

Concentration in farm inputs: seed



The Big Six:
Monsanto
DuPont
Syngenta
Bayer
BASF
Dow

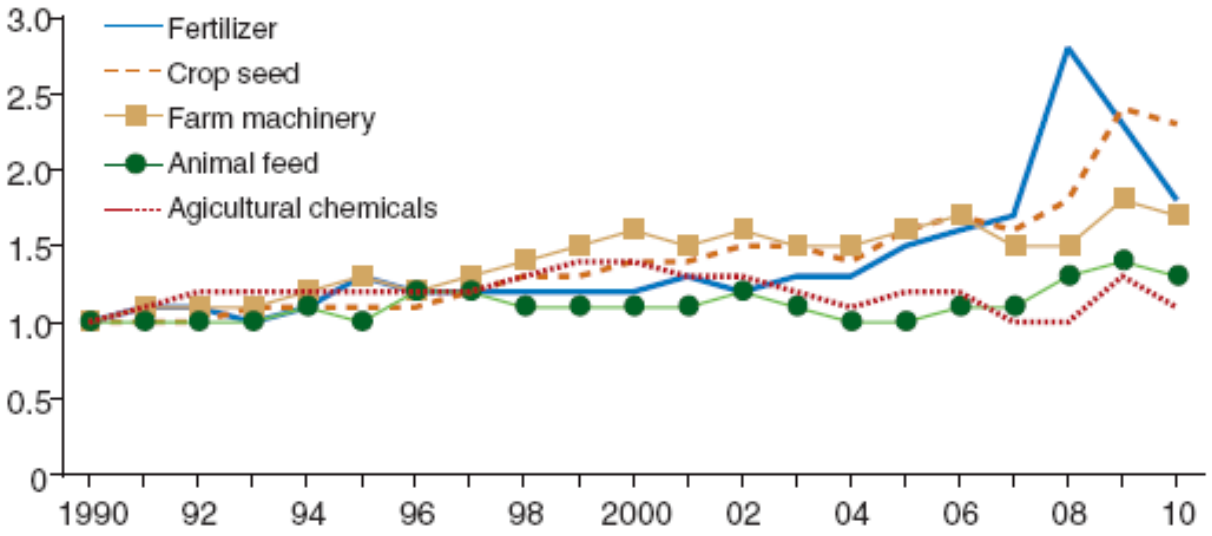
Global share of top 3:
1996: 22%
2011: 53.4%

Fuglie et al. 2011. Research Investments and Market Structure in the Food Processing, Agricultural Input, and Biofuel Industries Worldwide. USDA/Economic Research Service 130. 137pp.
http://www.ers.usda.gov/media/199879/err130_1_.pdf

Figure 1.3

U.S. agricultural input prices relative to prices received by farmers

Index, 1990=1.00



Source: USDA, Economic Research Service. Indexes of prices paid and received by farmers from USDA (various issues).

Seed price more than doubles relative to other prices. USDA: "This increase, was due, at least in part, to the increase in value-added characteristics developed by private seed and biotechnology companies. Le Buanec (2008) estimates that between 32 and 74 percent of the price of seed for corn, soybeans, cotton, and sugar beets in the United States and the European Union (EU) reflects technology fees or the cost of seed treatments." (USDA, 2010: pg. 13)

Fuglie et al. 2011. Research Investments and Market Structure in the Food Processing, Agricultural Input, and Biofuel Industries Worldwide. USDA/Economic Research Service 130. 137pp.
http://www.ers.usda.gov/media/199879/err130_1_.pdf

Table 1.7
Market concentration and research and development (R&D) intensity in global agricultural input industries

Year	Herfindahl index	4-firm concentration ratio	8-firm concentration ratio	Industry R&D intensity
		Share of market (%)		*R&D/sales (%)*
Crop protection chemicals				
1994	398	28.5	50.1	7.0
2000	645	41.0	62.6	6.8
2009	937	53.0	74.8	6.4
Crop seed and traits				
1994	171	21.1	29.0	11.0
2000	349	32.5	43.1	15.0
2009	991	53.9	63.4	10.5
Animal health				
1994	510	32.4	57.4	8.6
2000	657	41.8	67.4	8.5
2009	827	50.6	72.0	8.6
Farm machinery				
1994	264	28.1	40.9	1.9
2000	353	32.8	44.7	2.3
2009	791	50.1	61.4	2.7
Animal genetics				
1994	n.a.	n.a.	n.a.	n.a.
2000	n.a.	n.a.	n.a.	n.a.
2006/07	1,025	55.9	72.8	7.3

n.a. = not available.
Source: USDA, Economic Research Service estimates based on firm-level sales and R&D expenditure data collected for this study. See specific chapters for details.

Fuglie et al. 2011. Research Investments and Market Structure in the Food Processing, Agricultural Input, and Biofuel Industries Worldwide. USDA/Economic Research Service 130. 137pp.
http://www.ers.usda.gov/media/199879/err130_1_.pdf

Table 1.8
Factors driving changes in market structure in global agricultural input industries

Sector	Factors driving consolidation and concentration	Change in real R&D spending between 1994 and 2010[1]
		Percent
Crop seed & biotechnology	Acquisition of complementary technology and marketing assets, economics of scale in crop biotechnology R&D	138
Farm machinery	Financial losses of major manufacturers during farm sector business cycles (which strongly influence demand for large capital purchases)	88
Animal breeding & genetics	Vertical integration of poultry and livestock industries; economics of scale in animal biotechnology R&D	25
Animal health (food animals only)	Forces driving consolidation in the pharmaceutical industry: loss of profit streams and idled capacity when major drugs go off-patent	2
Crop protection chemicals	Stricter environmental and safety regulations; maturing markets; rise of generic products	-2

[1]We have data on research and development (R&D) spending by the animal breeding and genetics industry for 1996 and 2006/07 only. The estimate of 25 percent growth between 1994 and 2010 is derived by applying the 1996-2006 average annual growth rate to these years. Changes in real R&D spending calculated from the data in table 1.1.

Source: USDA, Economic Research Service. See chapters for discussion of specific industries.

Intellectual Property--plants

- 1930 Plant Patent Act—applies to asexually reproduced plants, excluding tuber propagated plants
- 1970 –Plant Variety Protection Act (PVPA)—allows plant variety certificates sexually reproduced plants and tubers. 20 years of protection or 25 years for tree or vine
  - Exemptions:
  - Farmer
  - Researcher
  - USDA (safeguards “public interest in wide usage)
- 1995 Asgrow Seed Co. v. Winterboer forbids farmer selling seed; won at District Court, lost at Court of Appeals
- 1994 PVPA amendments remove farmer sale of protected seeds

Key dates in patenting of life forms—which drives industry buying of seed companies

- 1980 Diamond v. Chakrabarty decision—allows utility patents on microorganisms
- 1985 Ex parte Hibberd—extends utility patents to sexually reproducing plants
- 1987 Harvard Oncomouse—extends utility patents to mammals
- 1995 Marrakech Agreement, General Agreement on Tariffs and Trade (GATT) replaced by World Trade Organization (WTO)
- 2001 J.E.M Ag Supply v. Pioneer Hi-Bred International—upholds utility patents on plants since Congress didn't explicitly forbid this

Plant agriculture

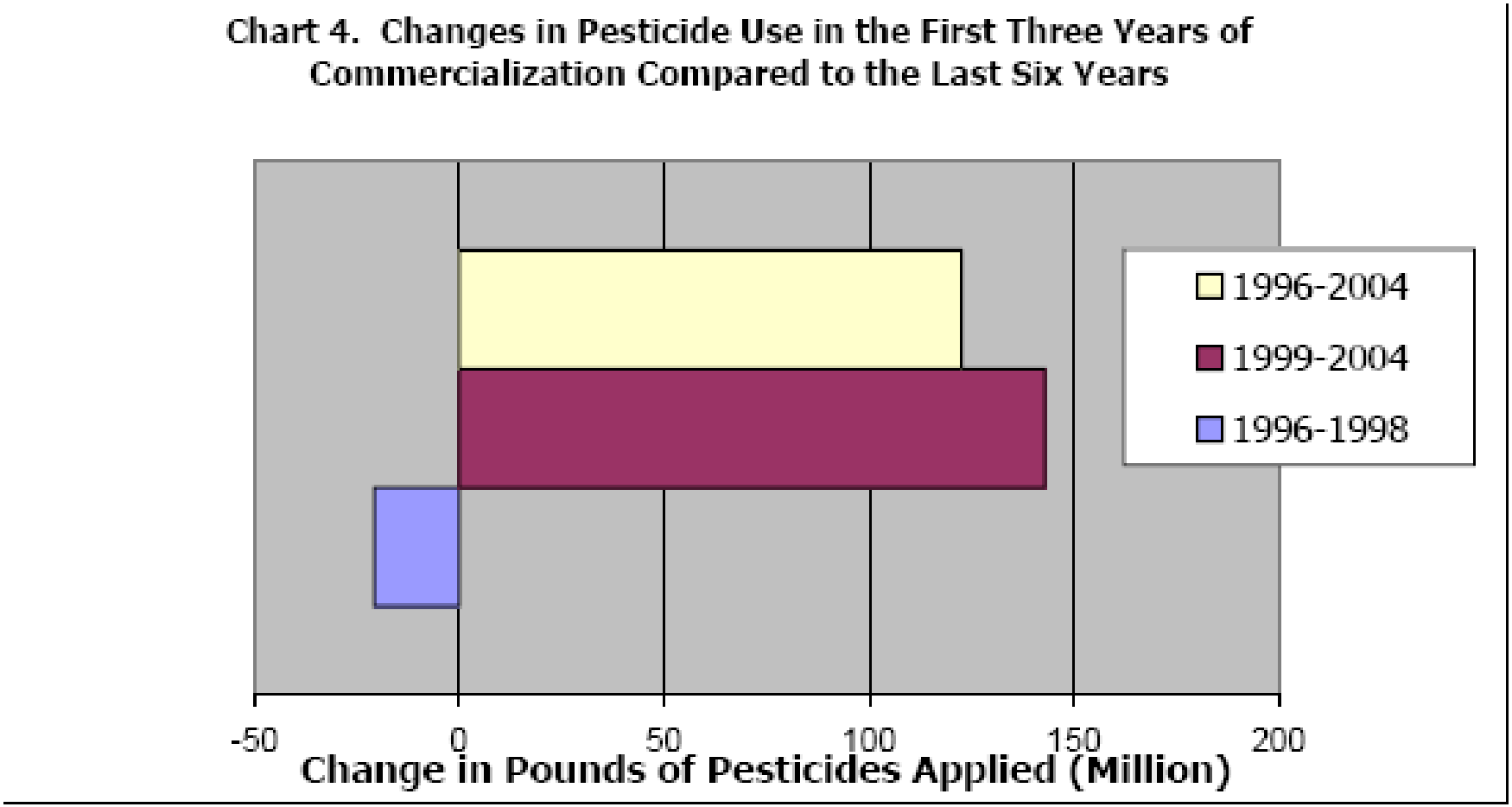
- Concentration in agricultural inputs, especially seeds and agricultural chemicals leads toward a chemically-intensive agriculture, characterized by monocultures, usually genetically uniform, of plants that are often genetically engineered.
- Since most GE plants in US are HR, this has resulted in epidemic of glyphosate-resistant weeds and explosion in herbicide, especially glyphosate, use.
- Little attention being paid to agroecological approaches to pest control

Major GM crops on the market in US, 2014

- Main traits—herbicide resistance (HR), insect resistance (Bt), virus tolerant; HR + Bt (>99.9%)
- Main crops engineered:
- Soybean (HR)—94%
- Sugarbeets (HR)—99%
- Corn (Bt and HR)—93% (89% HR)
- Canola (HR)—93%
- Cotton (Bt and HR)—96% (79% HR)
- Papaya (virus tolerant)—80% (Hawai'i)
- Squash/zuchinni (virus tolerant)—13% (2005)

Benbrook, C. 2004. Genetically engineered crops and pesticide use in the United States: The first nine years.

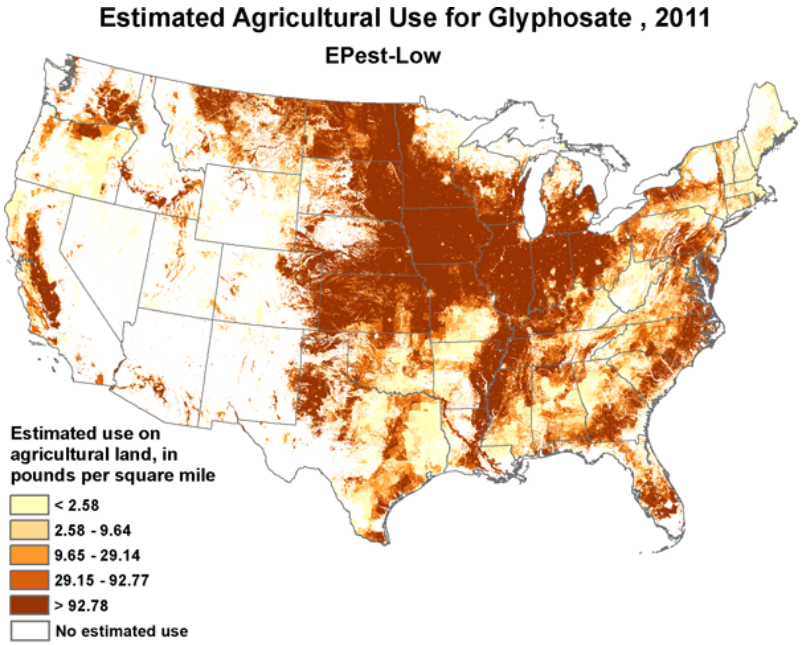
At: http://www.biotech-info.net/Full_version_first_nine.pdf

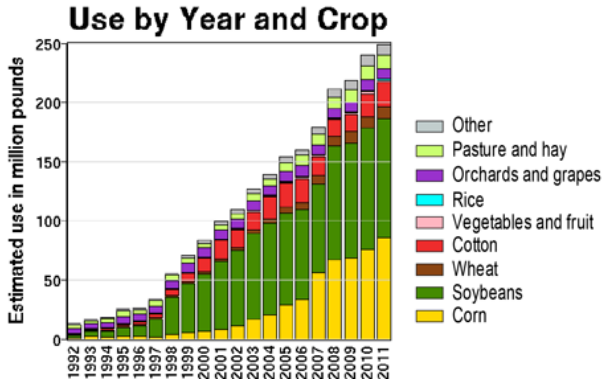


Benbrook, C. 2012. Impacts of genetically engineered crops in pesticide use in the U.S.—the first sixteen years. *Environmental Sciences Europe* www.enveurope.com/content/24/1/24

- Update on Benbrook's 2004 paper: By 2011, *Bt* corn and cotton has reduced insecticide use by 123 million pounds, but herbicide resistant crops have increased herbicide use by 527 million pounds, for an overall 404 million pounds increase over the 16 years.

http://water.usgs.gov/nawqa/pnsp/usage/maps/show_map.php?year=2011&map=GLYPHOSATE&hilo=L

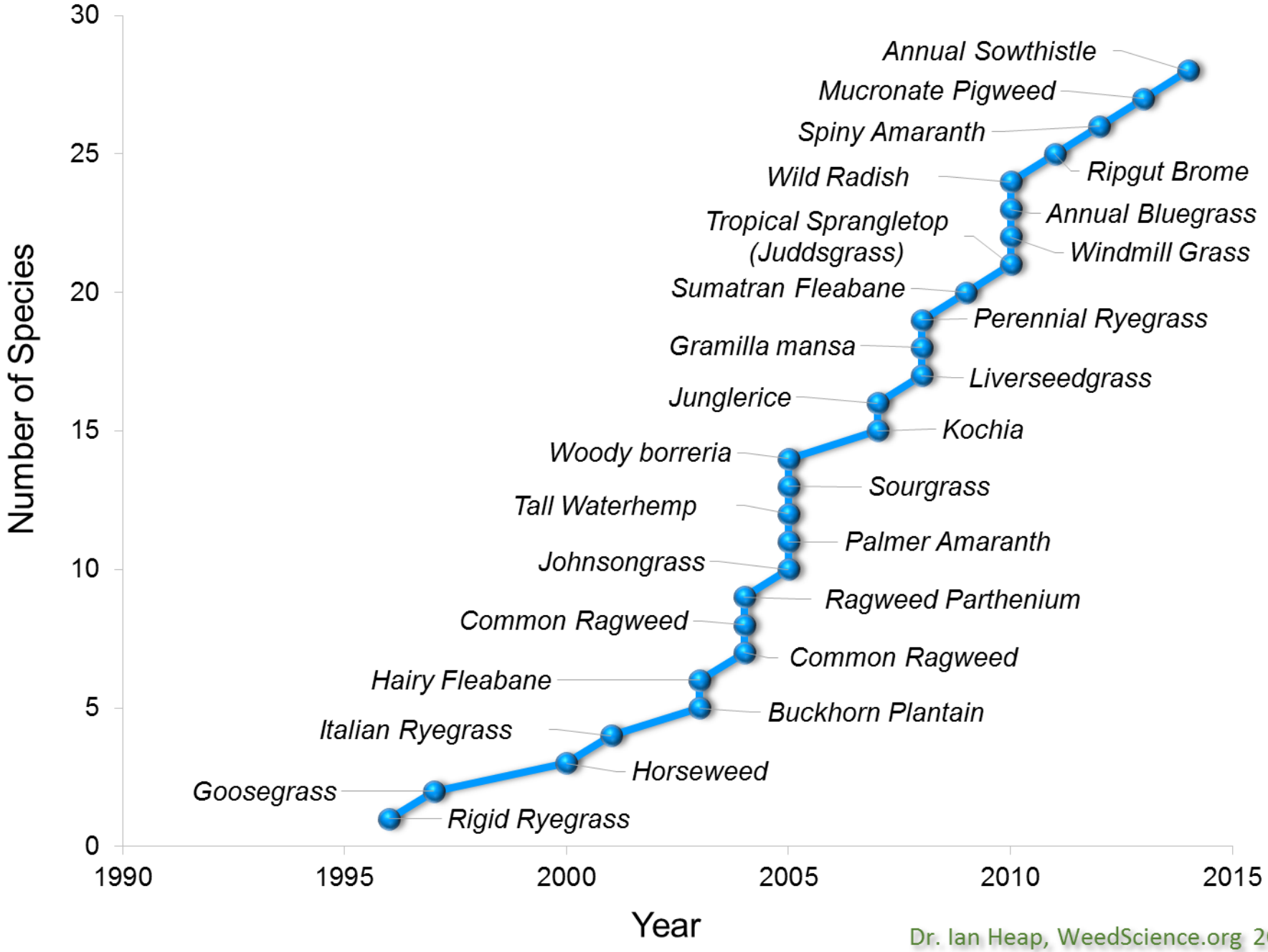




Glyphosate resistant (GR) weeds

- Globally, 27 species of GR weeds. In US 14 GR weeds in 73 locations Herbicide Resistance Action Committee. 2011. Glycines (G/9) resistant weeds by species and country. www.weedscience.org/Summary/UspeciesMOA.asp?lstMOAID=12&FmHRACGroup=Go
- Survey of thousands of US farmers in 31 states on GR weeds starting 2010 (http://stratusresearch.com/blog/glyphosate-resistant-weeds-intensifying)
- January, 2013: 61.2 million acres, almost doubling since 2010
- Farms with GR weeds: 34% in 2011; 49% 2012
- Problem the worst in southern states: GA 92%

Increase in Glyphosate-Resistant Weeds Worldwide

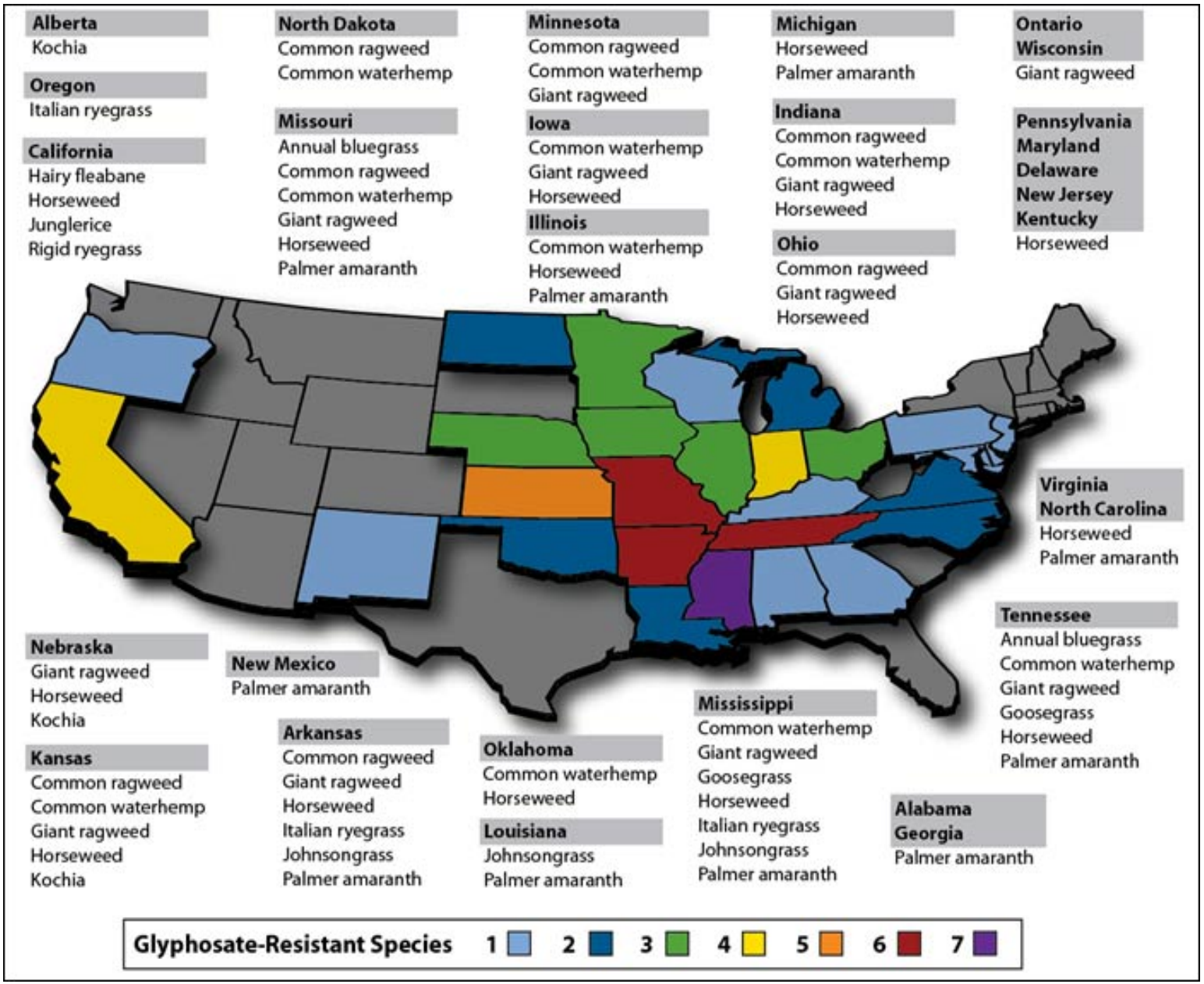


Dr. Ian Heap, WeedScience.org 2014

Glyphosate resistant (GR) weeds

GR Palmer pigweed (*Amaranthus palmeri*) first appeared in 2004 and now problem in maize, cotton and soya.

Georgia, 500,000 acres cotton were weeded by hand; weed control crops increased from $25 to $60-$100/acre. Haire, B. (2010). “Pigweed threatens Georgia cotton industry,” Southeast Farm Press, July 6, 2010. At: http://southeastfarmpress.com/cotton/pigweed-threatens-georgia-cotton-industry-0706/



https://www.pioneer.com/home/site/us/agronomy/library/template.CONTENT/guid.8C8F040A-9804-97F3-C650-1EA99776A1B3

Glyphosate resistant (GR) weeds

- Farmers response: spray more glyphosate and turn to supposedly more toxic herbicides.
- 2005-2006: 2,4-D applications in soya go from 1.73 million pounds to 3.67 million pounds. (Benbrook, 2009)
- GE industry responds by developing crops with resistance to multiple herbicides—gene stacking
- Pending applications for GE crops in US: 13 applications just last month, 9 of which are for HT (herbicide tolerant) plants, including Monsanto's soy MON 88708-9, resistance to dicamba; Dow's soya DAS-68416-4, resistance to glyphosate, glufosinate, and 2,4-D; Bayer's FG72 soy, resistant to glyphosate and isoxaflutole;
- Dow corn DAS-40278-9, with resistance to 2,4-D, MCPA, mecoprop, and quizalofop

(http://www.aphis.usda.gov/biotechnology/not_reg.htm)l

Domingo JL and JG Bordonaba. 2011. A literature review on the safety assessment of genetically modified plants. *Environment International* 37: 734-742. http://maurin.bnk.free.fr/Domingo%20et%20al.,%202011.pdf

The main goal of the present review was to assess the current state-of-the-art regarding the potential adverse effects/safety assessment of GM plants for human consumption. The number of citations found in databases (PubMed and Scopus) has dramatically increased since 2006.

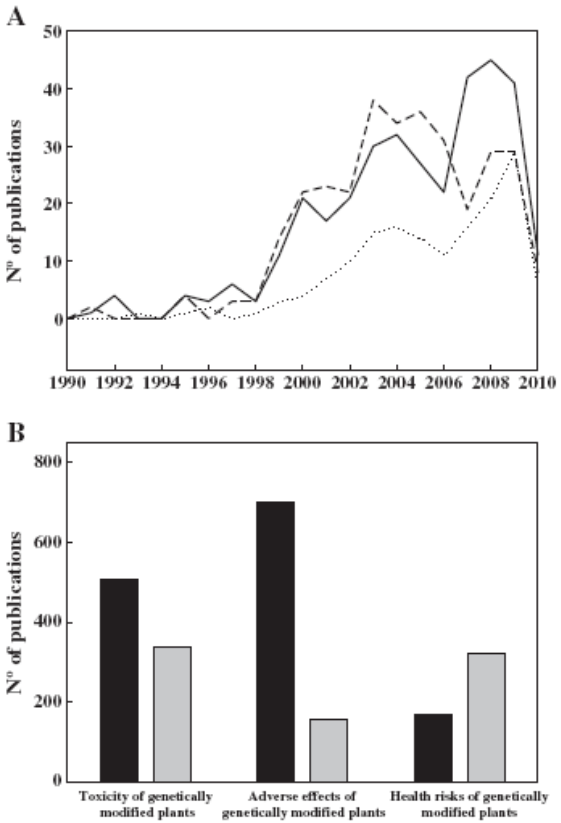


Fig. 1. (A) Number of publications per year, from 1990 to present, referring to (—) toxicity of genetically modified plants, (···) adverse effects of genetically modified plants and (- -) health risks of genetically modified plants, using the Scopus database. (B) Comparison between total number of publications using different keywords with Scopus (▒) and PubMed (■) databases.

Domingo JL and JG Bordonaba. 2011. A literature review on the safety assessment of genetically modified plants. *Environment International* 37: 734-742. http://maurin.bnk.free.fr/Domingo%20et%20al.,%202011.pdf

- "a certain equilibrium in the number of research groups suggesting, on the basis of their studies, that a number of varieties of GM products (mainly maize and soybeans) are as safe and nutritious as the respective conventional non-GM plant, and those raising still serious concerns, was observed. Moreover, **it is worth mentioning that most of the studies demonstrating that GM foods are as nutritional and safe as those obtained by conventional breeding, have been performed by biotechnology companies or associates**" **bold** added. Pg. 734.

Diels J,Cunha M, Manaia C, Sabugosa-Madeira B and M Silva. 2011. Association of financial or professional conflict of interest to research outcomes on health risks or nutritional assessment studies of genetically modified products. *Food Policy*, 36(2): 197-203. http://www.sciencedirect.com/science/article/pii/S0306919210001302

- Used objective criteria to select articles
- Two independent co-investigators classified the conclusions of each article as generally ‘‘favorable’’, ‘‘unfavorable’’ or ‘‘neutral’’.
- A third independent co-investigator classified for each article sponsorship, author affiliation and COI.
- None of the coinvestigators had any prior knowledge of the classification produced by their peers and had access only to the article sections relevant to their task.
- Finally, the relationship between conclusion type and sponsors was tested through the application of appropriate statistical methods.

Diels J,Cunha M, Manaia C, Sabugosa-Madeira B and M Silva. 2011. Association of financial or professional conflict of interest to research outcomes on health risks or nutritional assessment studies of genetically modified products. *Food Policy*, 36(2): 197-203. http://www.sciencedirect.com/science/article/pii/S0306919210001302

Professional COI significantly related to article conclusion; 0% of articles with professional COI have unfavorable conclusion (0 of 41), compared to 23% of articles without professional COI (12 of 51).

Table 2
Relation between article conclusion and conflict of interest. Exact *p* is the statistical significance of the Fischer Exact Test. In the analysis of COI, only those articles were included where certainty could be obtained that a COI was either present or absent.

Conflict of interest (COI)	Conclusion		Exact *p*
	Favorable	Unfavorable	
Financial COI			
Yes	5	1	0.631
No	29	8	
Professional COI			
Yes	41	0	<0.001
No	39	12	
COI (financial and/or professional)			
Yes	43	1	0.005
No	27	8	
Declaration of funding			
Declared	34	9	0.036
Undeclared	46	3	

Table 3
Relation between author affiliation and article declaration of funding or funding source. Exact *p* is the statistical significance of the Fischer Exact Test.

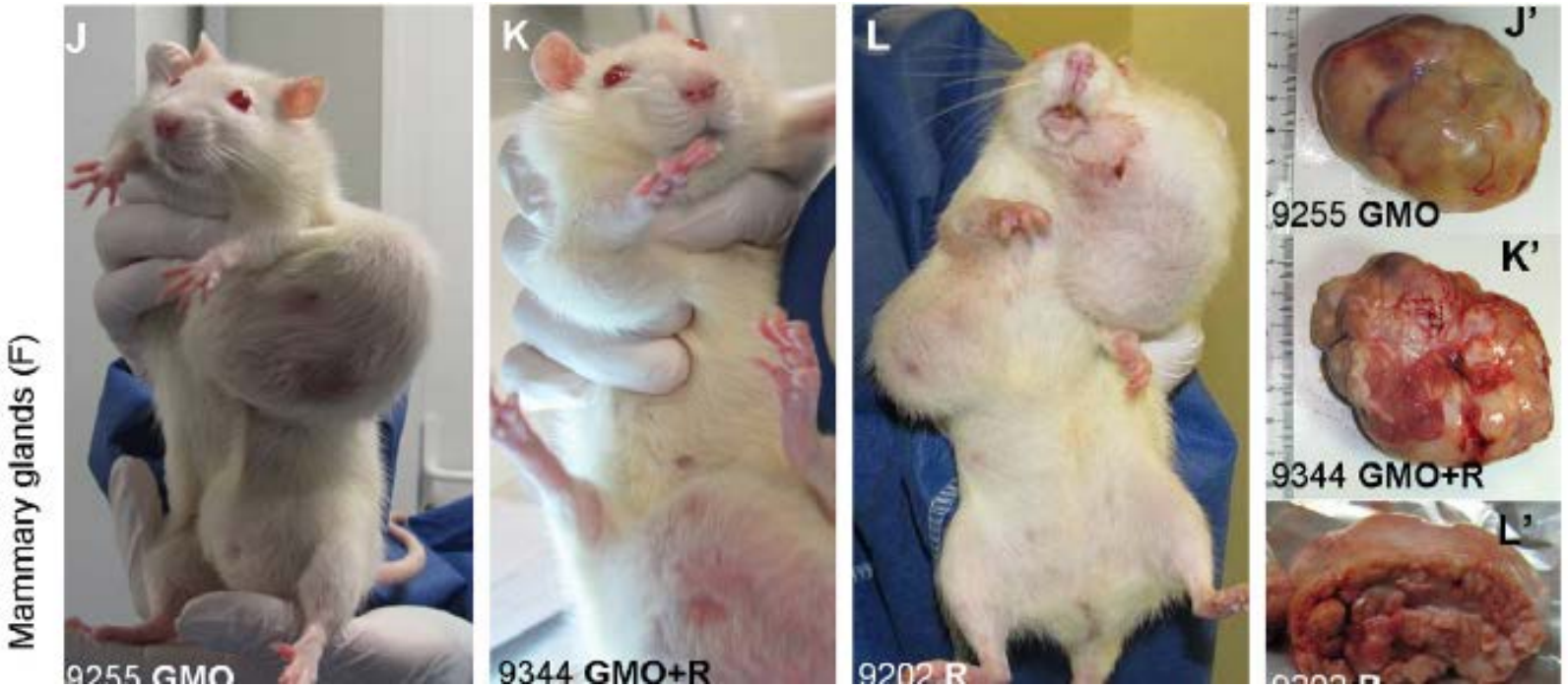
Article funding	At least one another of industry		Exact *p*
	Yes	No	
Declaration of funding			
Declared	7	36	<0.001
undeclared	36	13	
Funding source			
All industry	5	2	<0.001
No industry	2	34	

"combined analysis of COIs through professional affiliations or direct research funding are likely to influence the final outcome of such studies in the commercial interest of the involved industry. Our results partially confirm those observed in biomedical sciences, tobacco, alcohol and nutrition research."

Séralini et al. 2012. Long term toxicity of a Roundup herbicide and a Roundup-tolerant genetically modified maize. *Food and Chemical Toxicology*, 50: 4221-4231.
http://www.sciencedirect.com/science/article/pii/S0278691512005637

- First long-term (2 years) feeding study of a commercialized GE food; involved rats fed Roundup-resistant corn (NK 603) at three levels (11%, 22%, 33%), cultivated with and without Roundup
- Results: Females: died 2-3 times more quickly, and developed mammary tumors more often than controls. Males have liver and kidney problems at higher rate than controls, and more large tumors.

Séralini et al. 2012. Long term toxicity of a Roundup herbicide and a Roundup-tolerant genetically modified maize.
Food and Chemical Toxicology, 50: 4221-4231.
http://www.sciencedirect.com/science/article/pii/S0278691512005637



Séralini et al. 2012. Long term toxicity of a Roundup herbicide and a Roundup-tolerant genetically modified maize. *Food and Chemical Toxicology*, 50: 4221-4231.

http://www.sciencedirect.com/science/article/pii/S0278691512005637

- Main criticisms of study:
- 1. sample size too small for a cancer study; only 10 rats/group
- 2. Used a strain of rat (Sprague Dawley [SD]) that is prone to tumors, especially mammary tumors

Séralini et al. 2012. Long term toxicity of a Roundup herbicide and a Roundup-tolerant genetically modified maize. *Food and Chemical Toxicology*, 50: 4221-4231.
http://www.sciencedirect.com/science/article/pii/S0278691512005637

Table 1
Protocol used and comparison to existing assessment, and to non-mandatory regulatory tests.

Treatments and analyses	In this work	Hammond et al., 2004	Regulatory tests
Treatments + controls	GMO NK603, GMO NK603 + Roundup, Roundup, and closest isogenic maize	GMO NK603 + Roundup, closest isogenic maize, and six other maize lines non substantially equivalent	GMOs or chemicals (in standard diet or water)
Doses by treatment	3	2	At least 3
Duration in months	24 (chronic)	3 (subchronic: 13 weeks)	3
Animals measured/group/sex	10/10 SD rats (200 rats measured)	10/20 SD rats (200 rats measured/total 400)	At least 10 rodents
Animals by cage (same sex)	1–2	1	1 or more
Monitoring/week	2	1	1 or more
Feed and water consumptions	Measured	For feed only	At least feed
Organs and tissues studied			For high dose and controls
Histology/animal	34	17/36	At least 30
Organs weighted	10	7	At least 8
Electronic microscopy	Yes	No	No
Behavioral studies (times)	2	1 (no protocol given)	1
Ophtalmology (times)	2	0	2
Number of blood samples/ animal	11, each month (0–3) then every 3 months	2, weeks 4 and 13	1, at the end
Blood parameters	31 (11 times for most)	31 (2 times)	At least 25 (at least 2 times)
Plasma sex steroids	Testosterone, estradiol	No	No, except if endocrine effects suspected
Liver tissue parameters	6	0	0
Number of urine samples	11	2	Optional, last week
Urine parameters studied	16	18	7 if performed
Microbiology in feces or urine	Yes	Yes	No
Roundup residues in tissues	Studied	Not studied	Not mandatory
Transgene in tissues	Studied	Not studied	Not studied

The protocol used in this work was compared to the regulatory assessment of NK603 maize by the company (Hammond et al., 2004), and to non mandatory regulatory *in vivo* tests for GMOs, or mandatory for chemicals (OECD 408). Most relevant results are shown in this paper.

Number of rats tested for biochemical parameters: 10 for both studies; SD rats used in both studies

Reaction of ANSES (French Agency for food, environmental and occupational health and safety) to Seralini et al. study

http://www.anses.fr/Documents/PRES2012CPA20EN.pdf

- "The expert assessment carried out by the Agency concludes that the results of this research do not cast doubt on the previous assessments of genetically-modified NK603 maize and Roundup."

- "ANSES draws attention, however, to the originality of this study, namely its focus on a subject rarely investigated to date: the long-term effects of GMOs in association with plant protection products."

Reaction of ANSES (French Agency for food, environmental and occupational health and safety) to Seralini et al. study

http://www.anses.fr/Documents/PRES2012CPA20EN.pdf

- "ANSES recommends initiating studies and research on the long-term effects of GMOs in combination with plant protection products"

- "ANSES calls for public funding on the national and European level to enable large-scale studies and research for consolidating knowledge of insufficiently documented health risks"

Commission and EFSA agree need for two-year GMO feeding studies EU Food Policy, 17 December 2012

http://www.eufoodpolicy.com/cgi-bin/view_article.pl?id=5590

- "The European Commission is trying to fund two-year GMO feeding studies on rodents, Ladislav Miko, deputy director general of DG SANCO (food) said last week."

- "EFSA's executive director, Catherine Geslain-Laneelle, pointed out that the study would be on MON810, not NK603 - the GM maize used by Prof Seralini."

- "But at the EFSA board meeting on Thursday last week there was agreement that long-term studies were needed and it was now just a question of how to fund them."

European Commission funds 2-year carcinogenicity study of NK603

http://ec.europa.eu/research/participants/portal/page/call_FP7?callIdentifier=FP7-KBBE-2013-FEEDTRIALS&specificProgram=COOPERATION#wlp_call_FP7

Call title: FEED TRIALS KBBE 2013

- **Call identifier**: FP7-KBBE-2013-FEEDTRIALS
- **Date of publication**: 29 June 2013
- **Deadline**[1]: 1st October 2013 at 17.00.00, Brussels local time
- **Indicative budget**[2]: EUR 3 million

  The budget for this call is indicative. The final budget awarded to actions implemented through calls for proposals may vary:

  - The final budget of the call may vary by up to 10% of the total value of the indicated budget for each call

Indicative budget breakdown:

Activity	**Indicative amount**[3] **(EUR million)**
Activity 2.3: Life sciences, biotechnology and biochemistry for sustainable non-food products and processes Activity 2.1	3

- **Topics called**:

Activity/ Area	**Topics called**	**Funding Schemes and additional eligibility criteria**
Activity 2.3: Life sciences, biotechnology and biochemistry for sustainable non-food products and processes Activity 2.1		
Area 2.3.5 Environmental biotechnology	*KBBE.2013.3.5-03: Two-year carcinogenicity rat feeding study with maize NK603* *One project may be funded*	*- Collaborative Project (small or medium-scale focused research project)* *- The requested European Union (EU) contribution shall not exceed EUR 3 000 000 per proposal.* *- The duration of the proposed project shall be maximum 4 years.*

Séralini et al. 2012. Long term toxicity of a Roundup herbicide and a Roundup-tolerant genetically modified maize. *Food and Chemical Toxicology*, 50: 4221-4231.
http://www.sciencedirect.com/science/article/pii/S0278691512005637

- November 2013: FCT retracts Séralini et al. study: "Ultimately, the results presented (while not incorrect) are inconclusive, and therefore do not reach the threshold of publication for Food and Chemical Toxicology"

- COPE (Committee on Publication Ethics) guidelines for retracting articles: scientific misconduct/honest error, prior publication, plagiarism, or unethical research

- None of 4 COPE criteria apply to Séralini et al. paper

Séralini et al. 2012. Long term toxicity of a Roundup herbicide and a Roundup-tolerant genetically modified maize. *Food and Chemical Toxicology*, 50: 4221-4231.
http://www.sciencedirect.com/science/article/pii/S0278691512005637

- Journal retraction of Séralini GMO study is invalid and an attack on scientific integrity. Statement signed by 146 scientists and lawyers, at endsciencecensorship.org

- "We feel the decision to retract a published scientific work by an editor, against the desires of the authors, because it is "inconclusive" based on a *post hoc* analysis represents a dangerous erosion of the underpinnings of the peer-review process, and Elsevier should carefully reconsider this decision" Portier CJ, Goldman LR and BD Goldstein. 2014. Inconclusive findings: Now you see them, now you don't! *Environmental Health Perspectives*, 122(2): A36.

Animal Agriculture

- Increasing concentration in animal health and animal breeding and genetics leads toward larger size animal production facilities, aka CAFOs (confined animal feeding operations)
- EPA: large CAFO = > 1,000 or more large animals, e.g. beef cows, or 700 dairy cows, tens of thousands of smaller animals, e.g. turkeys (55,000), or chickens (30,000 to 125,000 depending on type—layer vs broiler—and manure handling)

Gurian-Sherman, D. 2008. CAFOs Uncovered. Union of Concerned Scientists.

http://www.ucsusa.org/assets/documents/food_and_agriculture/cafos-uncovered.pdf

Table 2. **Number of Animals by Operation Size,* 1982–1997**

Farm Size Category	1982	1987	1992	1997	Percent Change 1982 to 1997
Less Than 25 Total AU	7,311,927	6,406,057	5,727,476	5,407,009	-26
25 to <50 Total AU	9,465,723	8,379,402	7,797,699	7,277,610	-23
50 to <150 Total	29,009,019	25,722,744	23,961,311	21,460,328	-26
150 to <300 Total AU	17,142,530	16,352,605	16,483,027	15,967,020	-7
300 to <1,000 Total AU	16,912,228	17,061,674	18,603,343	20,271,518	+20
1,000 or More Total AU	15,779,144	17,285,205	19,364,252	24,925,729	+58
All Operations	95,620,570	91,207,687	91,937,108	95,309,215	0

*Operation size is measured in animal units (AU); numbers include both confined and unconfined animal operations.
SOURCE: Kellogg et al. 2000.

Number of animals in large CAFOs outnumber animals in any other size operation by 1997

Gurian-Sherman, D. 2008. CAFOs Uncovered. Union of Concerned Scientists.

http://www.ucsusa.org/assets/documents/food_and_agriculture/cafos-uncovered.pdf

Table 3. **Percent of Livestock Production under Contract by Sector**

Commodity	1991–1993	1994–1995	1996–1997	1998–2000	2001
Livestock	32.8	42.9	44.8	48.0	46.8
Cattle	na	19.0	17.0	24.3	20.9
Hogs	na	31.1	34.2	55.1	60.6
Poultry and Eggs	88.7	84.6	84.0	88.8	88.1
Dairy	36.8	56.7	58.2	53.6	53.1
Other Livestock	0.2	9.3	4.9	10.9	9.3

na=not available
Data drawn from USDA Farm Costs and Returns Survey (1991–1995); USDA Agricultural Resource Management Survey (1996–2001)
SOURCE: MacDonald et al. 2004.

Hogs and poultry increasingly under contract with large integrators

Gurian-Sherman, D. 2008. CAFOs Uncovered. Union of Concerned Scientists.

http://www.ucsusa.org/assets/documents/food_and_agriculture/cafos-uncovered.pdf

Table 4. **Percent of Animals Slaughtered in Large Plants**

Report Year	Slaughter Classes and Size Cutoff*				
	All Cattle (<500,000)	Steers/Heifers (<500,000)	(>1 million)	Cows/Bulls (<150,000)	Hogs (>1 million)
1977	12	16	nr	10	38
1982	28	36	nr	15	59
1987	51	63	31	20	72
1992	61	76	34	38	86
1997	65	80	63	57	88

*Size cutoff (in parentheses) refers to the number of animals slaughtered annually.
nr=not reported
Data drawn from U.S. Department of Agriculture (1999).
SOURCE: MacDonald et al. 2000.

Animals increasingly being slaughtered at large slaughter plants

Gurian-Sherman, D. 2008. CAFOs Uncovered. Union of Concerned Scientists.

http://www.ucsusa.org/assets/documents/food_and_agriculture/cafos-uncovered.pdf

- Problems with CAFOs due to excessive size and density:
- Water and air pollution from manure
- Overuse of antibiotics→antibiotic resistant bacteria
- Health costs (lower quality meat)
- Harm to rural communities
- Geographic concentration: swine CAFOs in IO and NC, dairy CAFOs in CA, broiler chicken CAFOs in AK and GA

Problems with CAFOs

- Drug use in CAFOs
- Antimicrobials (2011)—animals: 13.5 million kg; humans: 3.3 million kg. Thus, animal ag uses 80% of antimicrobials, with large bulk being used in CAFOs, often for non-therapeutic purposes
- Other growth promotants, e.g. hormones, ractopamine, zilpaterol

Problems with CAFOs

- Health problems:
- Lower quality meat: increased levels of antimicrobials and antibiotic resistant bacteria
- Grain-based diet: ruminants produce less saliva and increase acidity in gut; 12% to 32% feedlot cattle develop liver abscesses due to high-grain diet (Nagaraja TG and MM Chengappa. 1998. Liver abscesses in feedlot cattle: a review. *J of Animal Science*, 76(1): 287-298)

Problems with CAFOs

- Pasture-fed/raised
  - Milk has 5 times the CLA (conjugated linoleic acid); meat 200% - 500% more CLA as proportion of total fatty acids
  - Eggs from pasture-fed chickens have 10% less fat, 40% more vitamin A and 400% more omega-3
- Continued allowed animal re-feeding could exacerbate prion diseases, e.g. BSE (bovine spongiform encephalopathy), scrapie, CWD (chronic wasting disease)

Gurian-Sherman, D. 2008. CAFOs Uncovered. Union of Concerned Scientists.

http://www.ucsusa.org/assets/documents/food_and_agriculture/cafos-uncovered.pdf

Table ES-1. **CAFO Costs Underwritten by U.S. Taxpayers**[1]

	Cost of Pollution or Pollution Avoidance	Cost of Subsidy
Cost to Distribute and Apply Manure to Fields	$1.16 billion/year[2]	
Reduction in Property Values	$26 billion (total loss)[3]	
Public Health Costs from Overuse of Antibiotics in Livestock	$1.5 billion – $3.0 billion/year[4]	
Remediation of Leakage from Manure Storage Facilities (Swine and Dairy)	$4.1 billion (total cost)[5]	
Grain Subsidies for Livestock Feed		$3.86 billion/year[6]
EQIP Subsidy		$100 million – $125 million[7]

[1] Numbers are rough estimates of current or recent costs and are presented only to indicate the magnitude of these costs. See the text for details.
[2] SOURCE: Aillery et al. 2005.
[3] SOURCE: Mubarak, Johnson, and Miller 1999. Extrapolation from Missouri data based on national CAFO numbers.
[4] SOURCE: NRC 1999. Extrapolation based on U.S. population of 300 million.
[5] SOURCE: Volland, Zupancic, and Chappelle 2003. Extrapolation from Kansas data based on national swine and dairy CAFO numbers.
[6] SOURCE: Starmer 2007. Data averaged over the period 1996–2005.
[7] SOURCE: NRCS 2003. Calculations based on NRCS projections for 2007 (yearly values increase from a low in 2002 to a high in 2007).

Gurian-Sherman, D. 2008. CAFOs Uncovered. Union of Concerned Scientists.
http://www.ucsusa.org/assets/documents/food_and_agriculture/cafos-uncovered.pdf

- Decrease tax payer subsidies
- Alternatives to CAFOs:
- Smaller feeding operations
- Pasture-based cattle, swine and poultry
- Swine hoop barns
- Fund work on alternatives

Concentration in meatpacking industry

Percentage of total commercial slaughter by four largest firms

	1980	1985	1990	1995	2000	2001	2002	2003
Four-firm concentration	35.7	50.2	71.6	80.8	81.4	80.4	79.2	80.3

Source: Grain Inspection, Packers, and Stockyards Administration, 2004.

JBS (buys Swift Food Company [#3] in 2007)

Tyson Foods

Cargill

National Beef Packing

2008: JBS tries to merge with National Beef Packing but 16 state AGs and DOJ file a complaint and merger is dropped

In Search of sustainable/food integrity

- **ENVIRONMENT** less chemical, drugs, heavy metals, sewage sludge, animal feed, antibiotics, growth hormones-- ground and water contamination
- **LOCAL** less transport = less fuel = less global warming; local farmers
- **WORKERS** better wages, safety protection, basic rights, small scale farms
- **ANIMAL WELFARE** better space, treatment, physical alterations, animal feed, less pesticide and other toxic exposures
- **HEALTH** safety, health and nutrition concerns

Consumer Reports Greener Choices website on Eco-labels

http://www.greenerchoices.org/eco-labels/eco-home.cfm?redirect=1

What makes a good eco-label?

Generally, the best eco-labels are seals or logos indicating that an independent organization has verified that a product meets a set of meaningful and consistent standards for environmental protection and/or social justice.

Here are five key criteria we use to evaluate label claims and certifying groups:

Meaningful, verifiable standards: Eco-labels should have a set of environmentally meaningful standards. These standards should be verifiable by the certifying group or another independent inspection organization.

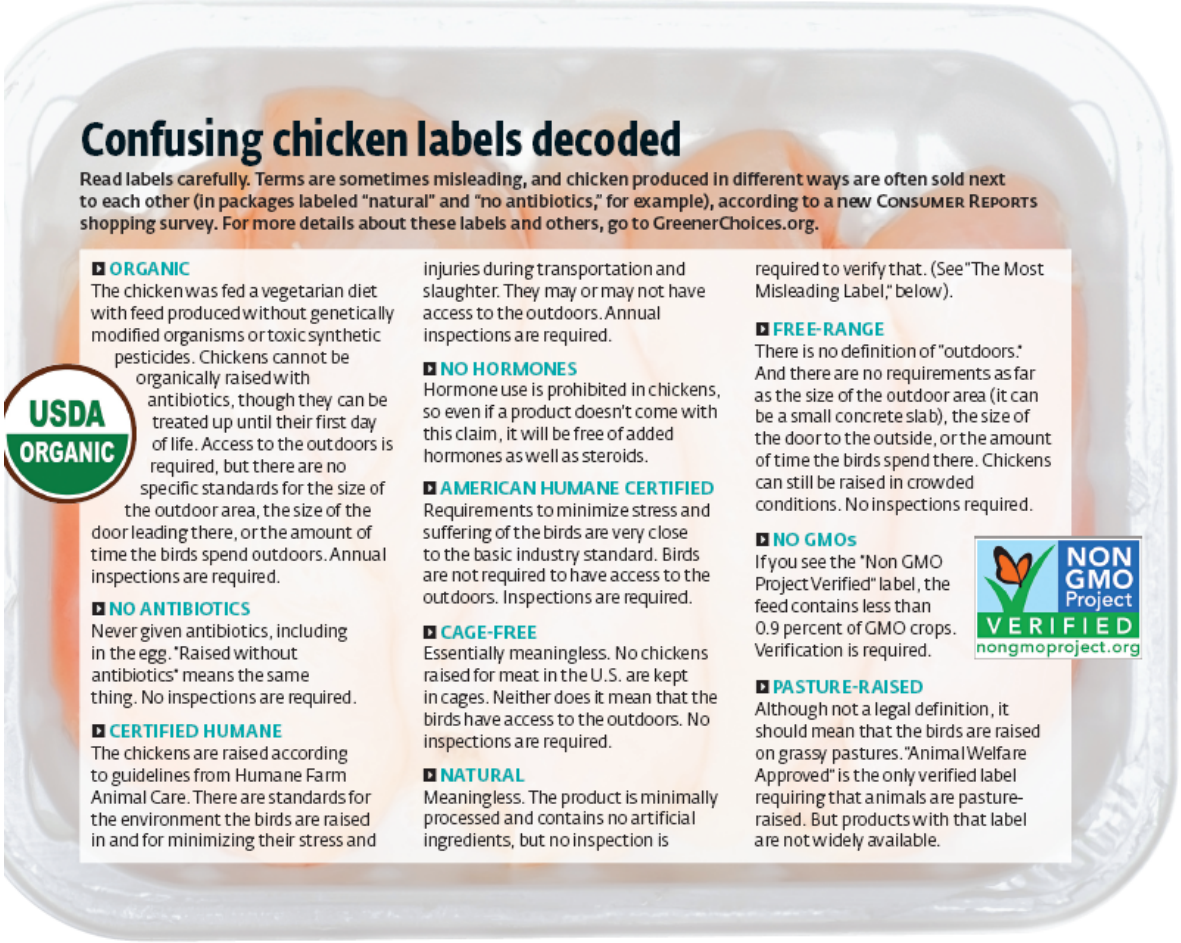
Consistency: An eco-label used on one product should have the same meaning if used on other products. Standards should be verifiable in a consistent manner for different products.

Transparency: The organization behind an eco-label should make information about organizational structure, funding, board of directors, and certification standards available to the public.

Independence: Certifying organizations and their employees should not have any ties to, and should not receive any funding, sales fees, or contributions, from logo users except fees for certification. Employees of companies whose products are certified, or who are applying for certification, should not be affiliated in any way with the certifier.

Public comment: All certification standards should be developed with input from multiple stakeholders including consumers, industry, environmentalists and social representatives in a way that doesn't compromise the independence of the certifier. Industry representatives, for example, can play an important advisory role without having direct financial, decision making or management ties to the certifier.

The high cost of cheap chicken. *Consumer Reports* February 2014



Confusing chicken labels decoded

Read labels carefully. Terms are sometimes misleading, and chicken produced in different ways are often sold next to each other (in packages labeled "natural" and "no antibiotics," for example), according to a new CONSUMER REPORTS shopping survey. For more details about these labels and others, go to GreenerChoices.org.

ORGANIC
The chicken was fed a vegetarian diet with feed produced without genetically modified organisms or toxic synthetic pesticides. Chickens cannot be organically raised with antibiotics, though they can be treated up until their first day of life. Access to the outdoors is required, but there are no specific standards for the size of the outdoor area, the size of the door leading there, or the amount of time the birds spend outdoors. Annual inspections are required.

NO ANTIBIOTICS
Never given antibiotics, including in the egg. "Raised without antibiotics" means the same thing. No inspections are required.

CERTIFIED HUMANE
The chickens are raised according to guidelines from Humane Farm Animal Care. There are standards for the environment the birds are raised in and for minimizing their stress and injuries during transportation and slaughter. They may or may not have access to the outdoors. Annual inspections are required.

NO HORMONES
Hormone use is prohibited in chickens, so even if a product doesn't come with this claim, it will be free of added hormones as well as steroids.

AMERICAN HUMANE CERTIFIED
Requirements to minimize stress and suffering of the birds are very close to the basic industry standard. Birds are not required to have access to the outdoors. Inspections are required.

CAGE-FREE
Essentially meaningless. No chickens raised for meat in the U.S. are kept in cages. Neither does it mean that the birds have access to the outdoors. No inspections are required.

NATURAL
Meaningless. The product is minimally processed and contains no artificial ingredients, but no inspection is required to verify that. (See "The Most Misleading Label," below).

FREE-RANGE
There is no definition of "outdoors." And there are no requirements as far as the size of the outdoor area (it can be a small concrete slab), the size of the door to the outside, or the amount of time the birds spend there. Chickens can still be raised in crowded conditions. No inspections required.

NO GMOs
If you see the "Non GMO Project Verified" label, the feed contains less than 0.9 percent of GMO crops. Verification is required.

PASTURE-RAISED
Although not a legal definition, it should mean that the birds are raised on grassy pastures. "Animal Welfare Approved" is the only verified label requiring that animals are pasture-raised. But products with that label are not widely available.

The high cost of cheap chicken. *Consumer Reports* February 2014

THE MOST MISLEADING LABEL

A Consumer Reports survey on chicken safety found that more than half of the 1,005 U.S. residents polled thought that "natural" chickens didn't receive antibiotics or genetically modified feed. Forty-two percent thought the word meant that the birds were raised outdoors. More than one-third thought "natural" was equal to "organic." But it doesn't mean any of those things. You should simply ignore "natural" claims.

http://www.greenerchoices.org/eco-labels/reportChickenLabels.cfm

A deep dive into chicken labels

As consumers become increasingly concerned with how food is produced and how farm animals are raised and treated, farmers and companies are responding with various labels and claims. Labels or claims generally aim to assure consumers that the food was produced in a better way - whether it be more humane, sustainable or healthy - but they can vary widely in how meaningful they are and in what is actually required.

The chart below is designed to help you better understand the different labels and claims you'll find on chicken. We looked at 23 different labels you might find on a package of chicken, and what they actually require for 17 different areas that affect either animal welfare (e.g., whether the chickens can go outdoors), public health (e.g., prudent antibiotic use) and sustainability (e.g., whether the chicken feed contains genetically engineered crops).

Click on the heading of each label column to see details on what the colors mean for that particular criteria

CHICKEN LABELS REPORT

Label	Prudent antibiotic use	Prohibits growth hormones	Prohibits animal byproducts in the diet	GMOs in feed	Prohibits synthetic pesticides/ fertilizers in feed production	Prohibits synthetic amino acids	Limit on rapid weight gain	Outdoor access	Indoor enrichment	Indoor space	Air quality	Artificial light and darkness	Catching and crating	Transport time limit	Natural v. dim light	Slaughter treatment	Slaughter line speed
Conventional	◆	Yes	No	◆	No	No	No	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
American Humane Association Certified	◆	Yes	No	◆	No	No	No	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Animal Welfare Approved	◆	Yes	Yes	◆	No	No	Yes	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Natural or All Natural	◆	Yes	No	◆	No	No	No	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
No antibiotics administered	◆	Yes	No	◆	No	No	No	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
USDA Organic	◆	Yes	Yes	◆	Yes	No	No	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Vegetarian Fed or No Animal By-Products	◆	Yes	Yes	◆	No	No	No	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Humanely Raised	◆	Yes	No	◆	No	No	No	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
No growth hormones	◆	Yes	No	◆	No	No	No	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Kosher	◆	Yes	No	◆	No	No	No	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
USDA Process Verified - Never Ever 3	◆	Yes	Yes	◆	No	No	No	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
USDA Process Verified - Humanely Raised (National Chicken Council Welfare	◆	Yes	No	◆	No	No	No	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆

The high cost of cheap chicken. *Consumer Reports.* February 2014

broiler farm Thousands of chickens are raised together on a farm in Texas.