Potential impacts of mandatory labeling for GE food in the United States

Alison Van Eenennaam, Ph.D.
Cooperative Extension Specialist
Animal Biotechnology and Genomics
Department of Animal Science
University of California, Davis, USA
530 752-7942
alvaneenennaam@ucdavis.edu

http://animalscience.ucdavis.edu/animalbiotech
I do not like the term genetically modified or GMO - ambiguous as to what “modified” means.
Genetic engineering (GE) can be defined as the 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 recombinant deoxyribonucleic acid (rDNA) techniques.
I prefer the term genetic engineering (GE) as it means something specific

• 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 recombinant DNA (rDNA) techniques.”

• Also known as genetically modified, GM, GMO, transgenic, bioengineered, biotech, made with modern biotechnology, frankenfood
Global Area of Genetically Engineered (GE) crops in 2013
Million hectares (1996-2013)

A record 18 million farmers, in 27 countries, planted 175.2 million hectares (433 million acres) in 2013, a sustained increase of 3% or 5 million hectares (12 million acres) over 2012.

Source: Clive James, 2013 ISAAA Brief 46-2013
CAST ISSUE PAPER 54, APRIL 2014

Presented by

Alison L. Van Eenennaam, Ph.D.
Department of Animal Science, University of California, Davis
Council for Agricultural Science and Technology
What Is CAST?

• CAST is a 501(c)3 nonprofit organization
• Based in Ames, Iowa
• Composed of
  o scientific societies
  o individual and student members
  o company, nonprofit, and associate society members
• Has U.S. and international members
Primary Objectives

• Publishing task force reports, commentaries, and issue papers written and peer reviewed by scientists from many disciplines

• Distributing CAST publications widely to nonscientists to enhance the education and understanding of the general public
Visit CAST Online

www.cast-science.org

Free access to all material for anyone having a “.gov” address

The map to the left depicts visits to the CAST website from every U.S. state and 181 countries.
The Potential Impacts of Mandatory Labeling for Genetically Engineered Food in the United States
Task Force Members

AUTHORS
Alison Van Eenennaam (Chair)
- University of California, Davis
Bruce M. Chassy
- University of Illinois at Urbana-Champaign
Nicholas Kalaitzandonakes
- University of Missouri, Columbia
Thomas P. Redick
- Global Environmental Ethics Counsel, LLC

CAST LIAISON
A. David Scarfe
- American Veterinary Medical Association

REVIEWERS
Julian M. Alston
- University of California, Davis
Paula Fitzgerald
- Biotechnology and Strategic Initiatives, Dairy Australia
Richard E. Goodman
- University of Nebraska, Lincoln
Mark Lynas
- Cornell University, Ithaca, New York
Gary Marchant
- Arizona State University, Tempe
The purposes of this paper are to

(1) explore the scientific, legal, and economic aspects of requiring food labeling in the United States based on the use of a process (i.e., use of genetic engineering in plant breeding) rather than on some distinguishable attribute of the food product itself

(2) clearly discuss the complex considerations that come into play when contemplating mandatory GE food labeling in the United States
Adoption of GE crop varieties in the United States, 1996–2013
(HT = herbicide-tolerant; Bt = *Bacillus thuringiensis*).

Recent state-based food labeling activity

Vermont population size in 2012 = 626,011

http://www.leg.state.vt.us/docs/2014/Acts/ACT120.pdf
There are three main themes that are often associated with mandatory GE labeling:

Public Opinion

**PRO:** Polls show an overwhelming majority of people support mandatory labeling of GE foods when specifically asked whether “the federal government should require labels on food saying whether it's been genetically modified, or ‘bio-engineered.’”

**CON:** In unprompted polls in which participants are asked what additional labeling they would like to see on food, more than 99% of respondents do not volunteer a desire to see mandatory labeling of GE foods.
Right to Know

**PRO:** People have the right to know what is in their food. Mandated calorie and nutritional content panels on packaged foods are examples of labels to inform consumers about food composition.

**CON:** The right to know what is in food is different than the right to know what processes were used in its production. Furthermore, this uniquely singles out GE technology—not other production methods and processes—for right to know.
Consumer Choice

PRO: People should have a choice regarding what types of products they purchase and consume. Many believe that this should include the choice to “vote with their wallets” about how the food was produced even if it does not result in any change or consequence for the food product itself.

CON: U.S. consumers who want to avoid GE products already have that choice available through voluntary non-GEO and organic labeling. In countries that have implemented mandatory GE labeling, GE products have generally been removed from the market, so choice has been reduced.
Mandatory GE labeling in other countries has actually removed GE choice from the marketplace

"Our objective is to eliminate GMOs [from the US food supply] but we also see GMO labeling as a useful tool in the meantime because we know that transitioning to a non-GMO supply chain will take time”.

Elizabeth O'Connell, campaigns director for GMO Inside/Green America, 2014

“How – and how quickly – can we move healthy, organic products from a 4.2% market niche, to the dominant force in American food and farming? ... The first step is to change our labeling laws.”

Ronnie Cummings, Organic Consumers, 2012
https://www.commondreams.org/view/2012/08/02-0

“Personally I believe GM foods must be banned entirely, but labeling is the most efficient way to achieve this.”

Dr. Joseph Mercola – 2012

“We are going to force them to label this food. If we have it labeled we can organize people not to buy it.”

Andrew Kimbrell – Center for Food Safety, 2013
Food Safety

- GE crops are “the most extensively tested crops ever added to our food supply.” American Association for the Advancement of Science (AAAS)

- The U.S. National Academy of Sciences concluded in 1987, and reaffirmed in 2000 and 2004, that GE poses no new or different risks to food safety.

- “There is no evidence that unique hazards exist either in the use of rDNA techniques or in the movement of genes between unrelated organisms ... The risks associated with the introduction of rDNA-engineered organisms are the same in kind as those associated with the introduction of unmodified organisms.” American Medical Association (AMA)

- A 2011 summary report covering a decade of publicly funded research, 130 research projects, and 500 research groups similarly concluded there is no scientific evidence of higher risks of GE crops to the environment or for food and feed safety. European Commission 2011
Professional Scientific and/or Medical bodies with an opinion on safety of GE

**Generally Positive**

- The U.S. National Research Council (NRC)
- U.S. National Academy of Sciences (NAS)
- The American Medical Association, (AMA)
- U.S. Department of Agriculture (USDA)
- U.S. Environmental Protection Agency (EPA)
- 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

**Generally Negative**
Food Labeling

• In the United States, the Food, Drug, and Cosmetic Act (FDCA) grants authority for food labeling to the FDA.

• Production methods or processes that create no material difference in products require no special labeling.

• Although some may consider the insertion or manipulation of genes in a laboratory a “material difference” per se, the science of food safety has not identified differences in the composition or safety of food derived from commercialized GE crops that would necessitate mandating a process-based label on GE food.

• The FDA allows voluntary process-based labeling as long as it is not false or misleading.
Voluntary labeling is allowed if it is not false or misleading

Non-misleading

“Cholesterol-free oil”

– Such claims are forbidden in the USA because they imply other vegetable oils have cholesterol, when in fact, none do.
Although some labels do exist that are both false and misleading!!

CAFFEINE!!!
CERTIFIED HUMANE
RAISED & HANDLED

Never ever 3

USDA ORGANIC

Animal Welfare
APPROVED

ACCREDITED
CAGE FREE

VEGAN
Natural Food Certifiers

GMO GUARD
Natural Food Certifiers

American Grassfed

NON GMO Project
VERIFIED
nongmoproject.org
Legal Issues

There are three major legal issues associated with state laws requiring mandatory process-based GE labeling:

1. **Commerce Clause of the U.S. Constitution**
   - forbids individual states from unduly burdening interstate commerce

2. **Supremacy Clause of the U.S. Constitution and FDCA Preemption**
   - federal law prevails in any conflict with state law

3. **The First Amendment Protection of Commercial Speech**
   - prohibits government compulsion of commercial speech unless the speech is factual, uncontroversial, and reasonably related to a legitimate government interest
National GE Labeling Law

• If the United States were to mandate labeling of GE food, the country would have to show a scientific health threat in order to be in compliance with international trade law.

• Many of the GE labeling laws in the 64 countries around the world that require GE labeling likely violate the World Trade Organization (WTO) and its 1994 Sanitary and Phytosanitary (SPS) Agreement, which frowns on process-based labels mandating disclosure of information on production-process issues that do not relate to food safety.

• The United States has lost two recent WTO decisions that ruled against U.S. laws requiring production-process labeling on dolphin-safe products and country-of-origin (COOL) labeling. Both laws were designed to inform consumers about process or origin information not impacting the food product itself.
Economic Issues

1. The Costs of Non-GE Foods
   - Organic and non-GE foods provide interested consumers information and choices, but they are more costly than conventional foods.

2. The Costs of Alternative Purity Standards and Tolerances
   - The incremental costs associated with the production and distribution of non-GE foods are not fixed and are heavily dependent on the GE purity standards and tolerances used.

3. The Costs of Mandatory GE Labels
   - This depends on how food manufacturers, food retailers, and other food merchants would choose to act if mandatory GE labeling was put in place.
   - Appraisal of the added costs for mandatory labeling involves the following:
     (1) an estimation of the share of the food market that might become non-GE
     (2) an estimation of the costs that would be incurred to procure ingredients and reformulate products
Recent study from Cornell - 2014

Labeling has real costs attributable to more expensive ingredients and the process of maintaining product identity and the labeling process itself, among others. Those costs are not insignificant – the median estimates annually for a family of 4 are:

- $348 - 401 in California
- $360 - 490 in Washington State
- $500 in New York with full labeled/unlabeled product range

“Consumer surveys and experiences in Europe suggest the products most likely to be dropped are the labeled ones resulting in a system, compared to present, with higher costs (due to more costly non-GE ingredients) and different but no real increase in consumer choice”

http://dyson.cornell.edu/people/profiles/docs/LabelingNY.pdf
Vermont Law: “Any person who violates the requirements of this chapter shall be liable for a civil penalty of not more than $1,000.00 per day, per product. The Attorney General shall have the same authority to make rules, conduct civil investigations, enter into assurances of discontinuance, and bring civil actions as provided under subchapter 1 of chapter 63 of this title. Consumers shall have the same rights and remedies”
Costs for Testing

The costs to test an end product for the presence of GE DNA range from $179 for a qualitative test to $600/sample for a qualitative assay (pers. comm from lab).

When food manufacturers and retailers choose to use non-GE ingredients in order to avoid GE labeling, they depend on testing and certification to guarantee the authenticity of such ingredients. Sampling, testing, and certification depend on statistical processes and hence all are subject to some error, which increases at very low tolerances. Under some state GE labeling laws, this type of error could open up firms to potential liabilities for misbranded products.

To the extent that such state laws provide for citizens to file suit—seeking restitution and attorneys’ fees—they could add to the segregation, testing, and certification costs borne by the food supply chain. State laws enacting such consumer fraud approaches to enforcing GE content in the food supply could therefore further increase the economic impact of mandatory GE labeling through litigation on food producers and manufacturers.
4. Potential Changes in the Costs of Mandatory Labeling

- In some states there is a clause that effectively introduces a time limit allowing products containing less than 0.9% GE content to be exempt from labeling until July 1, 2019—it is unclear what happens after that time.

5. The Cost Implications of Labeling Exemptions

- Many of the state labeling bills contain labeling exemptions for different categories of food (e.g., milk, meat, and eggs from animals that have eaten GE feed; alcohol; restaurant meals; organic food), and the implementation costs of GE labeling will be affected by which of these are exempt.
Chobani uses milk from cows fed GMOs. How “natural” is THAT?

Monsanto Latte?

Tell Starbucks to serve only organic, non-GMO milk.
Should meat, milk, and eggs from animals that have eaten GE feed require a label?

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


The Vermont Bill reads:

Sec. 6. ATTORNEY GENERAL REPORT ON LABELING OF MILK
(a) On or before January 15, 2015, the Office of the Attorney General, after consultation with the Agency of Agriculture, Food and Markets, shall submit to the Senate and House Committees on the Judiciary, the Senate Committee on Agriculture, and the House Committee on Agriculture and Forest Products a report regarding whether milk and milk products should be subject to the labeling requirements of 9 V.S.A. chapter 82A for food produced with genetic engineering.

http://www.leg.state.vt.us/docs/2014/Acts/ACT120.pdf
Where is GE used in Animal Agriculture?

GE products are used in animal feed, vaccines (chickens, pigs, horses, dogs, cats), pharmaceuticals, and food processing aids.
Safety of Meat, Milk, and Eggs from Animals Fed Crops Derived from Modern Biotechnology

Animal Agriculture’s Future through Biotechnology, Part 5

SUMMARY

As the global land area of biotechnology-derived crops modified for agronomic input traits such as herbicide tolerance and/or insect resistance continues to increase, these crops have become an increasingly important source of feed-stuffs for farm animals, and it is important to review the safety of meat, milk, and eggs derived from animals fed these crops. Once the safety of the newly expressed protein has been established, then nutritional equivalence between...
What crops are GE in US?

✓ 90% of all **corn** planted in U.S. was GE in 2013
✓ 90% of all **cotton** planted in U.S. was GE in 2013
✓ 93% of all **soybeans** planted in U.S. was GE in 2013
✓ 95% of all **sugar beet** planted in U.S. was GE in 2013; about 50% of US sugar is sugar beet-derived
✓ Also canola, papaya, some squash, melons, sweetcorn, and alfalfa

**NON-GE FEEDSTUFFS CURRENTLY INCLUDE**

- Wheat
- Sorghum
- Oats
- Rice
- Millet
- Barley
USDA ERS organic price data is based on Agricultural Marketing Service Market News and other data sources, and shows monthly and annual prices for major commodities – comparisons not available for all years.

- Organic milk 4.38% of total fluid milk market in 2013
  Between 2004-2007
- Retail price for organic milk ~ 3X conventional
- Retail price for organic eggs and poultry meat ~ 2X conventional
- Retail price for organic salad mix ~ 7X conventional
  Between 2010-2013
- Retail price for organic vegetables ~ 2X conventional
- Retail price for organic fruits ~ 1.5X conventional

Mandatory process-based labeling singles out GE process in absence of distinguishable in product – there are many processes used in food production.
6. Who Pays?

- Given the proposed rules and exemptions, younger and more affluent consumers who spend more on organics and food away from home would be least affected by the costs resulting from mandatory GE labeling.
- The incremental costs of any mandatory GE labeling regime in the U.S. market would exact a greater burden on low-income families.

Indeed, regardless of the reason for price increases, increasing food cost has a greater impact on the poor as a proportion of their income.
Summary and Conclusions

• All domesticated crops and animals have been genetically modified in some way; there is no science-based reason to single out GE foods and feeds for mandatory process-based labeling. Wide-ranging evidence shows that GE technology is equally safe to conventional breeding.

• Mandatory labeling based on process abandons the traditional U.S. practice of providing for consumer food preferences through voluntary product differentiation and labeling.

• Market-driven voluntary labeling measures (e.g., organic, Non-GEO Project, Whole Foods initiative) currently provide consumers with non-GE choices in the U.S. marketplace.
Summary and Conclusions

• Current labeling authority is federal; state mandatory labeling laws may be invalidated for conflicting with preemptive federal authority and may also violate First Amendment rights.

• Labeling at the national level has trade implications and needs to be harmonized with international trade agreements that frown on mandatory labeling for a production process when there is no scientific evidence that the process relates to food safety.

• Mandatory GE labeling would increase U.S. food costs. The size of this increase will depend on choices made in the marketplace by suppliers and marketers, and what products are included in labeling requirements.

• If, as in other countries, sellers move to non-GE offerings in response to mandatory labeling, food costs could rise significantly and these increased costs would exact a greater burden on low-income families. If, on the other hand, food suppliers choose to label virtually all products as containing GE without testing or segregation, increases in costs might be minimal.
Couple of points on proposed RI legislation

- Food and feed are included. How do you label animal feed? Unclear about pet food? Alcohol? Restaurant meals? Organic food? Milk, meat and eggs from animals that have eaten GE feed?
- Only exemptions in House bill are human and veterinary drugs although strange language in senate bill that states “This chapter shall apply only to products containing genetically modified organisms that are produced or made in Rhode Island.”
- Does not apply to traces of GMOs in products for food and feed produced from GMOs in a proportion no higher than one percent (1%) of the entire food product – by weight??
- Has unique and extensive (and I would argue commercially impossible as there are a total of 165 GE approved events in 19 plant species) traceability requirements. Requires that at the first stage of the placing on the market of a product consisting of or containing GMOs, including bulk quantities, operators shall ensure that the following information is transmitted in writing to the operator receiving the product:
  
  (i) That it contains or consists of GMOs
  (ii) An identification of the GMOs within the product.
  (iii) In the case of products consisting of or containing mixtures of GMOs to be used only and directly as food or feed for for processing, the information referred to in subsection (ii) may be replaced by a declaration of use by the operator, accompanied by a list of the unique identifiers* for all those GMOs that have been used to constitute the mixture.

* “Unique identifier” means a simple numeric or alphanumeric code which serves to identify a GMO on the basis of the authorized transformation event from which it was developed and providing the means to retrieve specific information pertinent to that GMO
Thanks for inviting me

Alison Van Eenennaam, Ph.D.
Cooperative Extension Specialist
Animal Biotechnology and Genomics
Department of Animal Science
University of California, Davis, USA
alvaneenennaam@ucdavis.edu

http://animalscience.ucdavis.edu/animalbiotech