# The Role of Biotechnology in a Sustainable Food Supply

## Section 3:

# Risk Assessment

Biotechnology and Food Safety

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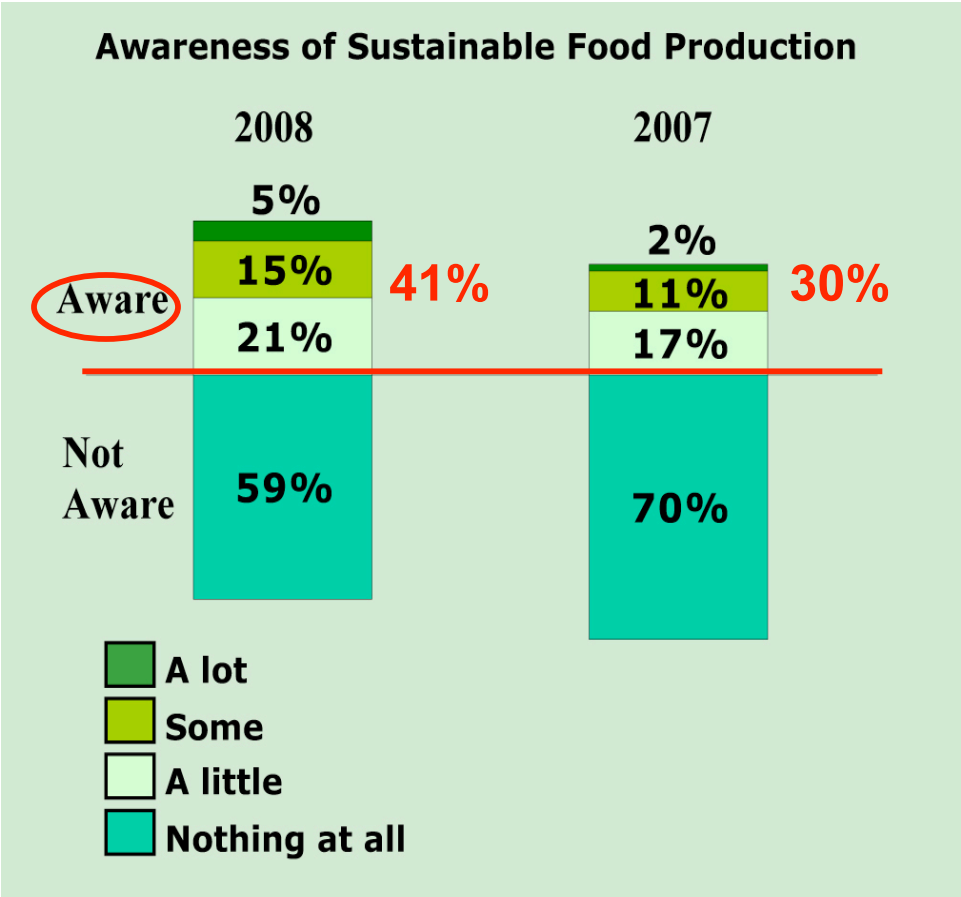
# Food & Food Safety Issues




**Are consumers aware of what sustainable food production is?**

**Are consumers aware that GE crops could contribute to sustainability?**

**Do consumers worry about food safety risks of GE crops that would interfere with their impact on sustainability?**

*SOURCE: International Food Information Council. 2008 Food Biotechnology: A Study of US Consumer Trends Survey. http://www.ific.org/research/biotechres.cfm*

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# Food & Food Safety Issues

| Percent that mention concern with each food safety issue: | | |
|---|---|---|
| | 2008 | 2007 |
| Disease/ contamination | 50% | 38% |
| Handling/ preparation | 29% | 31% |
| Food sources | 13% | 20% |
| Health/ nutrition | 8% | 8% |
| Agricultural production | 7% | 8% |
| Preservatives/ chemicals | 6% | 9% |
| Packaging/ labeling | 3% | 5% |
| Biotech | 1% | 1% |
| Processed foods | 1% | 1% |
| Others | 2% | 4% |

**But there are consumer concerns out there?**

**What are the food and food safety issues raised?**

*SOURCE: International Food Information Council. 2008 Food Biotechnology: A Study of US Consumer Trends Survey. http://www.ific.org/research/biotechres.cfm*

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# Food & Food Safety Issues

## 1. Have any food safety studies been done on GE foods?

- Yes, food safety testing has been done on all commercialized GE crops by companies or institutions developing them, as with pharmaceuticals.
- Data reviewed by FDA, EPA, and/or USDA
- Tests also done by outside groups and published in peer-reviewed journals.
- Submission of some safety data voluntary, but all commercial products have had full review due in part to possible legal liabilities if a safety problem occurs.

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# Food & Food Safety Issues

- Health safety of GE foods based in part on substantial equivalence to comparable non-GE foods.
- Substantial equivalence establishes comparable nutritional qualities (e.g., protein, phytonutrients, fat, vitamins), digestibility, toxicity and allergenicity.
- Large numbers of animal tests on GE foods conducted.

| Animal (Species/categories) | Number of experiments | Nutritional assessment |
|---|---|---|
| Ruminants | | No unintended effects in composition (except lower mycotoxins concentration in Bt plants) |
| Dairy cows | 23 | |
| Beef cattle | 14 | |
| Others | 10 | |
| Pigs | 21 | No significant differences in digestibility and animal health as well as no unintended effects on performances of animals and composition of food of animal origin |
| Poultry | | |
| Laying hens | 3 | |
| Broilers | 28 | |
| Others (Fish, rabbits etc.) | 8 | |

*SOURCE: Flachowsky, G. 2007. Feeds from Genetically Engineered Plants - Results and Future Challenges. ISB News Report, March 2007, pp. 4-7.*

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# Food & Food Safety Issues

## Austrian Government Study Finds Possible Effects of GE Food on Fertility

A study published by the Austrian Ministries for Agriculture and Health identi fied serious health threats of genetically engineered (GE) crops. In one of the very few long-term feeding studies ever conducted with GE crops, the fertility of mice fed with GE maize was found to be severely impaired, with fewer offspring being pr odu ced than by mice fed on natural crops.

Mice fed with GE maize had less offspring in the third and fourth generations, and these differences were statistically significant. Mice fed with non-GE maize reproduced more efficiently. This effect can be attributed to the difference in the food source.

"GE food appears to be acting as a birth control agent, potentially leading to infertility - if this is not reason enough to close down the whole biotech industry once and for all, I am not sure what kind of disaster we are waiting for," said Dr. Jan van Aken, GE expert at Greenpeace International. "Playing genetic roulette with our food crops is like playing Russian roulette with consumers and public health".

Owned by Monsanto, the GE maize variety tested in this study is tolerant to a herbicide and resistant to certain insect pests. It has been approved for planting and food use in a variety of countries, including the US, Argentina, Japan, Philippines and South Africa. In Mexico and the European Union, it is approved for food and feed use.

**Risk assessment of food safety is: case-by-case, iterative, depends on food prevalence and determines equivalent safety.**

**But some are not peer-reviewed and warn of dangers.**

**What is peer-review and why care?**

*SOURCE: http://www.greenpeace.org/international/press/releases/ge-threat-to-fertility-11112008*

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# Food & Food Safety Issues

## 2. Can eating Bt protein cause food safety issues for consumers?

- No, for several reasons. Bt proteins broken down quickly in acidic human gut.
- Toxin broken down in alkaline insect gut, binds to special receptors and kills insect larvae.
  - Lack of effect on nontarget organisms due to tight binding to specialized receptors not found in other organisms, including humans.
- Topical application of Bt toxins have been used to control pests on foods, including organic foods since 1920's with no food safety issues

# Food & Food Safety Issues

## 3. Can GE crops engineered to make pharmaceuticals contaminate food?

- Yes, 100% containment cannot be guaranteed.
- Focus should be on risk of contamination.
- Several pipeline examples of vaccines being produced in GE plants exist, none commercialized.
- Following documented contamination, USDA revised field rules to require stricter isolation, special handling and regular inspections.

**In planta smallpox vaccine confers protection in mice**

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# Food & Food Safety Issues

**Plant-made Pharmaceuticals**

*The majority of consumers (50 percent) continue to hold neutral opinions about using biotechnology to produce medicines from food crops.*

Consistent with previous trends, almost half (46 percent) of consumers have heard or read at least "a little" about using biotechnology to produce medicines from special varieties of crops.

Consumers are significantly less likely to be "somewhat favorable" towards PMPs relative to last year (27 percent down from 32 percent in 2007), and are more likely to be "not very favorable" (6 percent up from 3 percent in 2007). However, those who have an impression are still more than four times as likely to have a favorable impression (41 percent) than a not favorable one (9 percent).

**2008 poll indicates 50% of consumers hold neutral opinions on pharmaceutical crops but fewer are favorable relative to a 2007 poll.**

*SOURCE: International Food Information Council. 2008 Food Biotechnology: A Study of US Consumer Trends Survey. http://www.ific.org/research/biotechres.cfm*

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# Food & Food Safety Issues

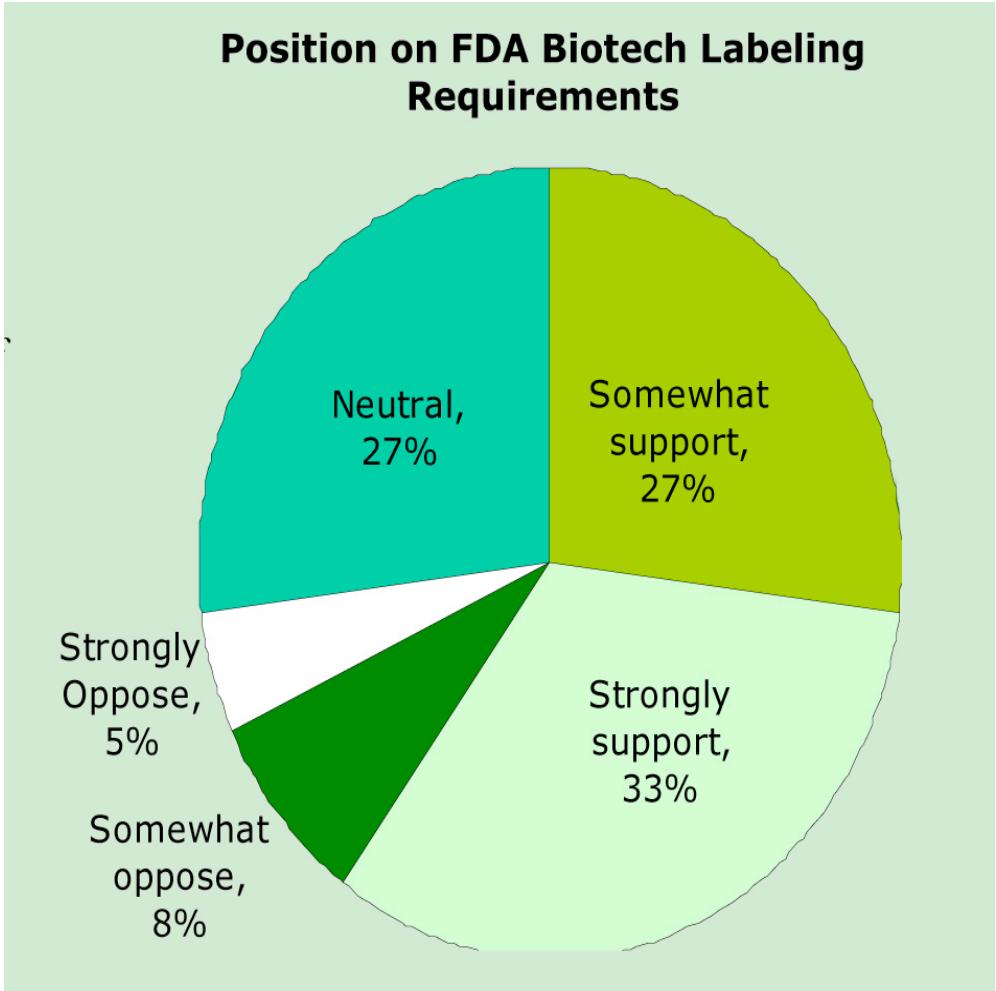
## 4. Does lack of GE food labeling raise safety risks for human consumption?

No, Food and Drug Administration's labeling policy for GE foods same as for conventional foods – to let consumers know about differences in nutritional quality, health safety and food quality.

Thus, labeling of GE food required only when nutritional,
health safety and food quality differences exist between GE and conventional foods.

Legally, labels are not mandated to provide information about process by which food is made

# Food & Food Safety Issues




**In 2008 poll 60% of consumers support FDA labeling requirements for GE foods**

*SOURCE: International Food Information Council. 2008 Food Biotechnology: A Study of US Consumer Trends Survey. http://www.ific.org/research/biotechres.cfm*

# Food & Food Safety Issues

## 5. Are GE foods 100% safe?

- No food (or any technology) is 100% safe. Non-GE example is kiwi fruit – found to be allergenic more than decade after U.S. introduction.
- But all marketed GE-derived food products are widely considered as safe as their non-GE counterparts.
- Safety of US food supply is amon highest in world, regardless of how agricultural production is practiced.

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# Food & Food Safety Issues

## 6. Are organic foods safer, healthier than GE foods or those grown conventionally?

- Much more research needed to determine whether nutritional differences sometimes seen between organic and conventional foods have significant impacts on human health.
- But there is strong evidence that diets rich in fresh fruits and vegetables have a positive impact on health – and this far outweighs differences in nutritional content from production strategies.

# Food & Food Safety Issues

## Conclusions

- No food safety issues exist for commercial GE crops based on peer-reviewed research.
- Regulatory agencies have, in general, proceeded with caution in releasing GE varieties.
- Food safety of commercial GE crops is as high as for food produced by conventional methods.
- Careful scrutiny is necessary, but GE products should not be held to higher standards than for other foods.
- With balance between caution and scrutiny, we can realize the power of GE crops without compromising human, animal or environmental health.