The Role of Biotechnology in Our Food Supply
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www.foodinsight.org/foodbioguide.aspx

Presented to [insert name here]

Date
What We Will Cover

- Definition and History of Food Biotechnology
  - Why Do We Use Biotechnology?
    - Four Key Benefits
  - Agricultural Biotechnology Today
  - What Does the Future Hold?
- Communication Lessons from Other Food Technologies
What is Biotechnology?

“Bio” means “life"
“techno” means "tools"
“ology” means "the use or study of”

Using biology (the study of life) to create or improve tools, products, or processes.

E.g., Food Crops & Animals
History of Food Biotechnology

Food Biotechnology Timeline

- **8500–5500 B.C.** People begin to settle in one place and raise plants and animals; the best of their crop was saved to use as seed the next year.
- **1863** From observing pea plants in a garden, renowned scientist Mendel concludes that certain “unseen particles” (later described as genes) pass traits from parents to offspring in a predictable way—the laws of heredity begin to be understood.
- **1875** The first high-yield, hardier wheat-rye hybrid grain is created.
- **1931** USDA begins to develop a pesticide called DDT.
- **1961** USDA registers Bacillus thuringiensis (Bt) as the first biopesticide.
- **1973** Scientists Cohen and Boyer successfully transfer genetic material from one organism to another.
- **1986** EPA approves commercial growing of the first genetically engineered crop—tobacco plants resistant to tobacco mosaic virus. A similar Bt corn is also approved.
- **1992** FDA issues a policy stating that foods from bioengineered crops would be regulated in the same manner as other foods. Pre-market consultation with FDA is encouraged, consistent with industry practice.
- **1993** Recombinant bovine somatotropin (rBST)—a naturally occurring protein that is reproduced using biotechnology and used to increase milk production—is approved in the U.S.
- **1994** The first whole food produced using biotechnology—the FlavrSavr® tomato—enters the marketplace after FDA issues its advisory opinion on safety. Virus-resistant squash is also planted.
- **1996** The sheep that was the first animal clone to be born.
- **1999** The ENVAR™ potato is genetically engineered in Canada to produce an enzyme in its saliva that would allow it to get more phosphorus from its food. This would reduce phosphorus runoff into waterways.
- **2000** FDA releases its risk assessment on animal cloning, concluding that food from clones is as safe as other food.
- **2008** Sugar beets produced with biotechnology are commercialized.
- **2011** “High-coll” soybean varieties higher in heart-healthy monounsaturated fats are available in the U.S.
- **2012** Bioengineered crops are planted on 420.6 million acres by 17.3 million farmers in 39 countries. More than 90% of farmers planting bioengineered seed are small, resource-poor farmers in developing countries.
WHY DO WE USE BIOTECHNOLOGY?
Why Biotechnology?

“...The First Essential Component Of Social Justice Is Adequate Food For All Mankind.”

Scientists and farmers have been striving for generations to increase quality and quantity of food for world’s growing population.

Norman Borlaug,
Agronomist & Humanitarian,
Father of the ‘Green Revolution,’ 1970 Nobel Peace Prize Winner
Consumers Expect Benefits from Biotechnology

(Among those who say "yes")
Benefits of Biotechnology in Next 5 Years:
- Nutrition/health benefits 35%
- Improved quality/taste/variety 22%
- Price/economic benefits 21%
- Improved crops/agricultural production 13%
- Safer foods 11%
- Reduced pesticides/chemicals 3%
- Other 13%
- Don’t know 3%
- Nothing 2%
- Missing/Refused 8%

Q 17. Do you feel that biotechnology will provide benefits for you or your family within the next five years?
Q 18. What benefits do you expect? [OPEN END]

Source: IFIC 2012 Consumer Perceptions of Food Technology Survey
Four Key Benefits

1. Food Safety
2. Consumer Benefits
3. Sustainability
4. Feeding a Hungry World
FOOD SAFETY
Food Safety

“For thousands of years we’ve been breeding plants...so that we can have fruits and vegetables that are safe and healthy. We’re now using the latest generation of biotechnology to...make them even safer.”

Ronald Kleinman, MD, Physician in Chief, Massachusetts General Hospital for Children
Plant-Based Foods Currently Available Using Biotechnology are Safe

- Extensive research
- Consumed safely around world
- No evidence of harm
- Safe for children
- No increased risk for allergies

Groups that have deemed food biotech safe:
- WHO
- FAO
- AMA
- IFT
- FDA
- EPA
- USDA
Animal biotechnology is a safe technique for producing meat, milk, and eggs

**rbST:** Safety of food products using rbST has been established and reinforced through decades of research.

**FDA on Animal Cloning:** Meat and milk from cows, goats, and pigs are the same as from other animals.
### Biotechnology: Not a Food Safety Concern for Americans

<table>
<thead>
<tr>
<th>Percent concerned with each food safety issue (unaided):</th>
<th>2012</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disease/contamination</td>
<td>29%</td>
<td>29%</td>
</tr>
<tr>
<td>Handling/preparation</td>
<td>21%</td>
<td>23%</td>
</tr>
<tr>
<td>Preservatives/Chemicals</td>
<td>13%*</td>
<td>8%</td>
</tr>
<tr>
<td>Health/nutrition</td>
<td>8%</td>
<td>7%</td>
</tr>
<tr>
<td>Agricultural production</td>
<td>7%</td>
<td>6%</td>
</tr>
<tr>
<td>Food sources</td>
<td>7%</td>
<td>8%</td>
</tr>
<tr>
<td>Packaging/labeling</td>
<td>5%</td>
<td>4%</td>
</tr>
<tr>
<td><strong>Biotech</strong></td>
<td><strong>2%</strong></td>
<td><strong>2%</strong></td>
</tr>
<tr>
<td>Processed foods</td>
<td>1%</td>
<td>1%</td>
</tr>
<tr>
<td>Other</td>
<td>1%</td>
<td>1%</td>
</tr>
</tbody>
</table>

*Denotes statistical significance from 2010.

Q12. What, if anything, are you concerned about when it comes to food safety? [OPEN END]

Food Biotechnology: A Communicator’s Guide to Improving Understanding  
www.foodinsight.org/foodbioguide.aspx
Biotech Foods Are Regulated to Ensure Safety

U.S. regulation coordinated by:

- USDA
- EPA
- FDA

- Regulations in place for foods from plant and animal biotechnology
Food Biotech Labeling

Special labeling required only to disclose a material change, such as:

- Allergens present in the food.
- Increased levels of naturally occurring toxins.
- Changes to nutrient composition or profile.

*FDA has determined the process of biotechnology is not a “material fact” to be mandated on the food label.*
Potential for Biotechnology to Improve Food Safety

Benefits today:

- Protects against mold in corn
- Enzymes that produce low-lactose milk more efficiently

Products being developed to:

- Protect rice and sugar cane from insects
- Produce a potato with reduced acrylamide levels
- Remove allergenic proteins (e.g., peanuts, milk, soy)
CONSUMER BENEFITS
Potential to Deliver “Heart-Healthy” Oils

• Advanced breeding, modern food production are used to develop canola, soybean, and sunflower oils that do not produce trans fats.

• Soybean, canola oils being developed with biotechnology to provide the specific omega-3 fats that are most protective for heart health.
Biotechnology Improves Food Taste & Quality

Under regulatory review:
• Non-browning apples
• Keep their original color longer, stay crisp longer.

In development:
• Potatoes
• Tomatoes, melons, etc.
• Enzymes used in food production

Above all else, consumers want food that tastes good. 69% say they’d buy foods enhanced through biotech to taste better - IFIC 2012
Biotechnology Contributes to a Consistent, Affordable Food Supply

Biotechnology facilitates:

• Greater efficiencies on the farm.
• More reliable harvests.
• Less risk of spoilage or contamination from farm to store.
Sustainability

Sustainability in agriculture is about meeting today’s needs in a manner that ensures we can continue to meet those needs tomorrow, as well as or better than today.
Biotechnology Allows for More Judicious Use of Insecticides

Important tools for protecting crops, the environment:

• Responsible use of biotech seeds
• Responsible use of crop protection products
• Integrated weed and pest management practices
Biotechnology Allows for Use of Safer Herbicides

• Glyphosate: 16 times less toxic than older herbicides
• Newer biotech varieties addressing weed resistance

New types of herbicide-tolerant corn and soy have been developed that help address ongoing challenges with herbicide resistance of certain weeds.
Biotechnology Protects Soil Quality

**Less Sustainable**

Moldboard Plowing: Exposes soil to wind, erosion

**More Sustainable**

No-Till Farming: Plants seeds directly into residue of previous crop

Biotechnology allows for improved soil quality.
Biotechnology Reduces Carbon Footprint

• No-till / Conservation tillage:
  • Agriculture’s “carbon footprint” decreased by: 46.5 billion pounds

• Carbon emissions are lower on farms that use biotechnology
  • 2011: Estimated carbon dioxide reductions: 4.19 billion pounds
Biotechnology Makes it Possible to Produce More Food Per Acre and Per Animal

- Crops thrive with better weed and insect control.
- Less land, insecticides, fertilizers, fuel, animals, and feed needed to produce same amount of food.
- With rbST and proper management, \textbf{5} cows can produce as much milk as previously took \textbf{6} cows = \textbf{More Sustainable}
Biotechnology Improves Economic Sustainability for Family Farms Worldwide

We can help poor farmers sustainably increase their productivity so they can feed themselves and their families. By doing so, they will contribute to global food security. But that will happen only if we prioritize agricultural innovation.”


Biotechnology Improves Social Sustainability for Family Farms Worldwide

Efforts being pursued in developing nations:

• Cooperation with local people ensuring a positive social impact.

Food security (or regular access to food) is essential to a nation’s overall stability.
FEEDING A GROWING WORLD
More Food, Better Nutrition Needed for a Growing Global Population

By 2050, the global population is expected to reach 9 billion people, requiring 70% more food than is produced today.

“The past 50 years have been the most productive period in global agricultural history, leading to the greatest reduction in hunger the world has ever seen.”

Former President Jimmy Carter.
Biotechnology Improves Harvest Per Acre

• Increasing yield in developing nations, ensuring greater access to food.

• Strengthening crops against extreme temperatures, drought, poor soil conditions – critical in developing nations
Biotechnology Offers Solutions for Reversing Malnutrition

Where malnutrition is rampant, nutritionally improving staple food crops and native foods has great potential to improve the health of entire communities.

In development:

• Golden Rice
  • beta-carotene \(\rightarrow\) vitamin A

• Biofortified sorghum
  • vitamin A, iron, zinc
AGRICULTURAL BIOTECHNOLOGY TODAY
Biotechnology Applications in the U.S. Today

In Crops:
• Insect protection
• Herbicide tolerance
• Virus resistance
• Stacked traits, tailored to agricultural needs

In Dairy Cows:
• Protein hormones for increased milk production efficiency
Foods From Crops & Animals Raised Using Biotechnology

- Sweet Corn
- Papaya
- Dairy Products
- Food ingredients
  - Sweeteners (e.g. corn syrup, sugar)
  - Vegetable oils
  - Corn starch
  - Soy protein
  - And more
Biotechnology: An Important Factor in Our American Harvest

More than 90% of all US SOYBEANS are herbicide tolerant.

Nearly 70% of all US corn is insect PROTECTED.
In 2012, more than 15 million, or 90% of farmers growing biotech foods were resource poor, from developing countries.
WHAT DOES THE FUTURE HOLD?
Future Biotechnology Benefits

- Foods higher in omega-3s and other nutrients.
- Foods with better taste, freshness.
- Ability to grow crops in difficult climates and poor soil.
- Further improvements in yield and disease protection.
Communication Lessons from Other Food Technologies

For example:

• Animal antibiotics
• Animal protein hormones
• Ractopamine
• Nanotechnology
Biotechnology: Benefiting the Common Good

“When we look back over the last century, we see that biotechnology is responsible for some of our greatest progress in public health, from the discovery of penicillin to the development of effective therapies for HIV infection ... Today... we can see even bigger opportunities ahead.”

THANK YOU!
References

References


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