

The background of the slide features a large, faint, circular seal of Rutgers University. The seal contains the text 'RUTGERS THE STATE UNIVERSITY OF NEW JERSEY' around its perimeter and a central emblem with a sunburst design.

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How Consumers Make Decisions

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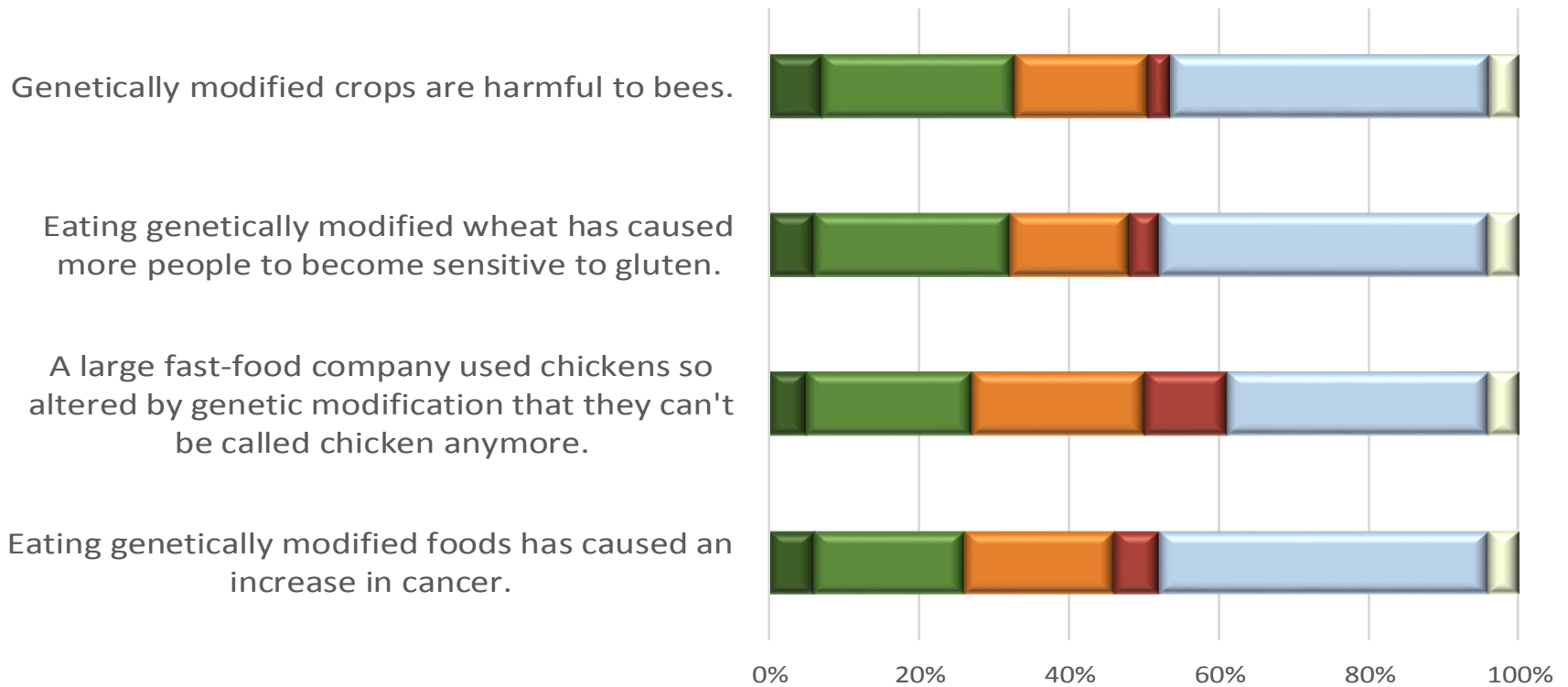
Rutgers University

When Science and Citizens Connect:
Public Engagement on Genetically Modified Organisms

What Kind of Decisions?

Decisions About The Veracity of Claims / “Facts”

Beliefs about GM Agriculture



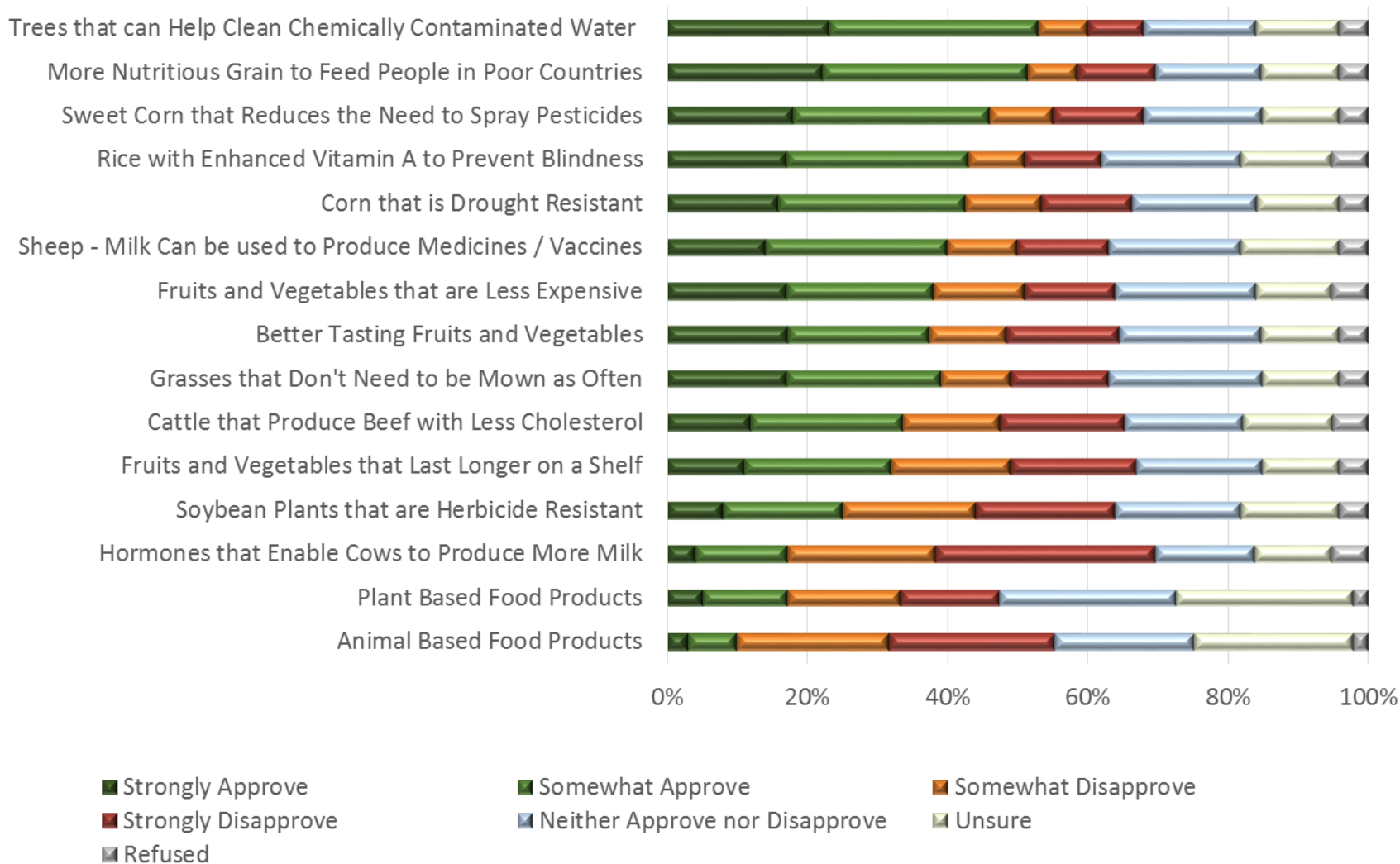
Hallman, Cuite, Morin, 2013

TRUE
 Likely True
 likely false
 FALSE
 Unsure
 Refused

What Kind of Decisions?

- **Evaluative Decisions Involving Cost/Risks and Benefits**
 - Is the technology is positive or negative overall?
 - For me
 - For society
 - Is a particular application of biotechnology likely to be beneficial?
 - For me
 - For society
 - For the environment

Approval of the Use of GM to Create:



What Kind of Decisions?

- **Evaluative Decisions Involving Values**

- Is the technology consistent with my values?
- Are the potential costs/benefits of a specific application consonant with my values?
- Do the people/corporations involved share my values?

What Kind of Decisions?

- **Behavioral Decisions**

- How should I vote in the referendum on GMO labeling?
- Should I buy this product because it says it is GMO-free?
- Should I put on this costume depicting a giant ear of corn and march with a sign in front of my local supermarket?

Guides to Decision Making

- Worldview
 - Naturalness bias
 - Beliefs about the fallibility of humans
- Social comparisons/Norms
 - What decision have others made?
- Social desirability
 - What does my decision say about me?

Can The Public Reach The Right Decision about GMOs?

- Yes,
 - But it depends on your definition of “right”
 - Public perceptions are unlikely to match perceptions of scientific experts
 - So their decisions are unlikely to be the same.

Three Filters of Reality + One

- Literacy
 - The ability to understand words and stories
 - Written/spoken
- Graphicacy
 - The ability to understand graphical information
- Numeracy
 - The ability to understand the numbers
- Ecolacy
 - Skill in understanding complex relationships

Hardin, G. (1985). "The Expert as Enemy and Three Filters of Reality," in Hardin, *Filters Against Folly: How to Survive Despite Economists, Ecologists, and the Merely Eloquent*. (pp. 7-25). New York: Viking Penguin.

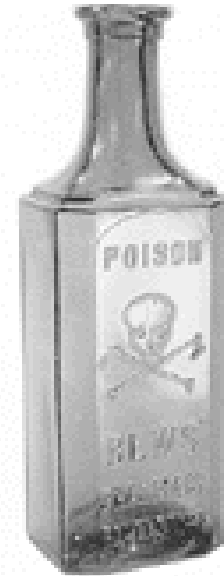
Literacy

- It's the way 'normal' people learn and communicate
- Through:
 - Stories
 - Anecdotes
 - Examples
 - Metaphors
 - Analogies
- Often, these are culturally specific



Graphicacy

- Visual Communication
- Through:
 - sketches
 - photographs
 - diagrams
 - maps
 - plans
 - charts
 - graphs
 - symbols
 - other non-textual formats
- Interpretation is often culturally constrained



Numeracy

- Essential to science, engineering, technology
- Unfortunately, much of the public struggles with mathematical concepts
 - Many have a difficult time grasping:
 - Very small and very large numbers
 - Fractions
 - Proportions
 - Percentages
 - Probabilities

The image shows the Pythagorean theorem equation, $a^2 + b^2 = c^2$, written in a white, hand-drawn style font on a solid blue rectangular background.
$$a^2 + b^2 = c^2$$

Implications

- Scientists often communicate using numbers
- Non-Scientists (and most journalists) communicate using words, stories, and sometimes pictures
 - This often presents a communications barrier
 - Even to experts outside of a given field



Ecolacy

- The ability to see ‘the big picture’
- The capacity to envision both intended and unintended consequences



Ecolacy

- Literacy + Numeracy + Graphicacy \neq Ecolacy
 - We all know people who are brilliant **but** ...
 - Are so focused on the details they can't see the big picture
 - Lack common sense

Implications

- Seeing the 'big picture' isn't simply a matter of observing all of the details
 - Often, to grasp the details you need the context of the 'big picture'
- Educating people about the scientific details doesn't necessarily lead to greater comprehension of the big picture or the ability to make informed decisions



Two Components in Decision Making

- Cognitive components – thoughts
 - Understanding of the likely consequences
 - Mental models of how GMOs “work”
 - Understanding of the contexts involved
- Affective components – feelings
 - Pleasure
 - Happiness
 - Fear
 - Worry
 - Frustration
 - Sadness
 - Anger
 - Disgust
 - Protectiveness
 - Others. . .

Cognition and Affect

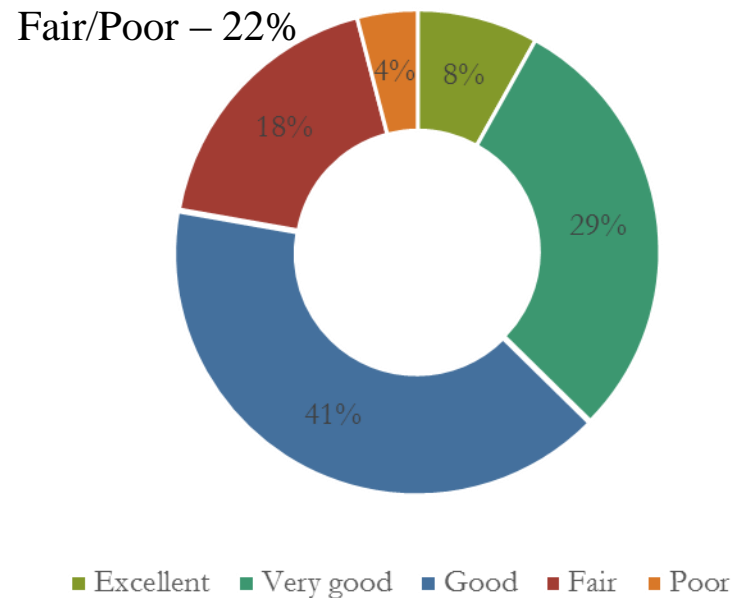
- Many psychologists (and especially economists) believe that affect is the byproduct of cognition.
 - People evaluate the information they are given, which leads to an overall affective reaction (i.e. fear, anger, dread, outrage).
- However, people have a remarkably poor understanding of what influences their perceptions and behaviors.
 - They can't say
 - Why they feel the way they do.
 - Why they made a particular choice.
 - Why they act the way they do.

Affect Can Come First

- It seems clear that affect can also drive future cognition.
 - First impressions matter.
 - “Curb appeal”
 - Cyclical thinking
 - I like it because it is good, and it is good because I like it.

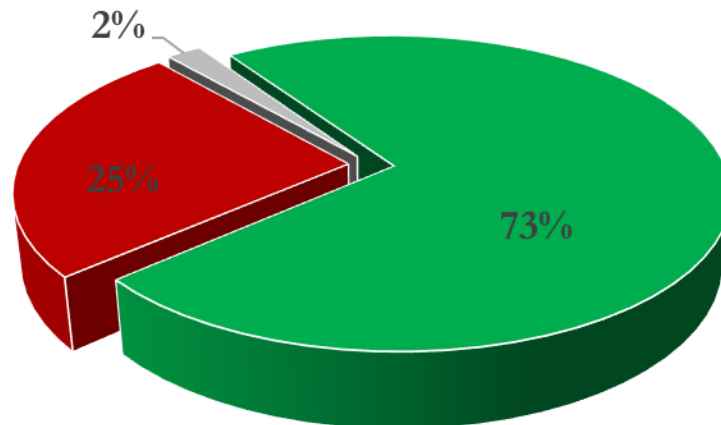
What Do People Think They Know?

- How would you rate your own basic understanding of how food is grown and produced?



Awareness of the Existence of GM Foods

- *Before this survey, were you aware that genetically modified foods existed?*
 - 25% say no

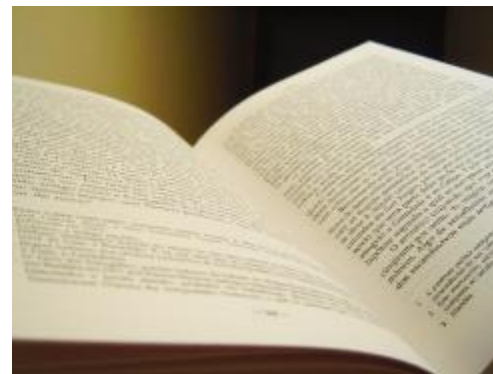


■ Yes ■ No ■ Refused

Heard or Read?

- *How much have you heard or read about genetically modified foods?*
 - A great deal 4%
 - A fair amount 13%
 - Some 33%
 - Very little 29%
 - *Nothing at all* 19%
 - Refused 2%

50%



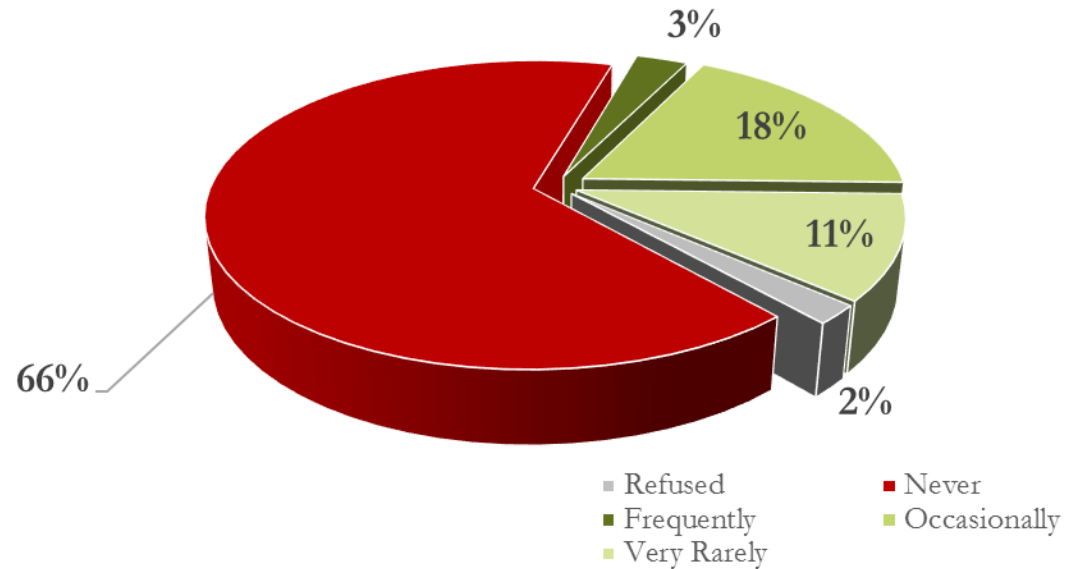
How Much Do You Know?

- *How much do you know about genetically modified foods?*
 - A great deal 2%
 - A fair amount 11%
 - Some 32%
 - Very little 32%
 - *Nothing at all* 21%
 - Refused 2%

55%

Frequency of Discussion of GM Foods?

- *How often have you discussed GM foods?*
 - 3% Frequently
 - 18% Occasionally
 - 11% Very Rarely
 - 66% Never



GM Foods in Stores Now?

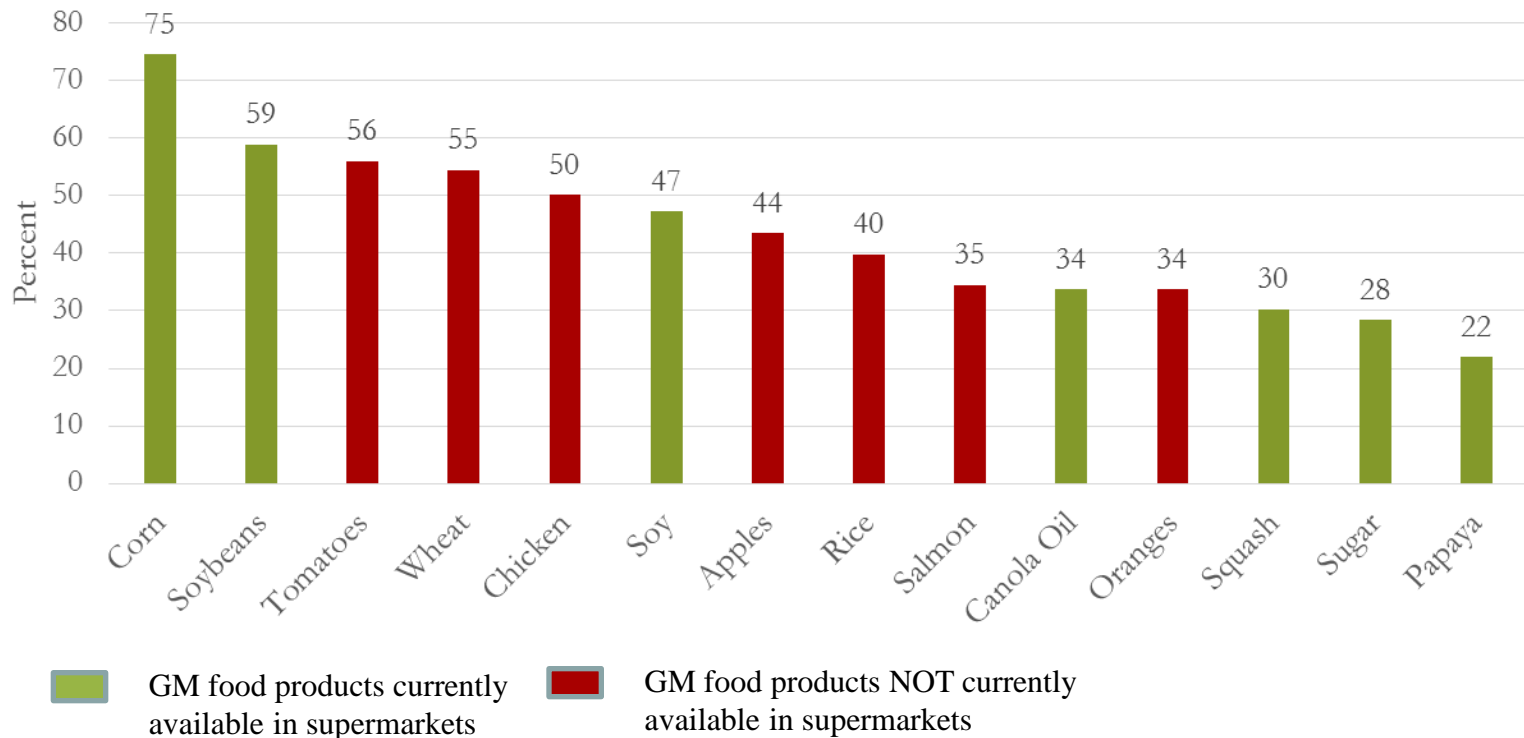
- *As far as you know, are there any foods containing genetically modified ingredients in supermarkets right now?*
 - Yes 43%
 - No 4%
 - Don't know 51%
 - Refused 2%

57%



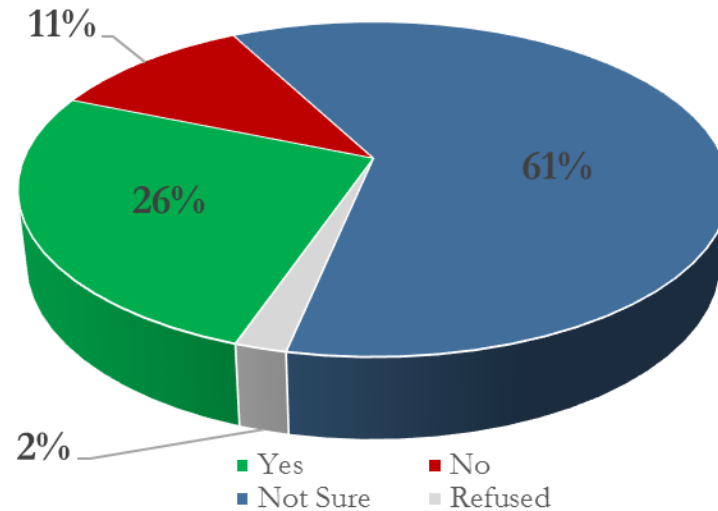
Perceived Availability of GM Foods

Percent of 491 Consumers who said GM foods are available in U.S. Supermarkets



Ever Eaten GM Foods?

- *As far as you know, have you ever eaten any food containing genetically modified ingredients?*
 - Only 26% say yes



Basis for Opinions

- *Would you say your opinion of genetically modified foods is based on a general feeling or specific issues?*
 - General feeling – 50%
 - Both – 34%
 - Specific issues – 15%

Opinions About Biotechnology

- Being uninformed doesn't stand in the way of having an *opinion*
 - The number of respondents who report approving or disapproving of biotechnology typically exceeds the number who report knowing much about it

Opinions About Biotechnology

- Relatively uninformed opinions are “uncrystallized”
- These opinions are:
 - Not well thought through
 - Not strongly held
 - Subject to change
 - Influenced by the wording of questions
- They are still important

Context for Decision Making

- Biotechnology is:
 - An abstract concept for many
 - Not high on the issue agenda for most people
 - Not something about which people have been forced to make *personal* decisions

Deciding About Biotechnology

- Once people make a decision their opinions become more crystallized
 - They adjust their attitudes and opinions to support their decisions
 - They pay attention to confirming information
 - They discount inconsistent information
 - They reinterpret disconfirming information to support their decision

Motivation and Ability

- Are people highly motivated and able to think carefully through information and form an argument?
- Are they only thinking superficially and using shortcut (Heuristic) processes to reach quick conclusions?

The Challenge

- What would it take to get people to move from largely using intuition to make decisions about biotechnology to a position where they can elucidate arguments based on evidence?
- Is this really the goal?
- How can we help people consider biotechnology in this way while also considering:
 - Nanotechnology
 - Synthetic Biology
 - Cloning
 - Climate Change
 - Etc.,

The Challenge

- An adverse event involving biotechnology would likely serve as a pivot point that would quickly catalyze public opinion and decision-making.
- Are there any positive developments likely to do the same?

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