Lecture 7 Ethical and Societal Considerations

How did societal disinterest in traditional plant and animal breeding become a global debate about GMOs?

As technology advances (gene editing) are we facing new opposition or acceptance?

Why are views of different applications of the technology so divergent?

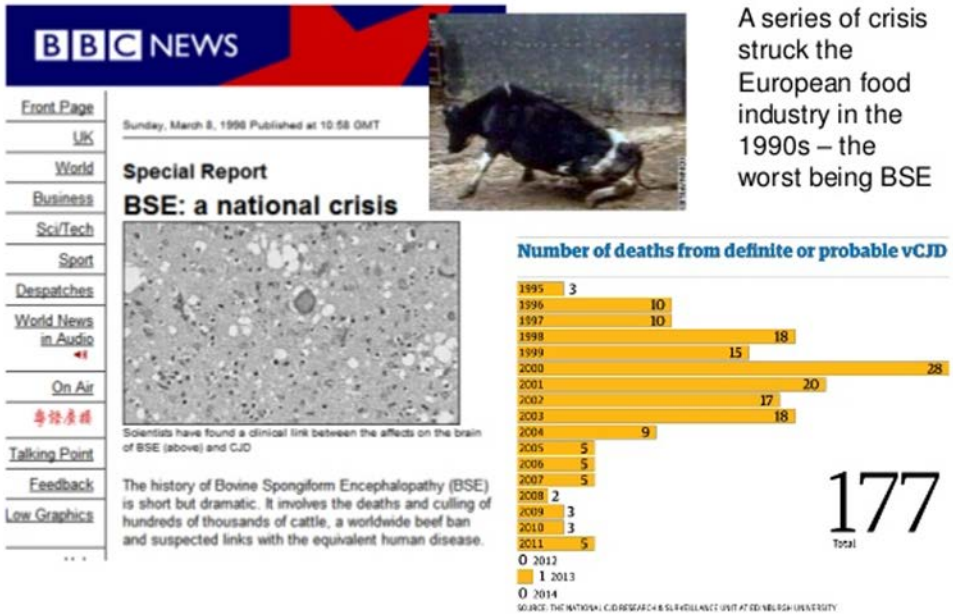
- Human applications – genetic diseases
- Plant and animal applications – productivity, disease and drought resilience,
  - plant applications - *bananas, corn, cotton, chestnut trees*
  - animal applications – *dairy cattle, pigs, chickens, cheese*

What are the ethical considerations about the use of this technology ?
Are the views of scientists aligned with the views of the public ? Should they be?

What is the role of data, science and science communication in the use of new and possibly controversial technologies?

The press photographed Mr Gummer - then Agriculture Minister in the Conservative government - tucking into the burger with his little girl at a boat show in Suffolk on May 6 1990.

The BSE/nvCJD crisis in the UK

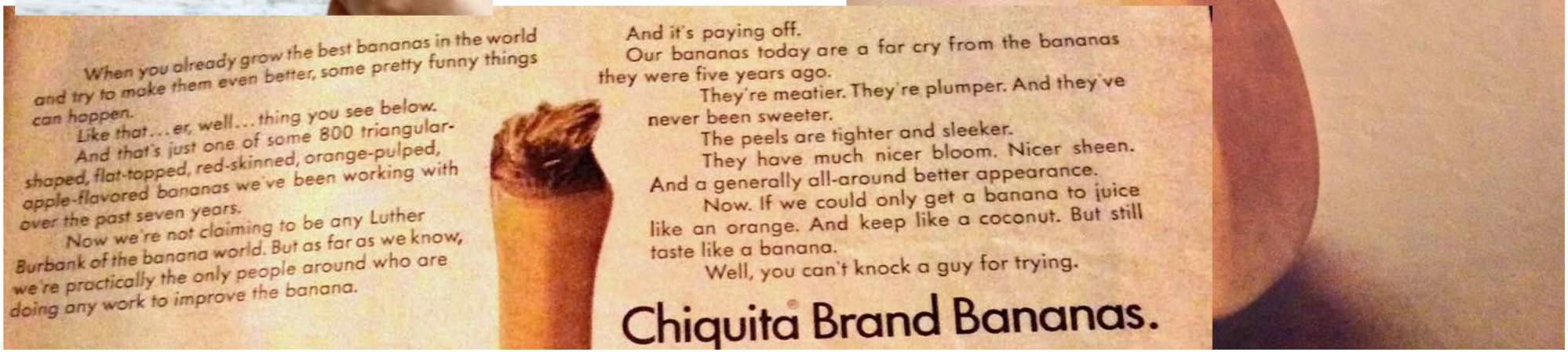


A series of crisis struck the European food industry in the 1990s – the worst being BSE

John Bostock, The development and implementation of European regulations for (fish and shellfish) traceability, Presentation given at the Symposium on seafood traceability and certification organised by Aqua-Int on behalf of the Korean Ministry of Oceans and Fisheries and Korean Fisheries Association, Busan, South Korea, 22 May 2015.

Second big Trust Issue

Chatelaine,
July 1968



A funny thing happened on the way to a better banana.

When you already grow the best bananas in the world and try to make them even better, some pretty funny things can happen.

Like that... er, well... thing you see below.

And that's just one of some 800 triangular-shaped, flat-topped, red-skinned, orange-pulped, apple-flavored bananas we've been working with over the past seven years.

Now we're not claiming to be any Luther Burbank of the banana world. But as far as we know, we're practically the only people around who are doing any work to improve the banana.

And it's paying off.

Our bananas today are a far cry from the bananas they were five years ago.

They're meatier. They're plumper. And they've never been sweeter.

The peels are tighter and sleeker.

They have much nicer bloom. Nicer sheen. And a generally all-around better appearance.

Now. If we could only get a banana to juice like an orange. And keep like a coconut. But still taste like a banana.

Well, you can't knock a guy for trying.

Chiquita® Brand Bananas.

APRIL/MAY 2012 ISSUE 88

30 GREEN AMERICAN

LIVE BETTER.
SAVE MORE. INVEST WISELY.
MAKE A DIFFERENCE.

INSIDE

PLUS!
GROCERY TIPS
How to Get GMOs Off Your Plate
p.20

"FrankenFood"

How genetically modified (GM) foods are taking over our food industry and wreaking havoc on our bodies, family farmers, and the planet. *Page 13*

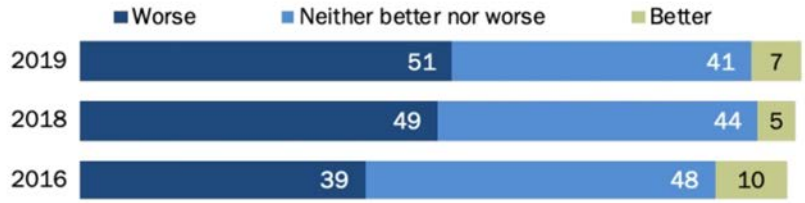
https://gmoanswers.com/gmos-food-and-medicine-overview

Pharmaceutical companies are looking to manufacture drugs that are intended to have deliberate effects on the biochemistry of their targets. Agricultural companies are adding traits that will help farmers or benefit consumers (e.g. non-browning apple), without affecting the safety of the crop.

In agriculture, the goal is to have no greater effect on our health and metabolism than the crop's non-GE variety. Again Golden Rice is the exception, as it is designed to have a higher nutritional content than its non-GE counterpart.

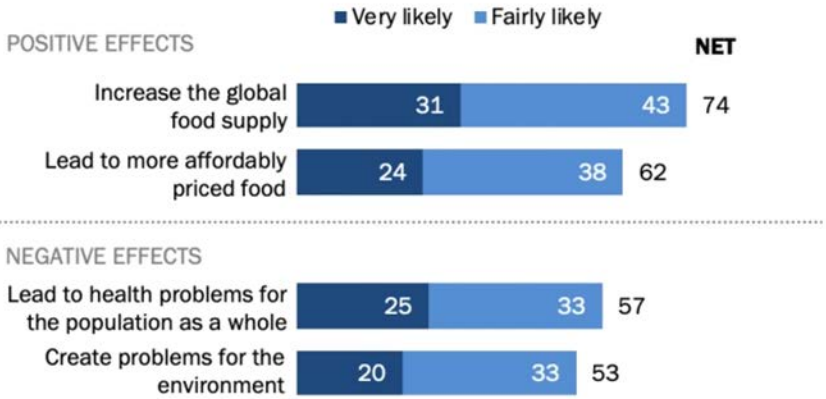
About half of U.S. adults think GM foods are worse for health than non-GM foods

% of U.S. adults who say that genetically modified foods are ____ for one's health than foods with no genetically modified ingredients



But most think GMOs are at least fairly likely to improve global food supply

% of U.S. adults who say that genetically modified foods are very/fairly likely to ...

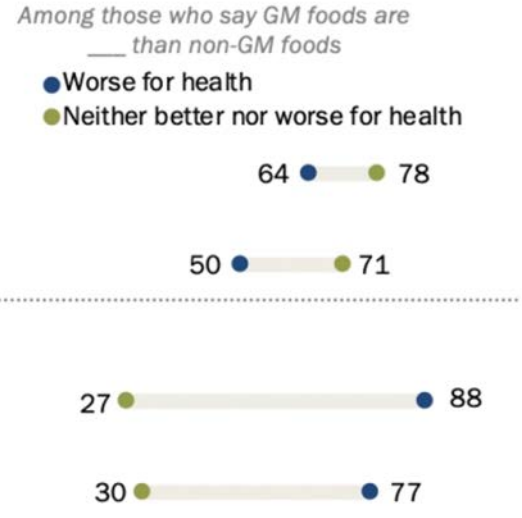


Note: Respondents who gave other responses or who did not give an answer are not shown.
Source: Survey conducted Oct. 1-13, 2019.

PEW RESEARCH CENTER

Americans who say GM foods are worse for health are much more inclined to expect negative effects ahead

% of U.S. adults who say genetically modified foods are very or fairly likely to ...

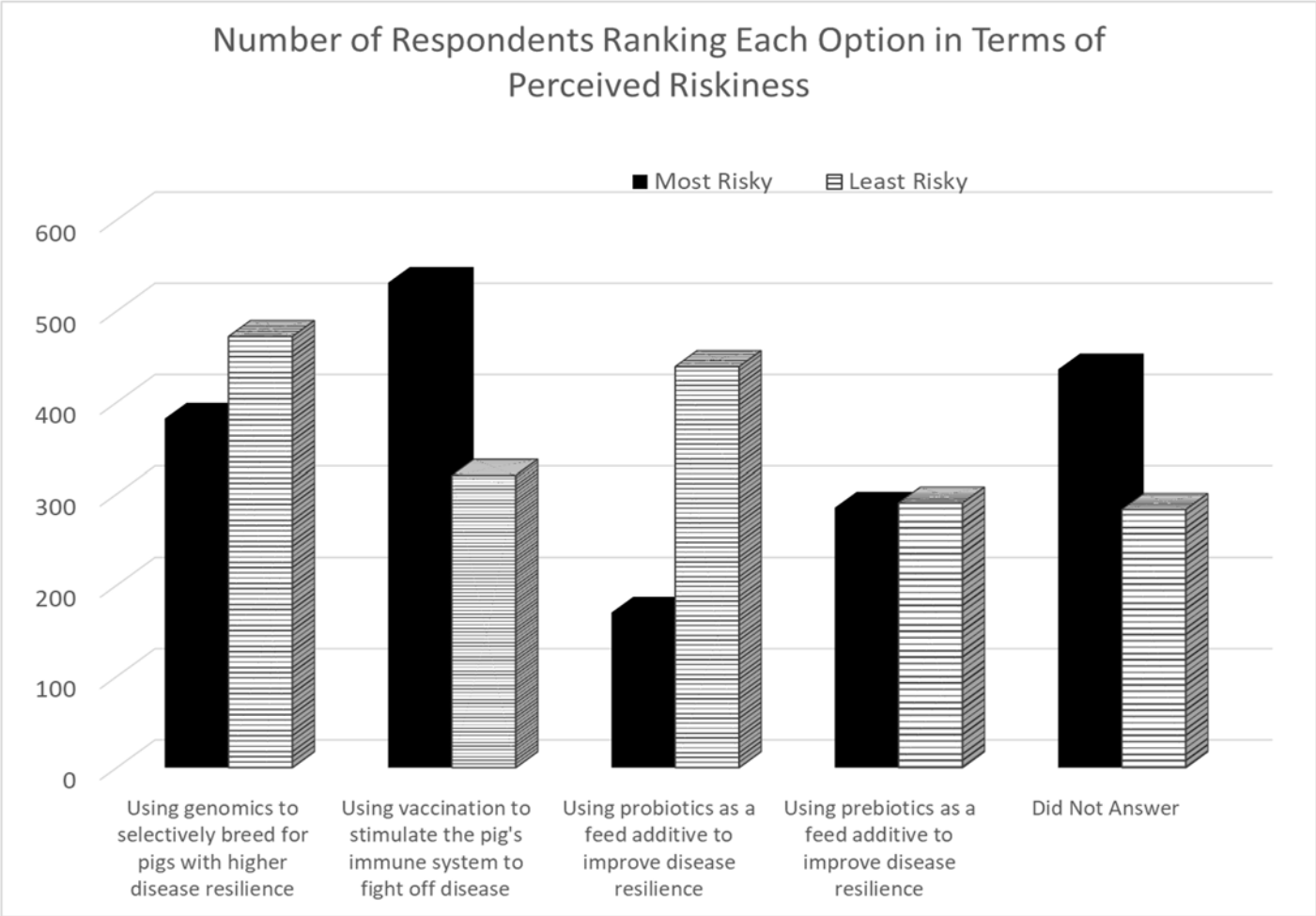


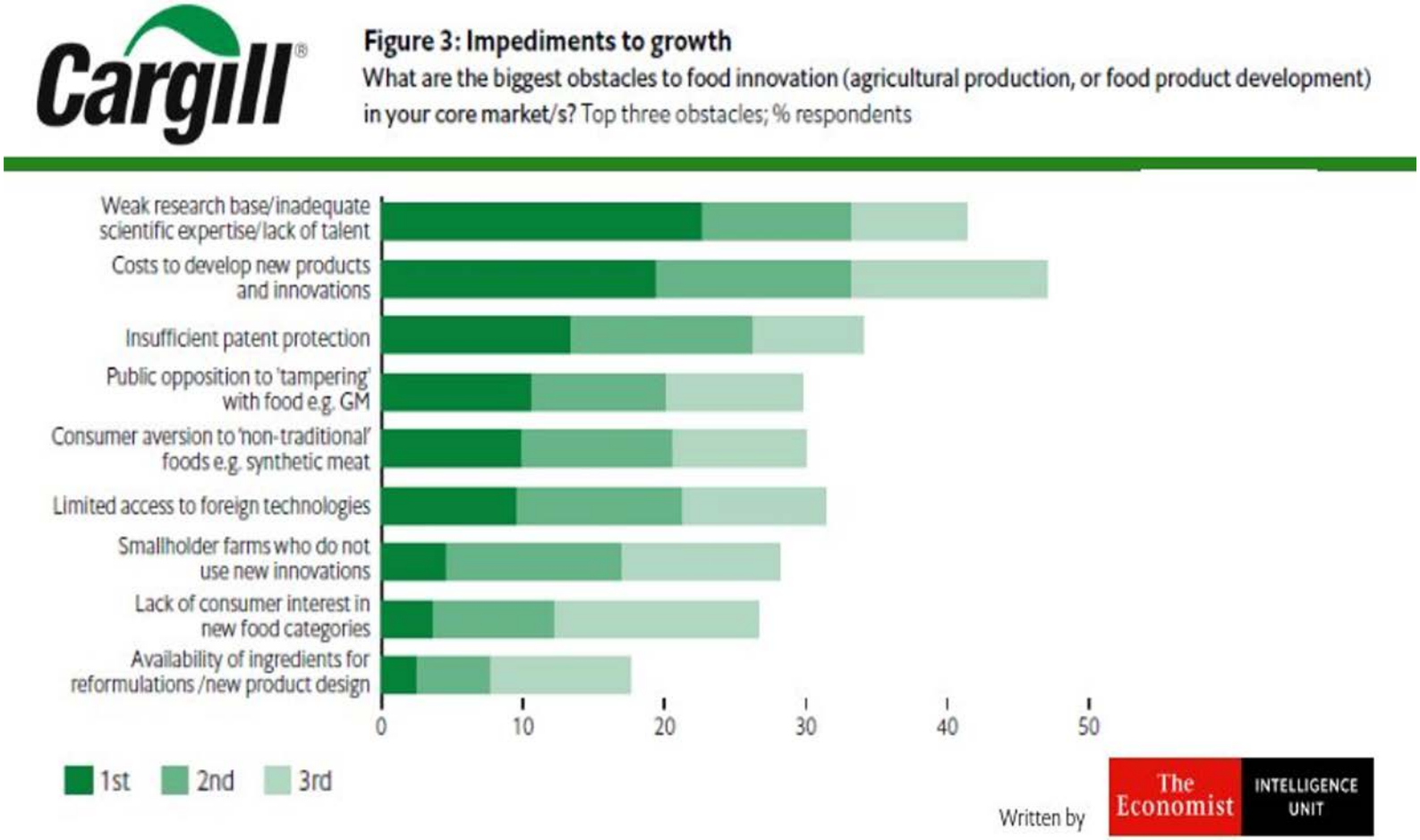
Note: There were not enough respondents in the sample saying that GM foods are better for health to show their expectations about the effects of GM foods. Respondents who said each effect was not too or not at all likely or who did not give an answer are not shown.
Source: Survey conducted Oct. 1-13, 2019.

PEW RESEARCH CENTER

https://www.pewresearch.org/fact-tank/2020/03/18/about-half-of-u-s-adults-are-wary-c
health-effects-of-genetically-modified-foods-but-many-also-see-advantages/

Relative Riskiness of Different Approaches to Livestock Disease Resilience





Source: FOOD 4.0: THE FUTURE OF FOOD INNOVATION IN ASIA
https://eiuperspectives.economist.com/sustainability/fixing-asias-food-system/white-paper/food-40

Food Giants Spend Big To Defeat Mandatory GMO Labeling Bill

Analysis shows that Coca-Cola ($5,040,000), PepsiCo ($3,230,000), Kraft ($1,180,000), Kellogg's ($1,310,000), General Mills ($1,100,000), and Land O'Lakes ($720,000) disclosed the largest lobbying expenditures that mentioned GMO labeling.

AUGUST 5, 2015

ENVIRONMENTAL WORKING GROUP (EWG)

Science Community Advises Against Mandatory GMO Labeling

Apr 30, 2014

A new paper released Monday in Washington, D.C., by the Council for Agricultural Science and Technology reviews the debate surrounding labeling for genetically modified foods (GMOs) in the United States and the potential impact of making it mandatory. The authors conclude that current labeling measures already provide consumers with non-GMO choices and that mandatory labeling would raise food costs.

Saying state labeling laws likely will spur litigation, they also conclude that legislators and consumers need independent, objective information to move the GMO conversation from contentious claims to a fact-based dialogue.

….It states, "All domesticated crops and animals have been genetically modified in some way, whether through conventional breeding techniques or biotechnology. Worldwide scientific evidence shows that both types of breeding are equally safe."

Prior to the Vermont GMO Mandatory Labeling Law Coming Into Effect

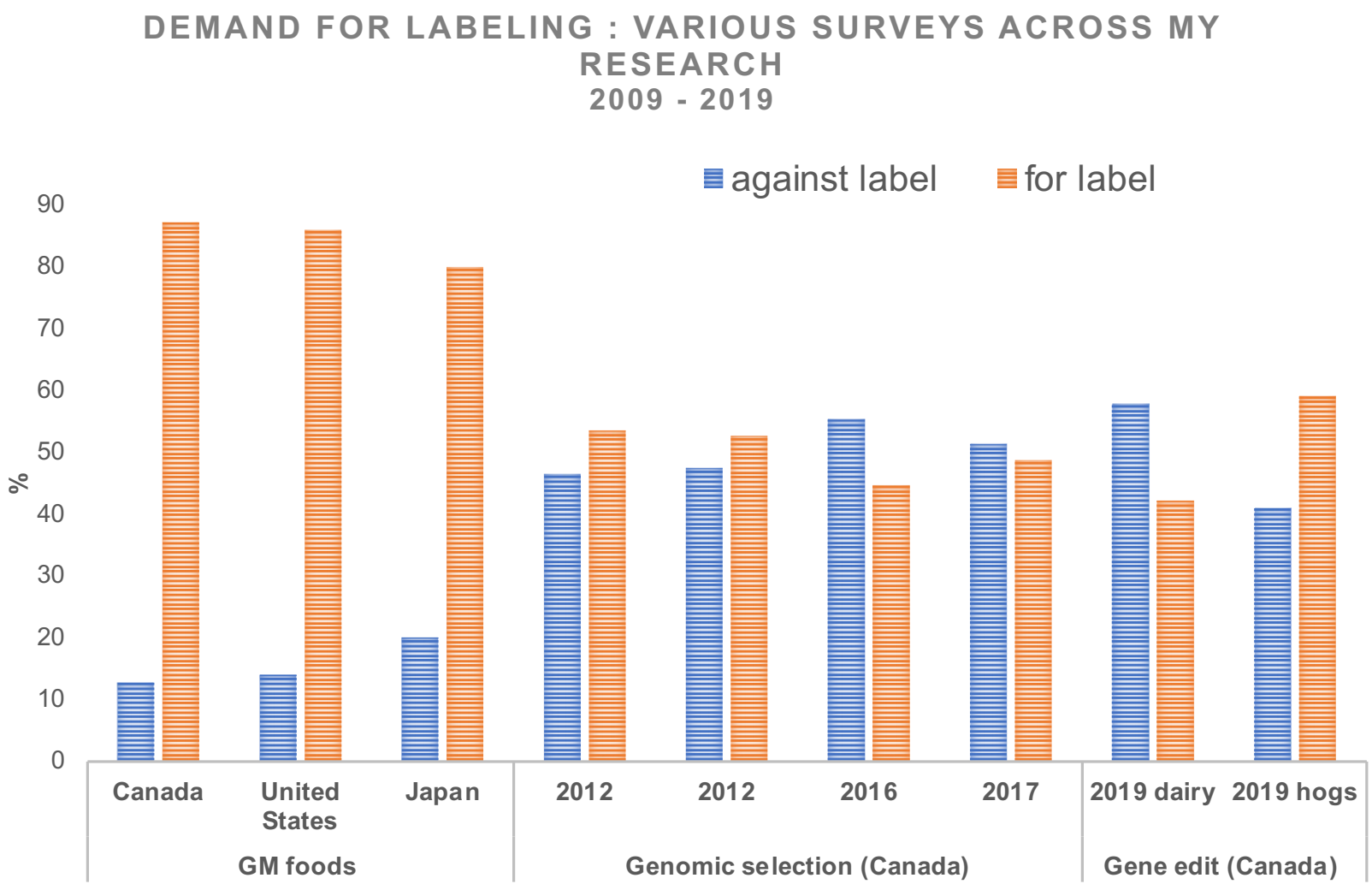
Do my favorite General Mills products contain GMOs or Genetically Modified ingredients? http://www.generalmills.com/Ingredients March 2016

ConAgra, Mars and Kellogg's followed suit – March 2016

Campbell's voluntarily labeling GMOs announced January 2016

Canada won't be following U.S. in labelling GMO food products

A plan to label all genetically modified food products in the U.S. won't be applied in Canada. *Toronto Star* *Wed., March 30, 2016*


DEMAND FOR LABELING : VARIOUS SURVEYS ACROSS MY RESEARCH
2009 - 2019
against label
for label
%
90
80
70
60
50
40
30
20
10
0
Canada
United States
Japan
2012
2012
2016
2017
2019 dairy
2019 hogs
GM foods
Genomic selection (Canada)
Gene edit (Canada)

Food companies say GMO labels having no impact on product sales

By Ken Roseboro
https://non-gmoreport.com/articles/food-companies-say-gmo-labels-no-impact-product-sales/

Are consumers avoiding products with GMO labels? According to the companies with GMO labeled products, the labels have had zero impact on sales.

*"**The disclosure of GM ingredients in those products that are made with them has had no impact aside from anecdotal notes of congratulations and thanks from shoppers**,"* says Michael Neuwirth, Dannon's senior director of external communication.

The same is true at General Mills. *"**We haven't noted any strong consumer response, and haven't seen any impact on sales**,"* says Bridget Christenson, General Mills media relations representative.

Thomas Hushen, media representative at Campbell's, also hasn't seen any negative impact of GMO labeling. In fact, he says the company has received positive feedback.

*"**Regarding sales, there are a variety of factors that impact sales and we can't attribute changes to any one thing,"*** **he says.** ***"(Labeling) was a popular decision in the eyes of consumers and customers**."*

Hushen said Campbell's talked to *"thousands of consumers"* about labeling.

*"**We know consumers want labeling so we did research by talking to them to understand more about what they wanted that label to say**,"* he says.

Campbell's recently announced that it was quitting the Grocery Manufacturers Association over the group's opposition to mandatory GMO labeling.

Gene-Edited CRISPR Mushroom Escapes U.S. Regulation
Fungus is the first organism engineered by CRISPR–Cas9 to get a green-light from the U.S. government
• By Emily Waltz, Nature magazine on April 14, 2016

Scientists must help to inform regulators wrestling with how to handle the next generation of genetically engineered crops.

Nature magazine on April 14, 2016

Monsanto licenses CRISPR technology to modify crops — with key restrictions https://www.statnews.com/2016/09/22/monsanto-licenses-crispr/

Monsanto cannot use it for gene drive, the controversial technique that can spread a trait through an entire population, with unknown consequences.

Monsanto not use CRISPR-Cas9 to create sterile ("terminator") seeds.

Five sets of ethical concerns have been raised about GM crops:

potential harm to human health;
potential damage to the environment;
negative impact on traditional farming practice;
excessive corporate dominance; and
the 'unnaturalness' of the technology.

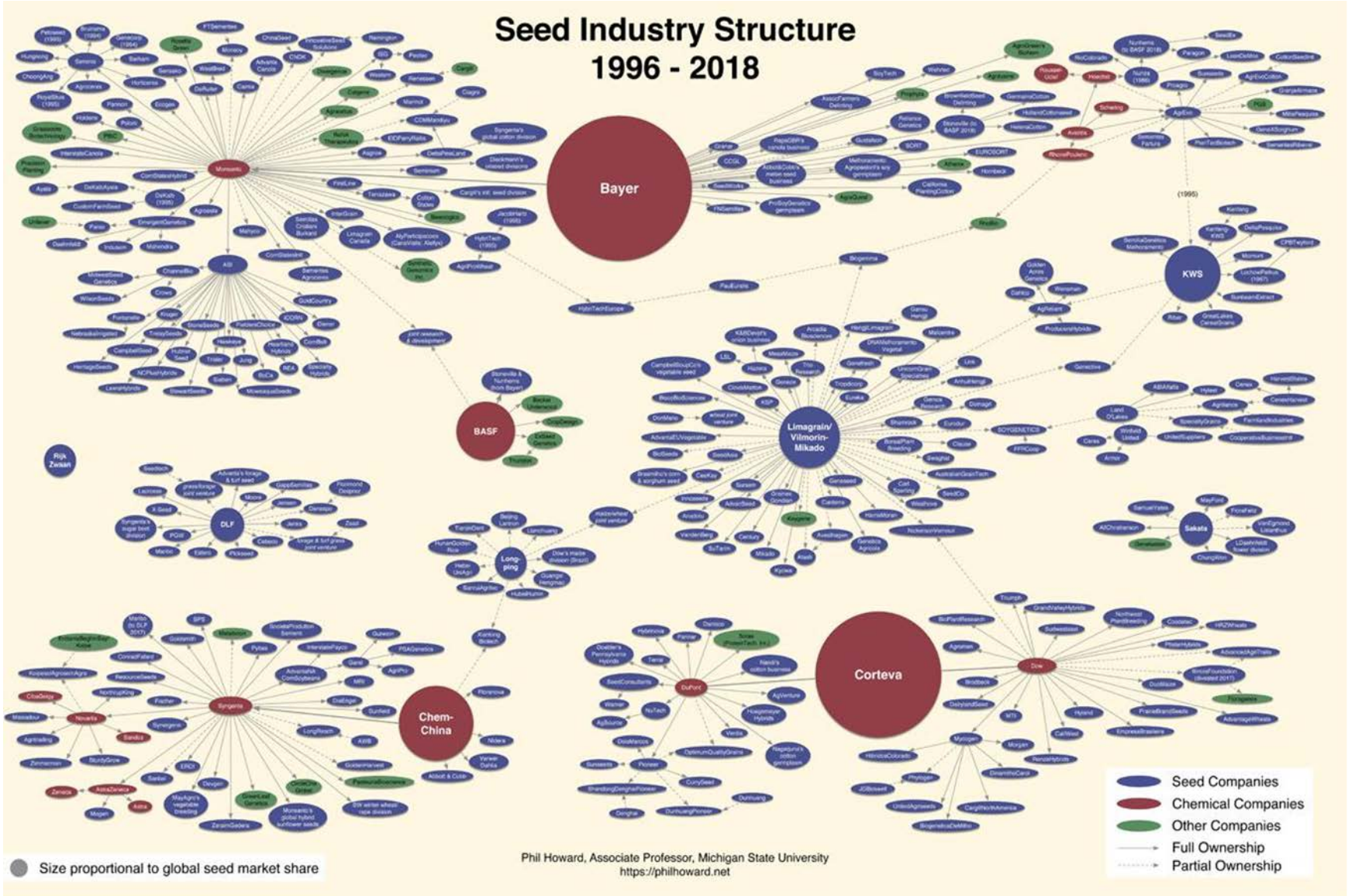
https://pubmed.ncbi.nlm.nih.gov/20850572/#:~:text=Five%20sets%20of%20ethical%20concerns,'unnaturalness'%20of%20the%20technology.

Issues related to the ethics of not using GM technologies

Global needs for food and for medicines driven by many issues

- population growth,
- climate change,
- antibiotic resistant bacteria,
- plant and animal diseases

Should we not use technology to fix?



https://philhoward.net/2018/12/31/global-seed-industry-changes-since-2013/

‘Scorching ethical debate’: Designer babies are already here. The future looks even more revolutionary — and contentious

ZME Science | March 22, 2021

Gene editing could make social inequalities worse if misused, warns author

'The rich would be buying better genes for their children, which would be a nightmare,' says Walter Isaacson

CBC Radio · Posted: Mar 23, 2021 4:56 PM ET | Last Updated: March 23

Author and professor Walter Isaacson says gene editing could give us the power to wipe out diseases, but it could also take away our diversity. (Simon & Schuster)

May 18, 2017,02:28pm EDT

The Anti-Vaccine And Anti-GMO Movements Are Inextricably Linked And Cause Preventable Suffering

Kavin Senapathy
Contributor
Opinion

Critics of the **anti-vaccine and anti-GMO movements**, which overlap more and more over time, point out that they share several fundamental tactics and viewpoints. Both cite cherry-picked, discredited, and retracted scientific studies, such as the 1998 Andrew Wakefield study linking the MMR vaccine with autism, and the 2012 Gilles-Éric Séralini rat study linking genetically engineered crops with cancer, while ignoring the vast bodies of evidence against them. Both movements claim special "you'll only hear it from us" knowledge and spread messaging via social media memes. Both use imagery of syringes, stuck willy-nilly into crying children or tomatoes, to plant fear and aversion. Both are quick to label detractors as shills, either for "Big Pharma" or "Big Ag."

This undated photo provided by Revivicor, Inc., a unit of United Therapeutics, shows a genetically modified pig. U.S. regulators have approved a genetically modified pig for food and medical products, making it the second such animal to get the green light for human consumption -- but United Therapeutics, the company behind it says there are no imminent plans for its meat to be sold. (Revivicor, Inc. via AP)

- **US regulators OK genetically modified pig for food, drugs**
- By CANDICE CHOI December 15, 2020

https://apnews.com/article/technology-animals-genetics-61789fc6eeb4999a314922f9ab73c18e

NEW YORK (AP) — U.S. regulators have approved a genetically modified pig for food and medical products, making it the second such animal to get the green light for human consumption. But the company behind it says there are no imminent plans to sell it for meat.

The pig is genetically engineered to eliminate the presence of alpha-gal, a type of sugar found in many mammals. The sugar makes its way into many products — including medications, cosmetics and food — and can cause allergic reactions in some people.

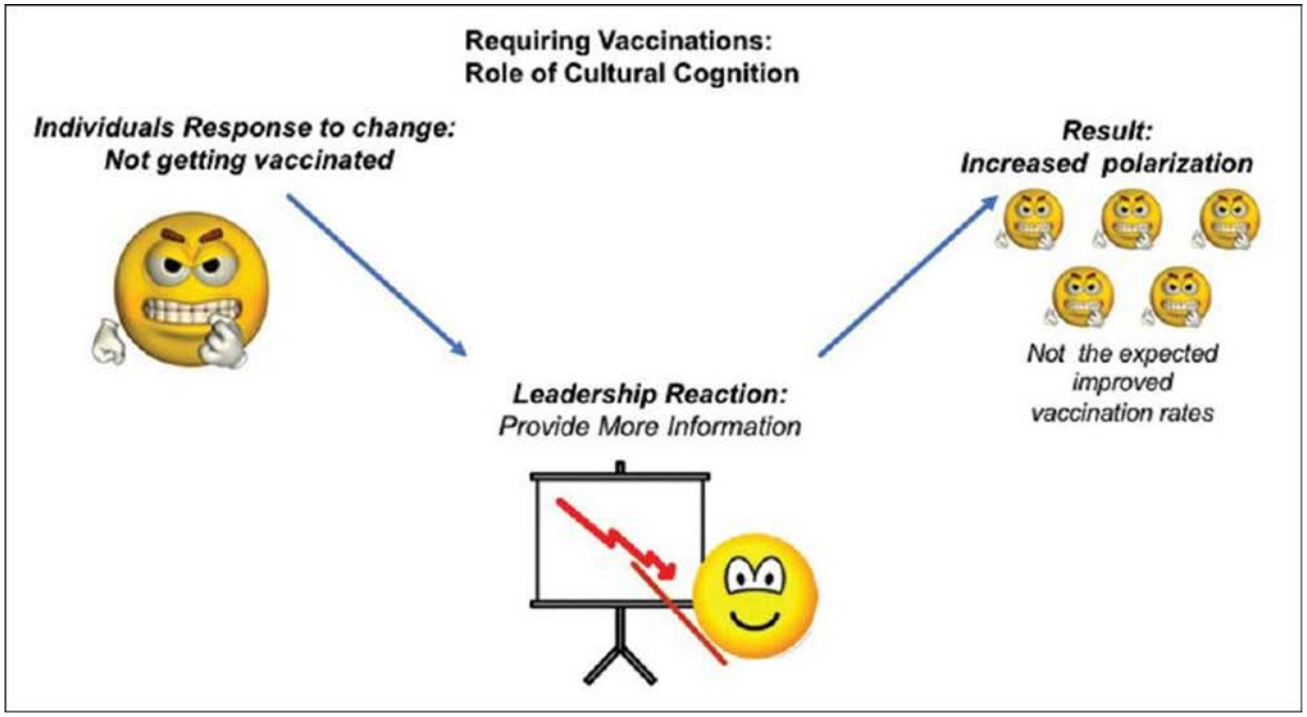
The main goal of the company behind the pig, United Therapeutics Corp., is to develop medical products, such as blood thinners, that won't set off such reactions, said its spokesman Dewey Steadman.

The lure of rationality: Why does the deficit model persist in science communication?

Molly J. Simis and Haley Madden

Public Understanding of Science
2016, Vol. 25(4) 400–414

https://www.ijam-web.org/viewimage.asp?img=IntJAcadMed_2018_4_1_12_230849_f2.jpg



Lecture 7 Questions

1. What were the origins of public opposition to GMOs?

1. Regulating versus non-regulating new technologies such as gene-editing: which will increase societal acceptance? Should that be a consideration?

1. Should there be public involvement in setting research priorities. The EU has just formalized public involvement in food safety risk assessments.