

The Ethics of Alternative Proteins: Technology, Animals, and Sustainability



VEGAN PROTEIN SOURCES

PROTEIN PER SERVING

cheatdaydesign.com

 SEITAN (4oz) 28g	 PEA PROTEIN (1/4 CUP) 22g	 TEMPEH (4oz) 21g	 SOYBEANS (1/4 CUP) 15g
 LENTILS (1/4 CUP) 13g	 TVP (1/4 CUP) 12g	 TOFU (4oz) 12g	 PUMPKIN SEEDS (1/4 CUP) 9g
 EDAMAME (1/2 CUP) 9g	 NUT BUTTER (1/4 CUP) 8g	 BEANS (1/2 CUP) 7g	 FARRO (1/4 CUP) 7g
 NUTS (1/4 CUP) 6g	 QUINOA (1/4 CUP) 6g	 CHICKPEAS (1/2 CUP) 6g	 CHIA SEEDS (1/4 CUP) 6g



Garrett M. Broad, Ph.D.
Robert M. Chiles, Ph.D.
National Academies Food Forum
August 17, 2022

Disclosures and Conflicts of Interest

Broad has served as a collaborative researcher with a number of organizations focused on community-based food justice, animal protection, and public interest media (see CV for details). Broad is also an incoming board member with the Plant-Based Foods Institute, a non-profit focused on identifying and implementing strategies that promote a plant-based food system.

Chiles' stakeholder engagement has focused on policymakers, tech forums, cooperative business groups, alt protein companies, ag scientists, and NGOs. He served on the Board of Directors for the Agriculture, Food, and Human Values Society (2018-2021).

Chiles and Broad are PIs on a grant from the USDA's National Institute of Food and Agriculture, focused on equitable economic pathways for cellular agriculture.

THE BIG QUESTION:

What is it about
“fake” meat that gets people so
worked up?

**WHAT'S HIDING IN YOUR
PLANT-BASED MEAT?**



Find out what you're putting in your mouth at

CleanFoodFacts.com

PHOTO BY THE CENTER FOR CONSUMER FREEDOM

**I BELIEVE THAT IN 30
YEARS OR SO WE WILL NO
LONGER NEED TO KILL ANY
ANIMALS AND THAT ALL
MEAT WILL EITHER BE
CLEAN OR PLANT-BASED,
TASTE THE SAME AND
ALSO BE MUCH HEALTHIER
FOR EVERYONE.”**

*RICHARD BRANSON,
VIRGIN AMERICA FOUNDER AND MEMPHIS
MEATS INVESTOR*

A close-up of a person's face with a red bindi.

COMMENTARIES, ENVIRONMENT, HEALTH | JUNE 16, 2019

Fake Food, Fake Meat: Big Food's Desperate Attempt to Further the Industrialisation of Food

Dr Vandana Shiva

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OUR LATEST VIDEO

ET BIODIVERSITY
A 10-minute video explaining the importance of biodiversity and how it is being lost. It features a mix of scientific and artistic imagery.

Professor Tony Shilton Offers the Insecticide Dipe to Cornell Students
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OUTLINE:

- I. About us; disclosures; why this debate
- II. Our current historical moment:
Multiple sustainability crises
- III. Making sense of the alt protein debate:
 - Ethical theory (a *very* brief intro)
 - “Sociotechnical Imaginaries”
 - “Meat Attachment”: The 4 Ns
- IV. The Alt Protein Ethical Matrix**
- V. Postscript: Food tech justice and the moral imagination

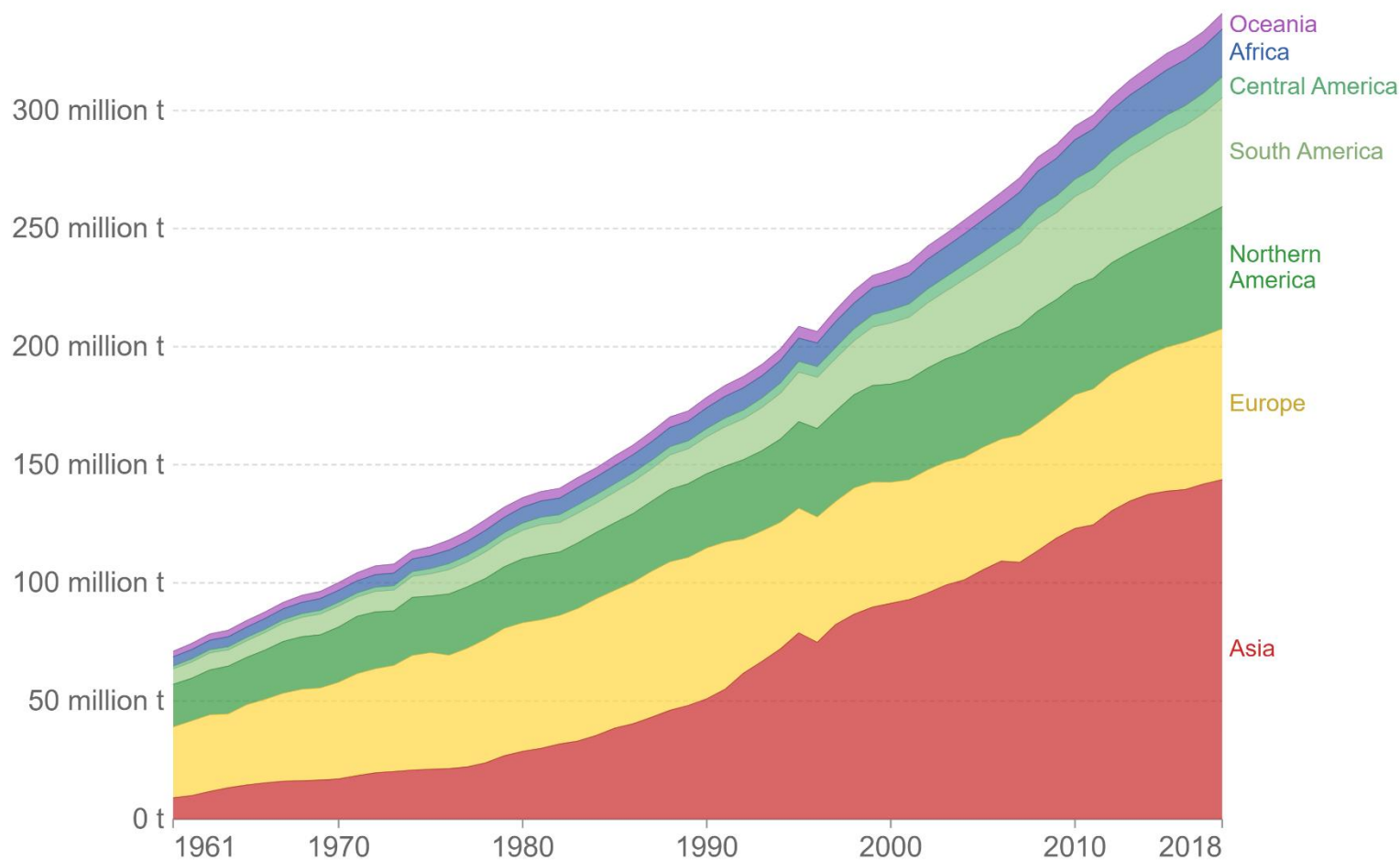
Our Current Historical Moment: Multiple Sustainability Crises

SUSTAINABLE DEVELOPMENT GOALS



Our Current Historical Moment: Multiple Sustainability Crises

Global meat production, 1961 to 2018



Source: UN Food and Agriculture Organization (FAO)

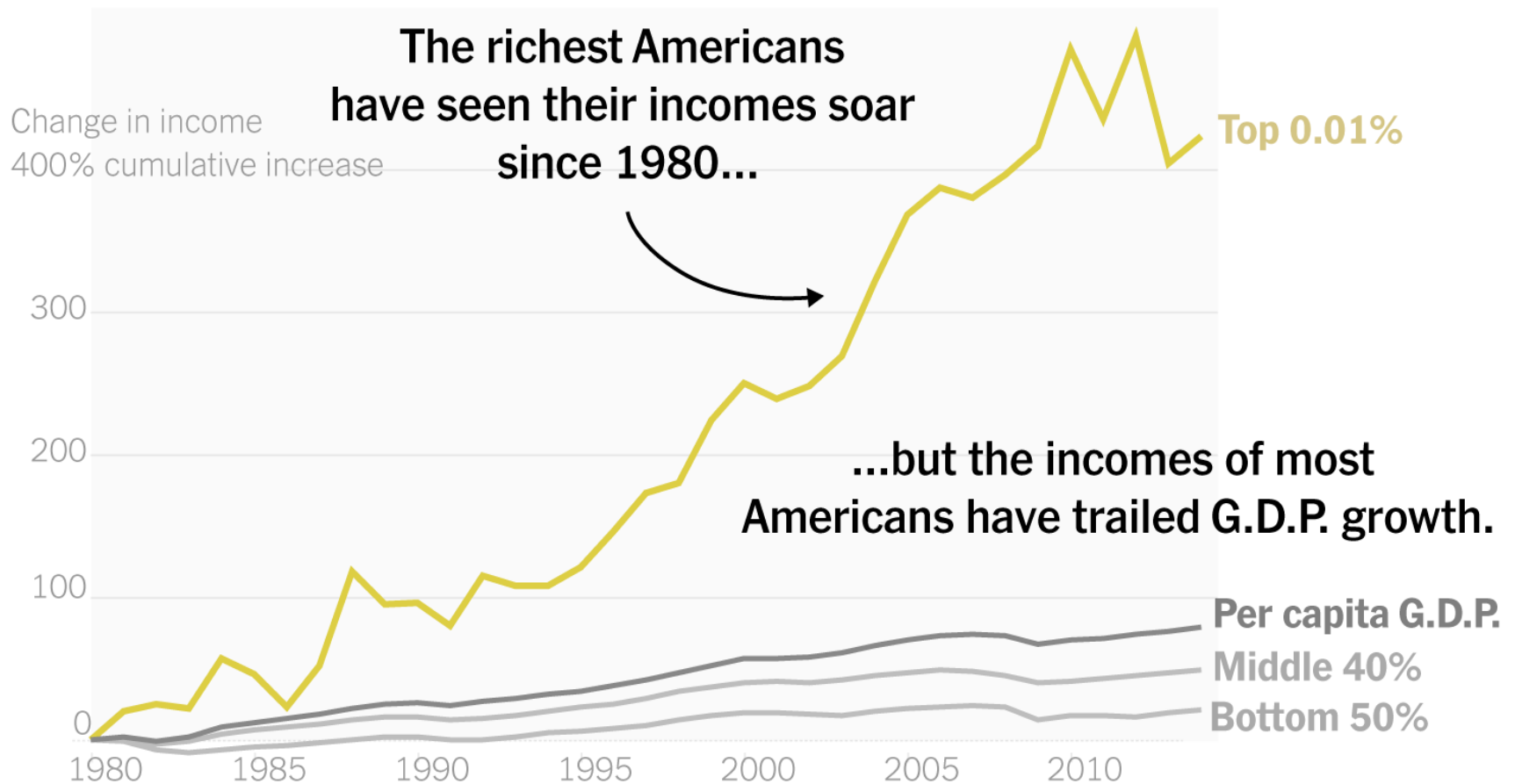
OurWorldInData.org/meat-production • CC BY

Our Current Historical Moment: Multiple Sustainability Crises

SUSTAINABLE DEVELOPMENT GOALS



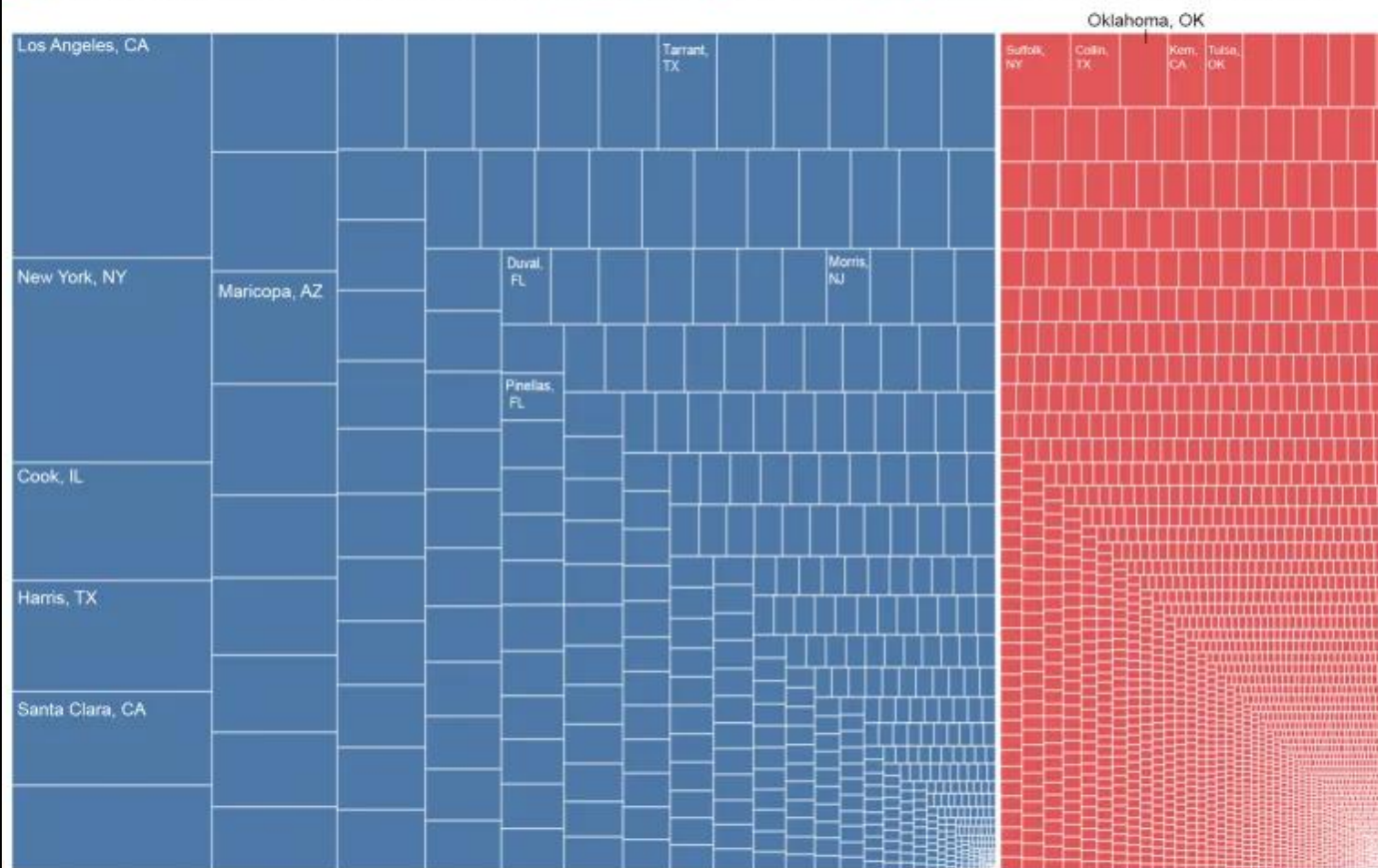
Our Current Historical Moment: Multiple Sustainability Crises



Our Current Historical Moment: Multiple Sustainability Crises

Figure 1. Candidate's share of 2018 Gross Domestic Product (GDP) by county in the 2020 presidential election

- The more-than-500 counties won by **Joe Biden** generated **71 percent** of America's GDP in 2018
- The more-than-2500 counties won by **Donald Trump** generated **29 percent** of America's GDP in 2018



Source: Brookings analysis of data from BEA, Dave Leip's Election Atlas, and The New York Times.

Our Current Historical Moment: Multiple Sustainability Crises



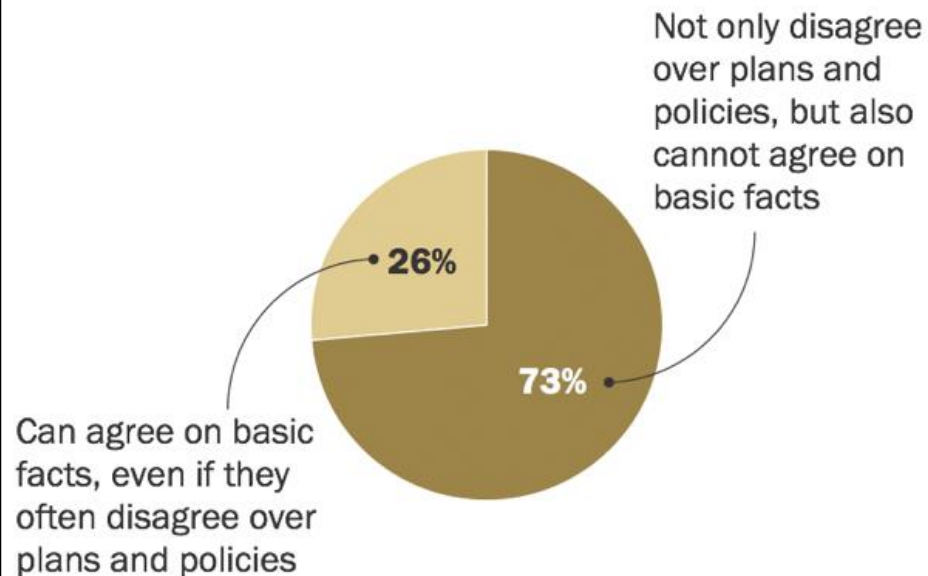
"I think that a post-truth society is a reflection of something deeper which is a basic lack of authority or the **decline of authority of institutions** across the board... If you think about the things that defined our society, they were **corporations, labor unions, the family, churches, political parties...** Over the last 40 to 50 years, every single one of those institutions has seen a decline in the number of people saying they trust those institutions."

"The biggest backlash, resentment and fear are coming from those who feel that they're part of the middle class but are in danger of falling downwards into genuine poverty. **Fear of losing one's social status...**"

Our Current Historical Moment: Multiple Sustainability Crises

Most Americans said in 2019 that Republican and Democratic voters can't agree on 'basic facts'

On important issues facing the country, most Republican voters and Democratic voters ... (%)



Source: Survey of U.S. adults conducted Sept. 3-15, 2019.
"Partisan Antipathy: More Intense, More Personal"

PEW RESEARCH CENTER

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*What's the right thing for us to
do?*

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IF YOU'VE WATCHED

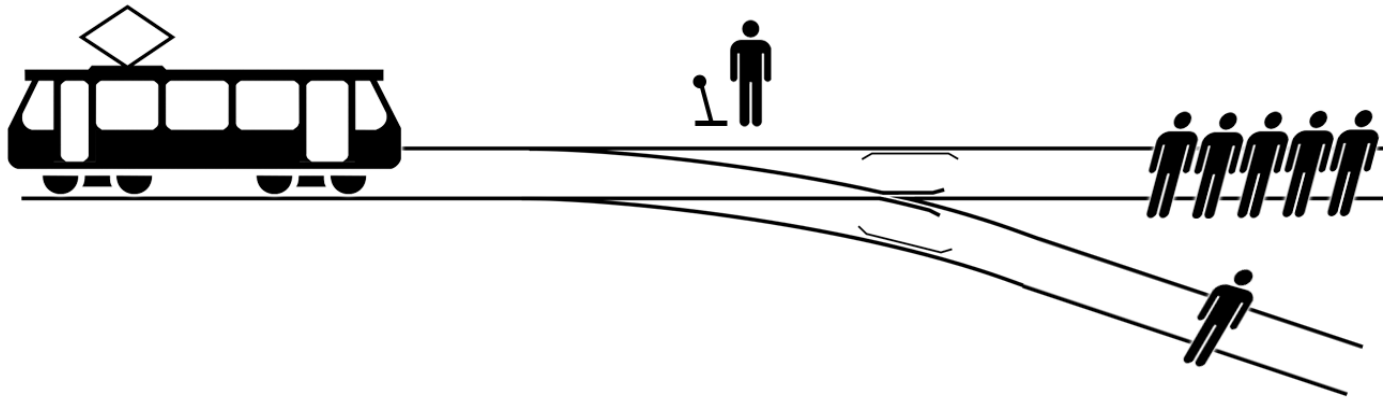
FAKE FOOD, FAKE MEAT: BIG FOOD'S DESPERATE ATTEMPT TO FURTHER THE INDUSTRIALISATION OF FOOD

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Ethical Theory (A Very Brief Intro)

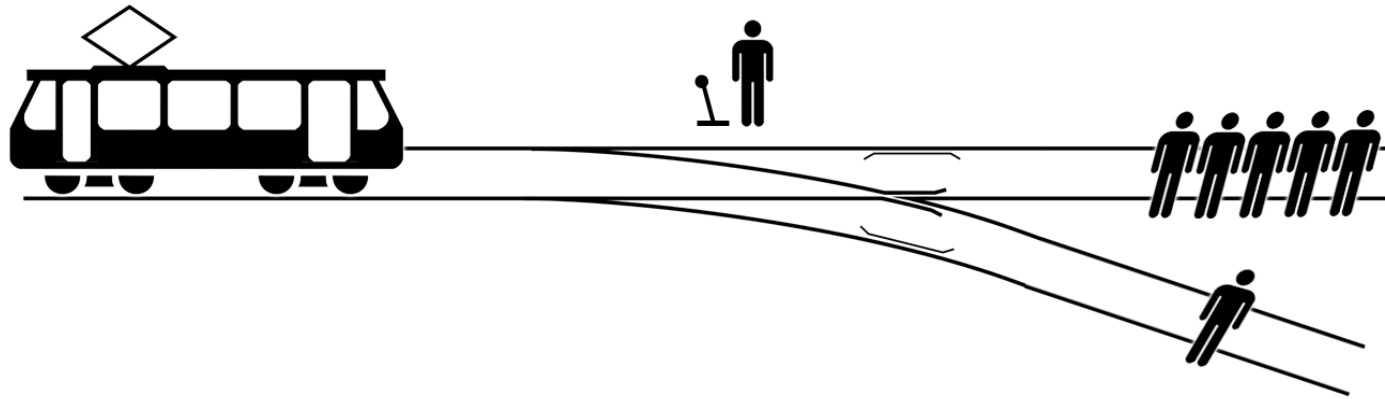
A trolley is coming down the tracks, and it's about to hit 5 people. If you pull a lever, it will divert the trolley and kill 1 person.



Do you pull the lever?

Ethical Theory (A Very Brief Intro)

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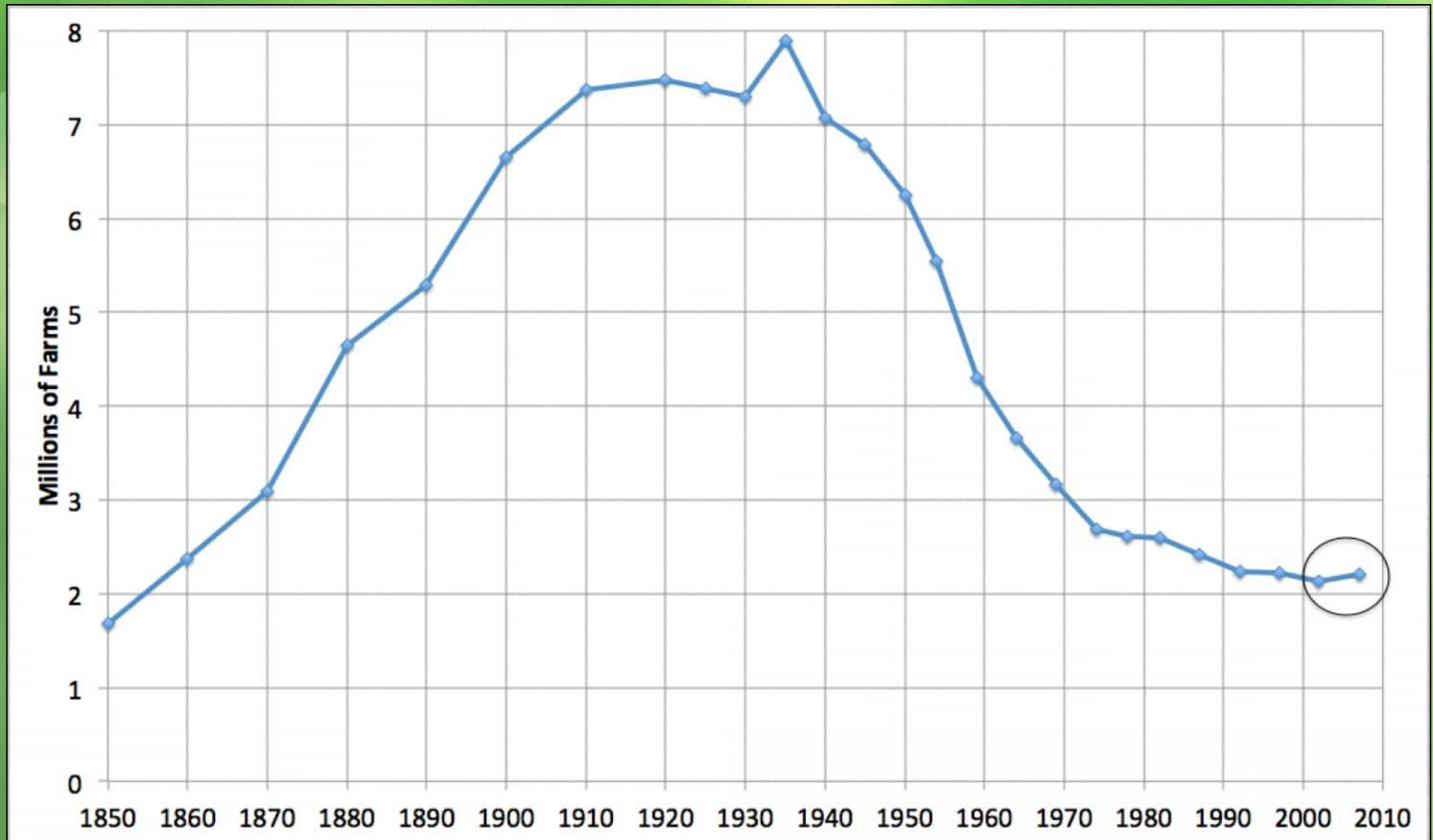


Do you pull the lever?

YES: The greatest good for the greatest number. (Utilitarian theory)

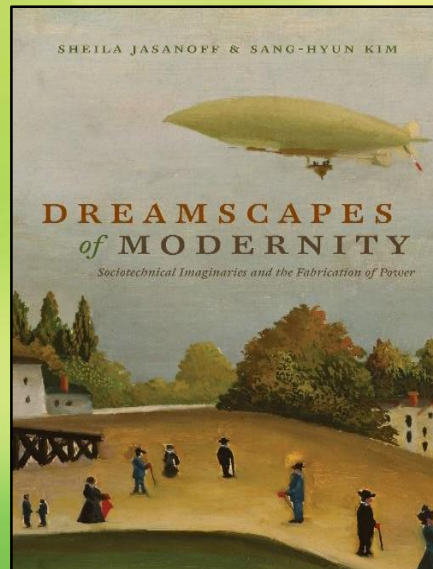
NO: The ends do not justify the means. (Rights-based theory)

Ethical Theory (A Very Brief Intro)



Ethical Perspectives on Technology

Sociotechnical imaginaries are defined as “collectively held, institutionally stabilized, and publicly performed **visions of desirable futures**, animated by shared understandings of forms of social life and social order attainable through, and supportive of, advances in science and technology.”
- Jasanoff (2015:4)



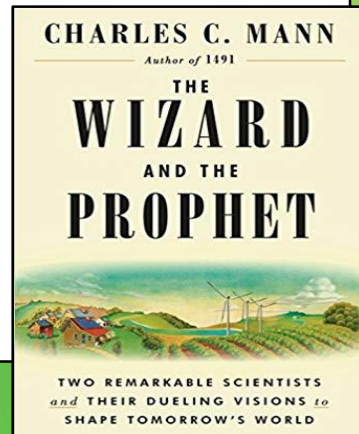
Ethical Perspectives on Technology

“Wizards basically believe that science and technology, properly applied, can let us produce our way out of dilemmas. Prophets believe that there are natural limits, and we transgress these limits at our peril.

One is saying, “Be smart, make more, and that way **everyone can win.**” The other is saying, “Hunker down, conserve, **obey the rules,** otherwise everyone is going to lose.”

*Wizards: Industrial-scale, Centralized,
Technology-focused (Utilitarian).*

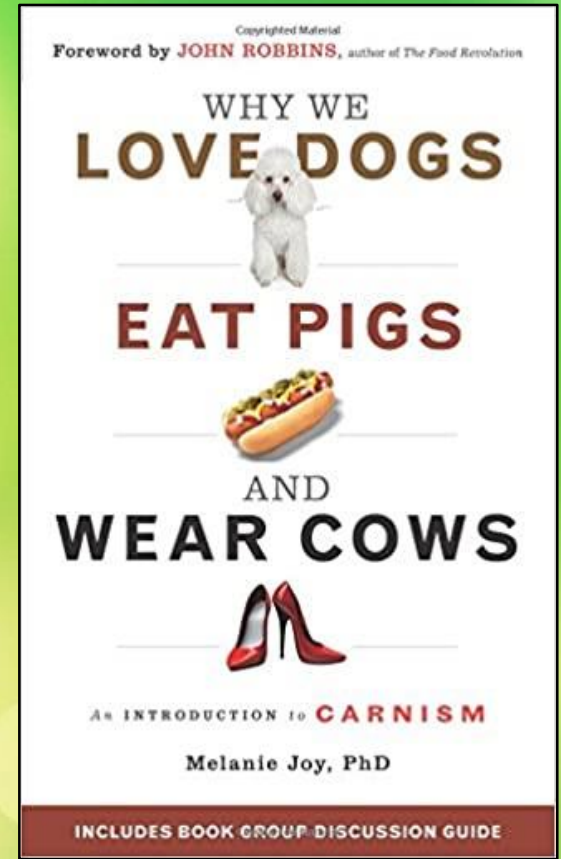
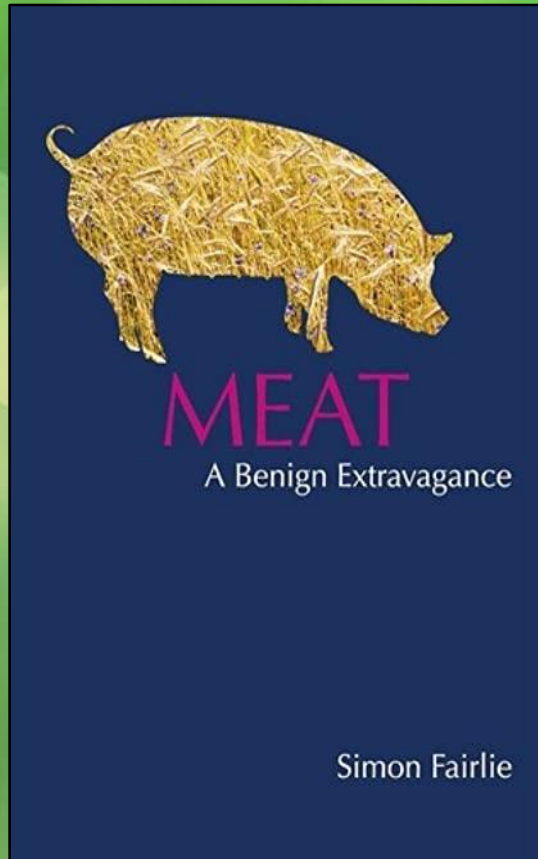
*Prophets: Local-scale, Decentralized,
Culturally-focused (Rights-Based).*



Ethical Perspectives on Animal Foods



Ethical Perspectives on Animal Foods



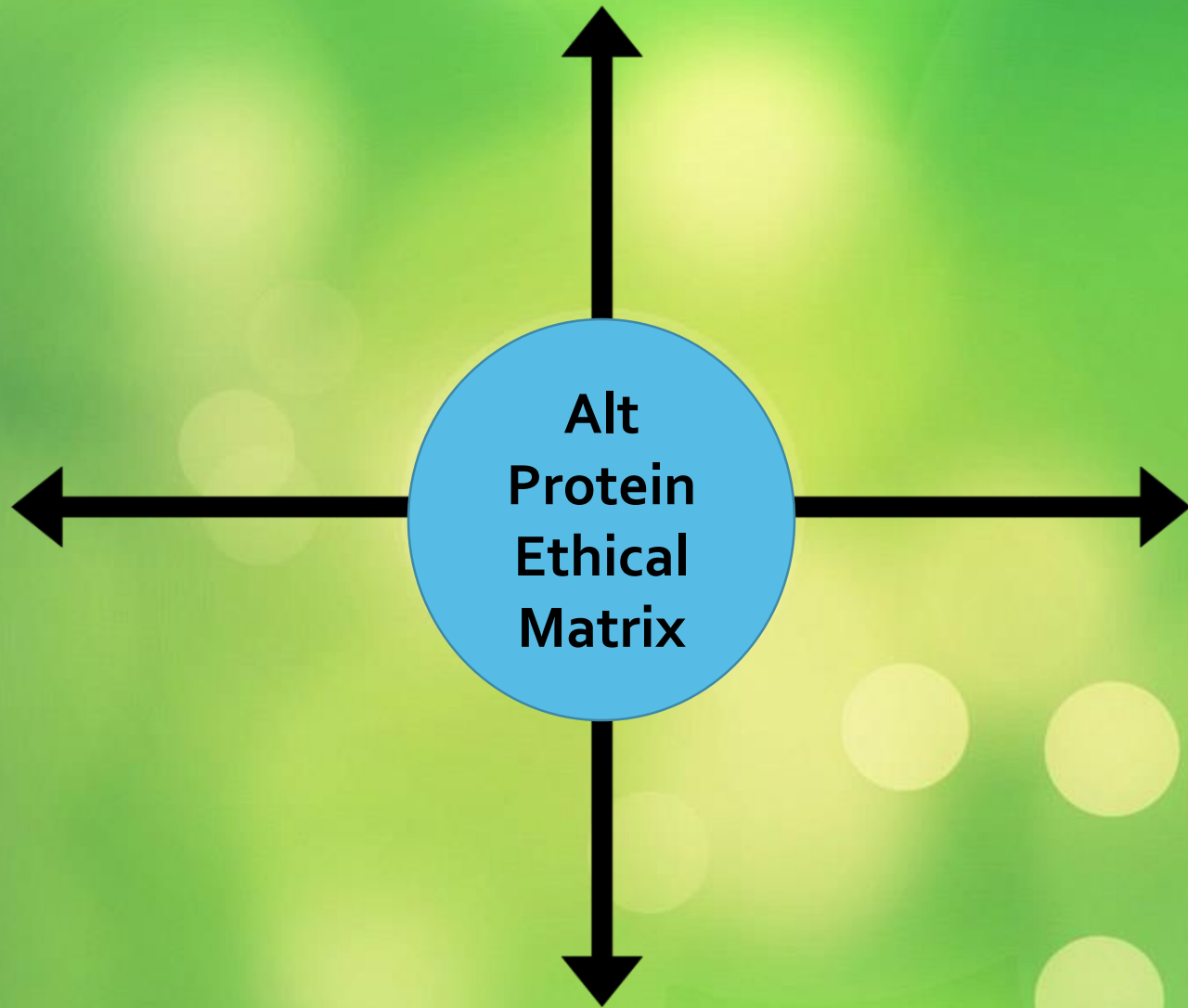
Ethical Perspectives on Animal Foods

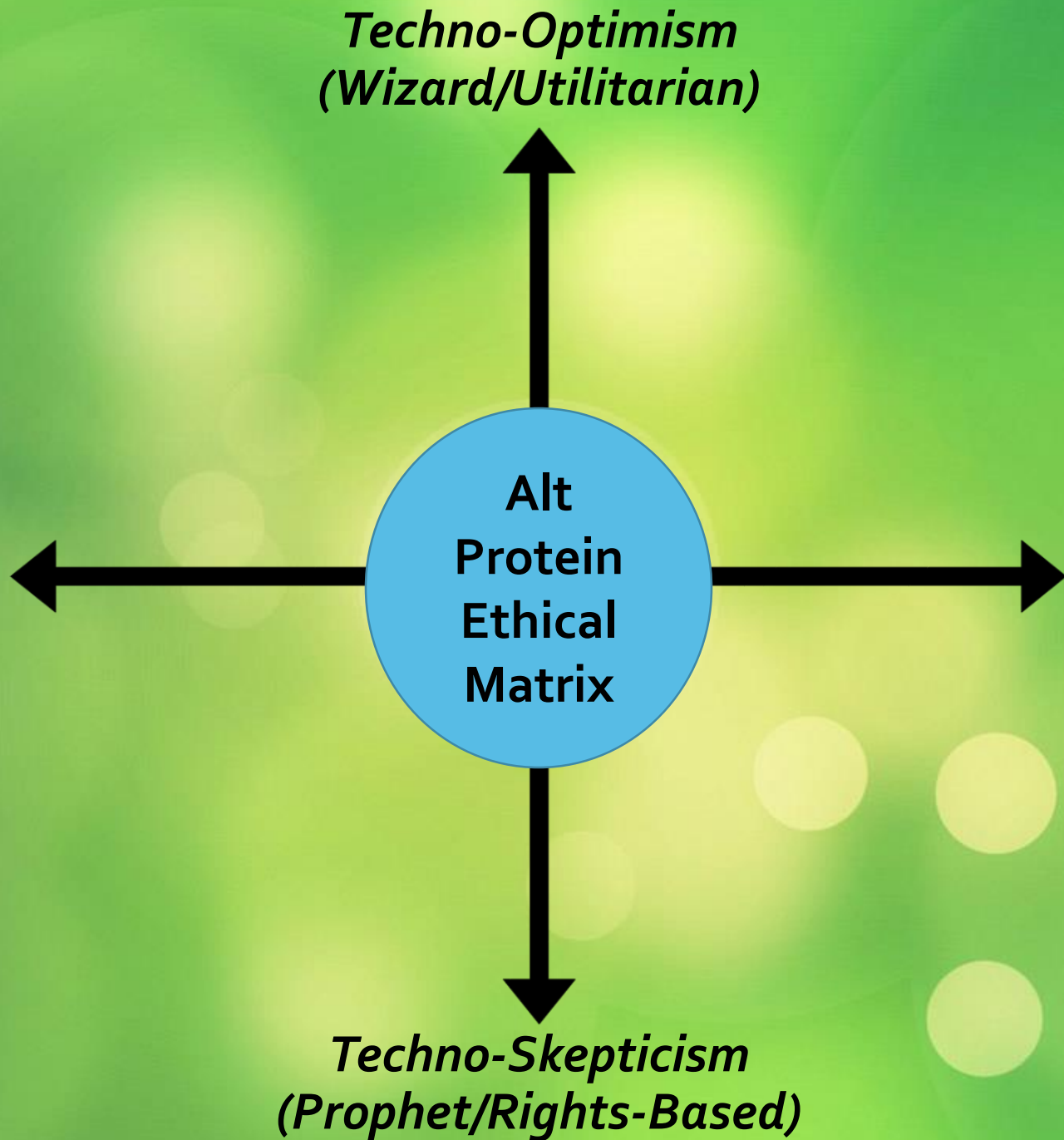
Rationalizing meat consumption. The 4Ns ☆

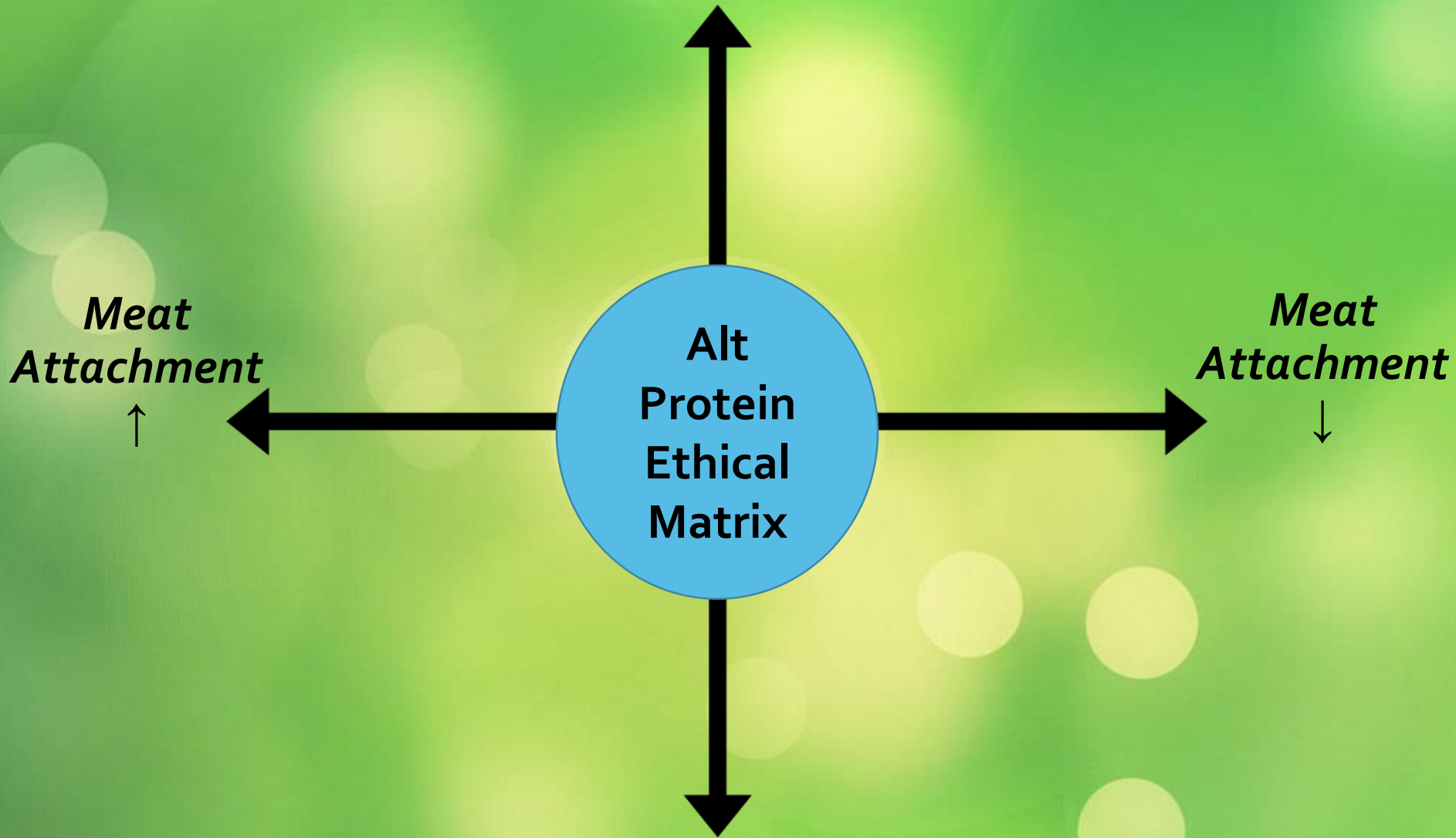
Jared Piazza ^{a,*}, Matthew B. Ruby ^b, Steve Loughnan ^c, Mischel Luong ^d, Juliana Kulik ^b, Hanne M. Watkins ^d, Mirra Seigerman ^d

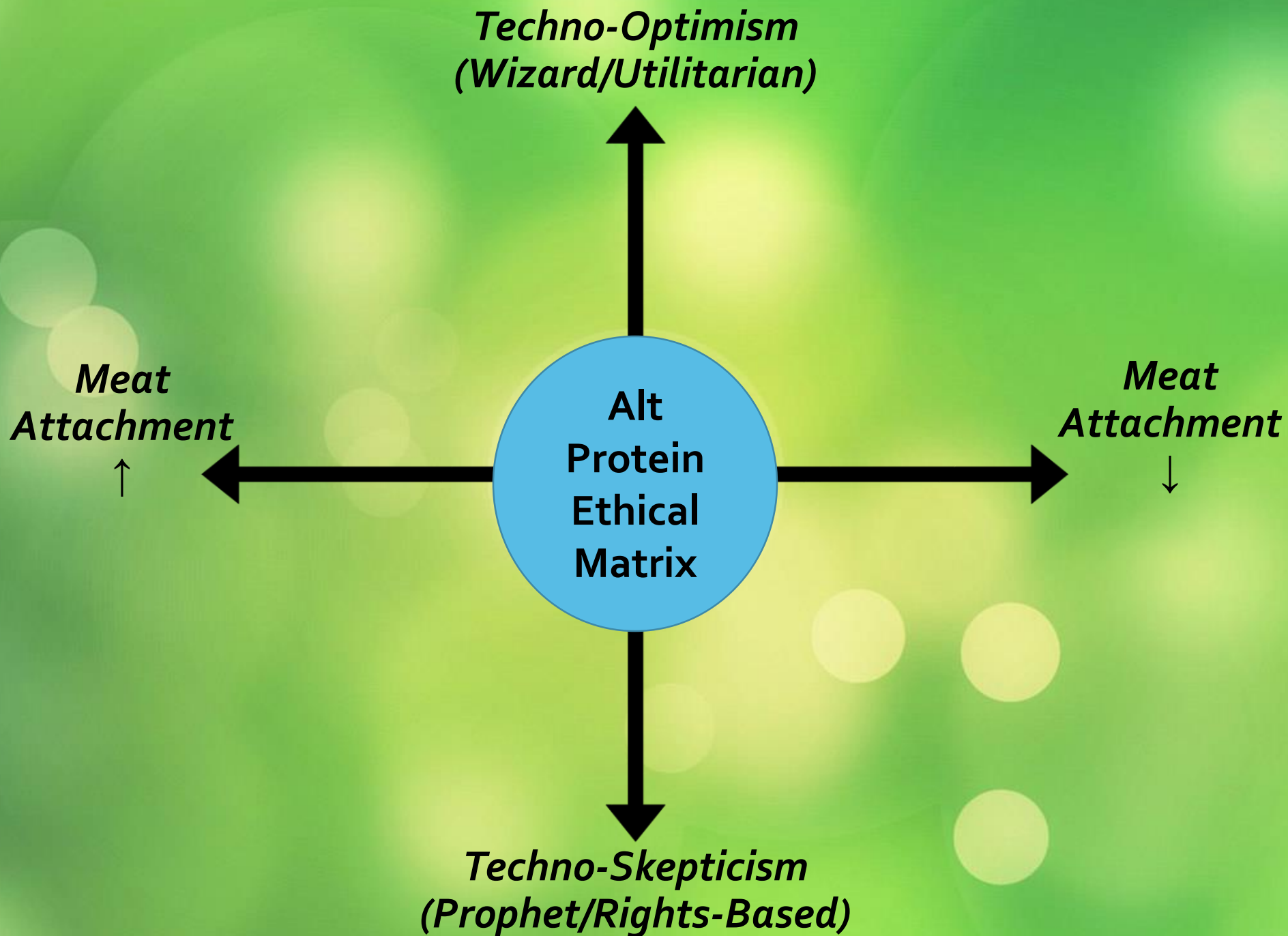
Scale items	Loadings	M (SD)
Natural		
It is only natural to eat meat.	.858	5.04 (1.67)
It is unnatural to eat an all plant-based diet.	.787	3.86 (1.82)
Our human ancestors ate meat all the time.	.677	5.29 (1.64)
Human beings naturally crave meat.	.788	5.00 (1.91)
Necessary		
It is necessary to eat meat in order to be healthy.	.815	4.00 (1.91)
You cannot get all the protein, vitamins, and mineral you need on an all plant-based diet.	.716	4.05 (2.02)
Human beings need to eat meat.	.834	4.15 (1.91)
A healthy diet requires at least some meat.	.847	4.47 (1.93)
Normal		
Not eating meat is socially unacceptable.	.334	2.69 (1.62)
It is abnormal for humans not to eat meat.	.773	3.92 (1.73)
Most people I know eat meat.	.400	6.34 (0.88)
It is normal to eat meat.	.709	5.93 (1.33)
Nice		
Meat is delicious.	.670	6.04 (1.38)
Meat adds so much flavor to a meal it does not make sense to leave it out.	.847	4.74 (1.83)
The best tasting food is normally a meat based dish (e.g., steak, chicken breast, grilled fish).	.821	5.08 (1.80)
Meals without meat would just be bland and boring.	.832	4.24 (1.98)

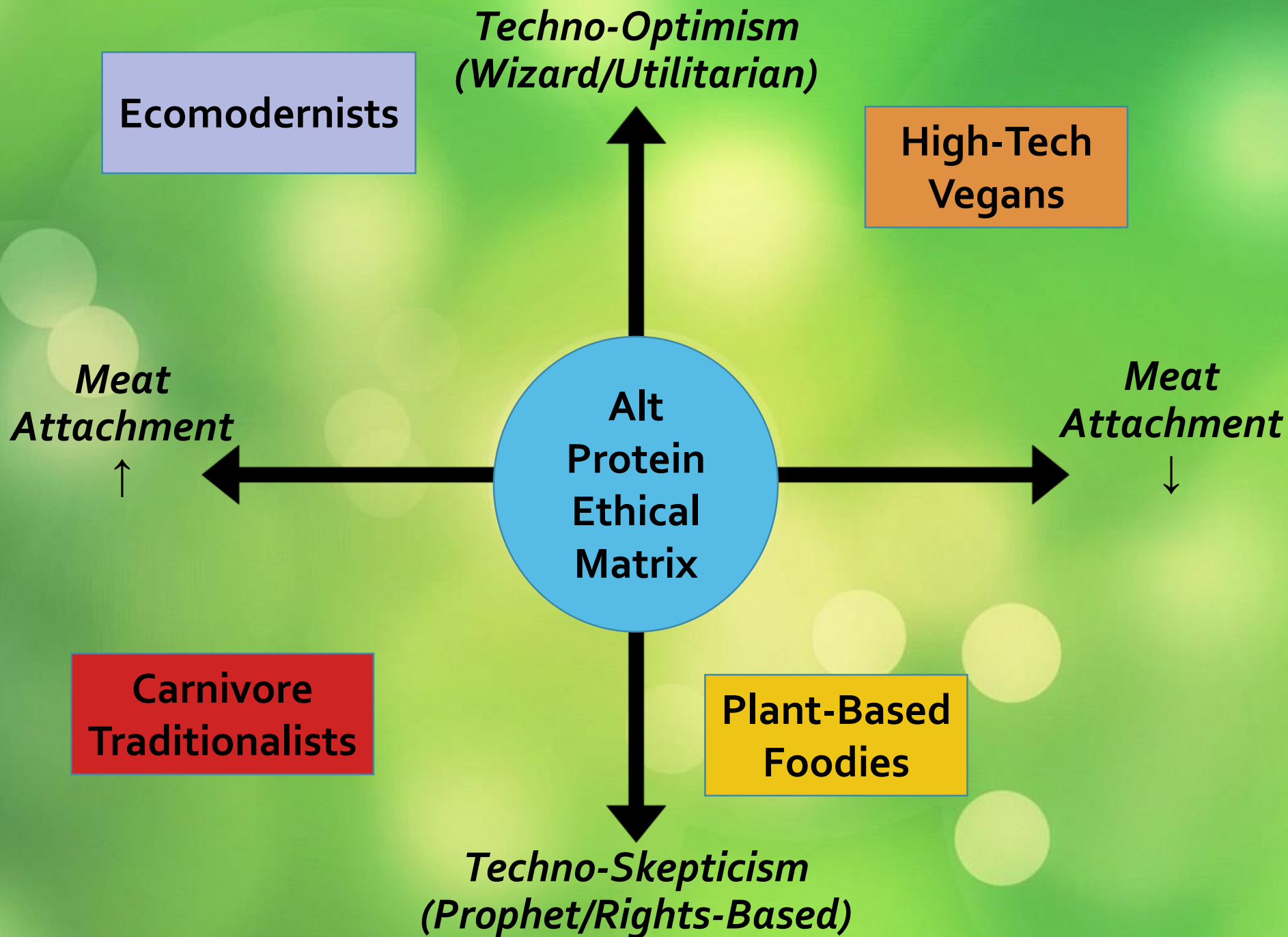
Note: Level of agreement or disagreement rated on a 1–7 scale (1 = Strongly disagree; 7 = Strongly agree).











High-Tech Vegans

Techno-Optimism + Meat Attachment ↓

WHAT THEY SAY:

“We wish people would become ethical vegans, but it’s not happening. Instead, we need to make “meat” without animals.”

WHO SAYS IT:

Mission-Driven Startups, (Some) Animal Rights Advocates.



The screenshot shows the top of a New York Times article. At the top left is a hamburger menu icon. The text 'The New York Times' is centered, with 'Account' and a dropdown arrow to the right. Below this is the word 'Opinion'. The main title of the article is 'Let's Launch a Moonshot for Meatless Meat'. Below the title is a large image of a person's hands holding a burger. In the bottom left corner of the article preview, there is a small circular portrait of Ezra Klein, followed by the text 'By Ezra Klein' and 'Opinion Columnist'. At the very bottom left of the preview, the date 'April 24, 2021' is displayed.

Solutions



We can produce meat from plants or cultivate it from cells more sustainably and efficiently. This will mitigate climate change, environmental degradation, and the rise of antibiotic resistance.

We will make more progress by changing the default choices than by trying to change every single person's mind.

Ecomodernists

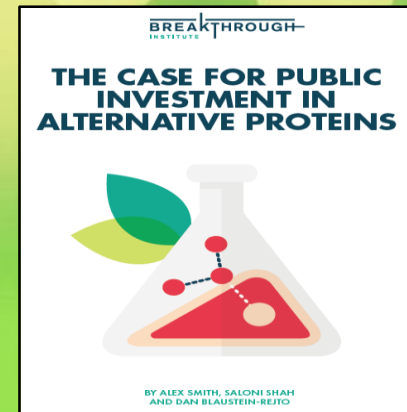
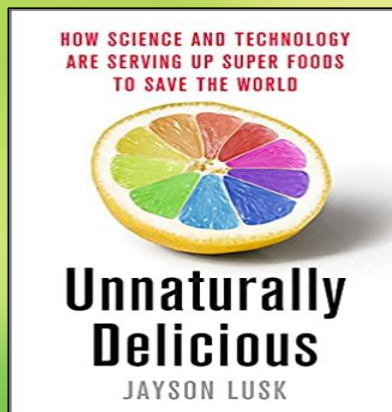
Techno-Optimism + Meat Attachment ↑

WHAT THEY SAY:

“The world demands more protein. We should be innovating protein in all its forms, from conventional meat to alternatives.”

WHO SAYS IT:

Meat/Protein Multinationals, Tech R&D Advocates.



Plant-Based Foodies

Techno-Skepticism + Meat Attachment ↓

WHAT THEY SAY:

“We need to reduce meat consumption, but tech isn’t the solution. Let’s eat more beans and eat local instead.”

WHO SAYS IT:

“Good Food Movement,” (Some) Animal Rights Advocates

BREEZE HARPER: “The whole food-tech startup thing is the problem, framed as it is through a white neoliberal-capitalist masculinist logic that is in itself deeply problematic— at least, here in the USA and especially in Silicon Valley/SF Bay area where I live.

-- *Dr. Breeze Harper* is a diversity strategist and analyst with *Critical Diversity Solutions* and the founder of the *Sistah Vegan Project*.

CLEAN MEAT HOAX

How To Replace Meat

We don’t need fake ‘meat’; there are better solutions.



Mark Bittman, Charlie Mitchell, and Melissa McCart

May 4, 2021



Isa Chandra
@IsaChandra

Wow if vegans promoted vegan restaurants half as much as they’re promoting Burger King rn.

10:31 AM · Aug 12, 2019 · Twitter for iPhone

Carnivore Traditionalists *Techno-Skepticism + Meat Attachment* ↑

WHAT THEY SAY:

"It's not the cow, it's the how. The problem is industrial food, from factory farming to lab meat. Eat MORE grass-fed beef."

WHO SAYS IT:

Local Ranchers, Regenerative Meat Advocates

Which Impossible Foods™ Patent is *Your* Favorite?

Patent 9700067

Methods and compositions for affecting the flavor and aroma profile of consumables

Patent 10287568

Methods for extracting and purifying non-denatured proteins

Patent 10172380

Ground meat replicas

Patent 10093913

Methods for extracting and purifying non-denatured proteins

Patent 9943096

Methods and compositions for affecting the flavor and aroma profile of consumables

Patent 9737875

Affinity reagents for protein purification

Patent 10273492

Expression constructs and methods of genetically engineering methylotrophic yeast



Patent 9833768

Affinity reagents for protein purification

Patent 9826772

Methods and compositions for affecting the flavor and aroma profile of consumables

Patent 9011949

Methods and compositions for consumables

Patent 10172381

Methods and compositions for consumables

Patent 9808029

Methods and compositions for affecting the flavor and aroma profile of consumables

Patent 10039306

Methods and compositions for consumables

Patent 9938327

Expression constructs and methods of genetically engineering methylotrophic yeast

Patent 10087434

Methods for extracting and purifying non-denatured proteins



Restoring Soil to Reverse Global Warming
soil4climate.org

FARMING METHODS CAN EITHER BENEFIT OR DESTROY BIODIVERSITY



REGENERATIVE

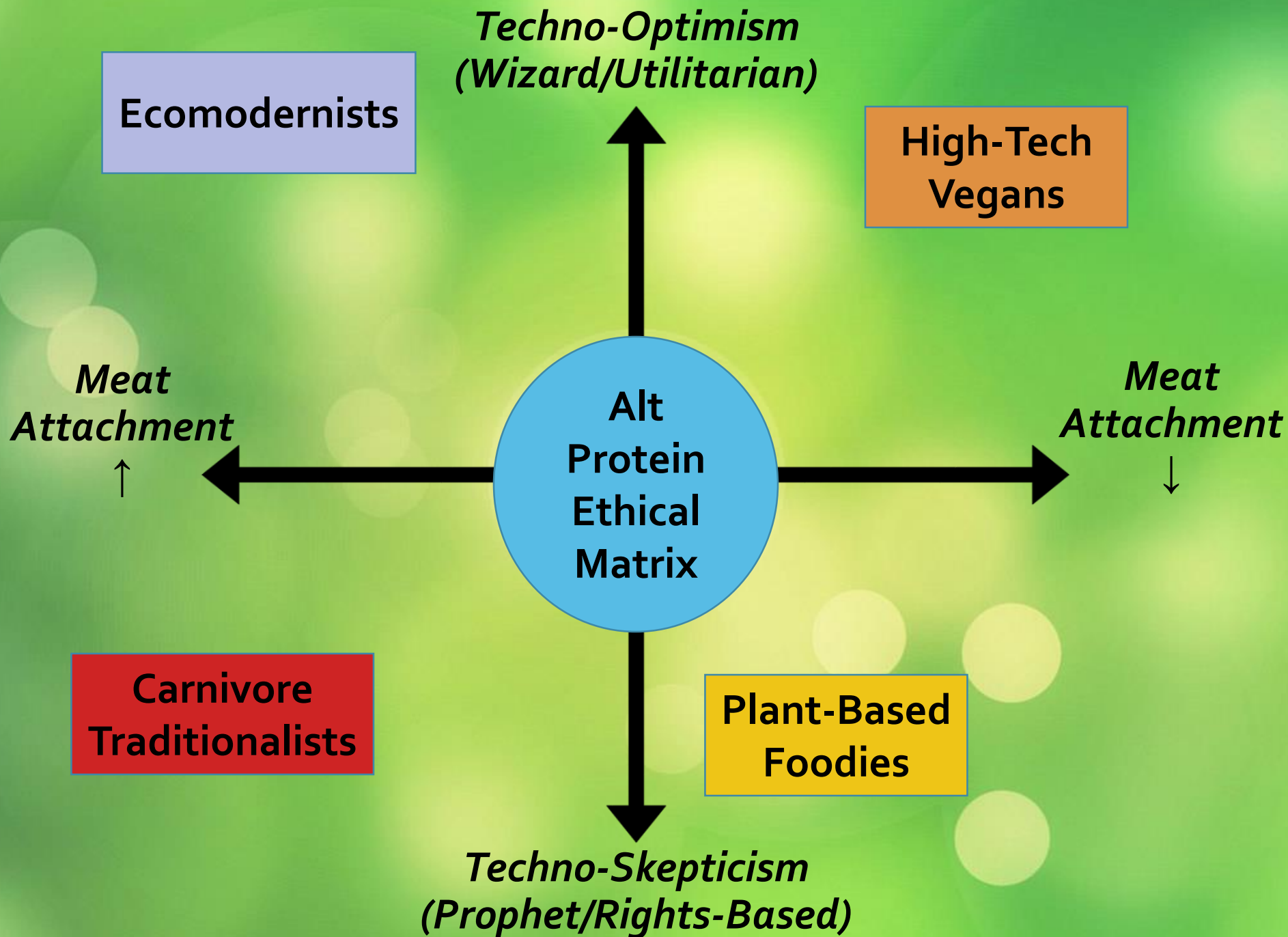
- ✓ NO CHEMICALS REQUIRED
- ✓ ACTIVE SOIL MICROBIAL LIFE
- ✓ INCREASED RAINFALL ABSORPTION
- ✓ COOLER GROUND TEMPERATURE
- ✓ BETTER WILDLIFE HABITAT
- ✓ LESS INPUTS REQUIRED
- ✓ MORE NUTRITIOUS PRODUCT
- ✓ HEALTHIER ECOSYSTEM



EXTRACTIVE

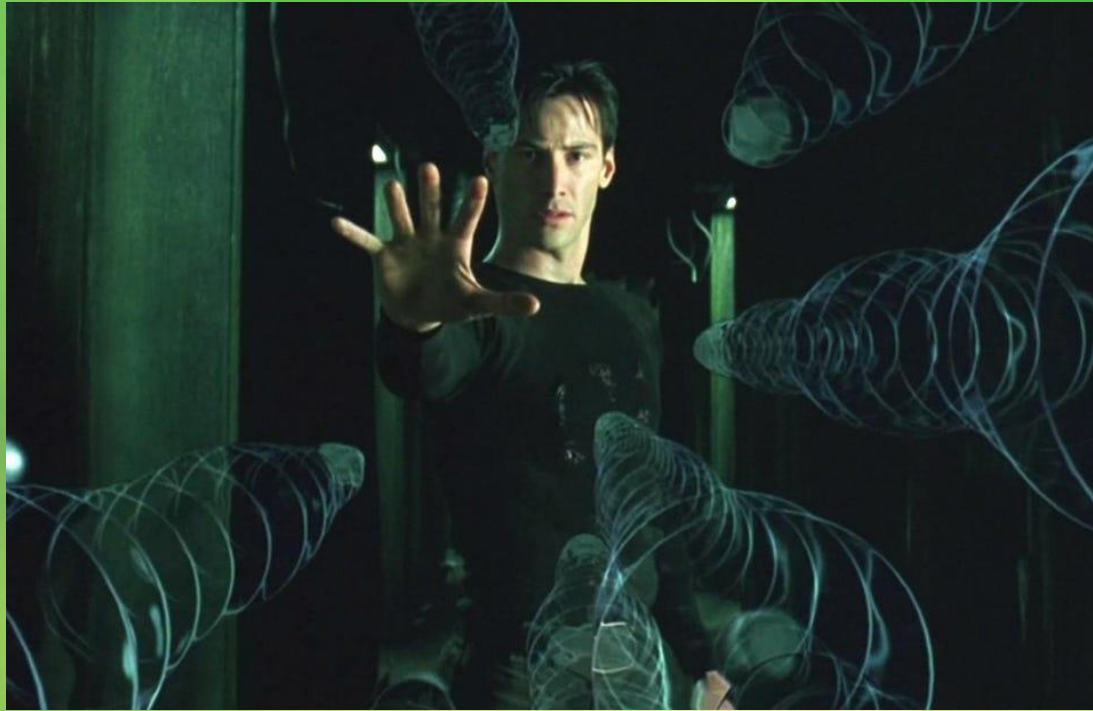
- ✗ INTENSE CHEMICALS NEEDED
- ✗ BARE, HARD, DEAD SOIL
- ✗ INCREASED RAINFALL RUNOFF
- ✗ HOTTER GROUND TEMPERATURE
- ✗ LESS WILDLIFE HABITAT
- ✗ MORE INPUTS REQUIRED
- ✗ LESS NUTRITIOUS PRODUCT
- ✗ UNHEALTHY ECOSYSTEM





Food Tech Justice

Break the Alt Protein Matrix



“I don't know the future. I didn't come here to tell you how this is going to end. I came here to tell you how it's going to begin...

I'm going to show them a world without you.

A world without rules and controls, without borders or boundaries. A world where anything is possible.

Where we go from there is a choice I leave to you.”

Food Tech Justice

Break the Alt Protein Matrix

Shojinmeat Project : Open-Source Cell-Ag Initiative

2020.01



Shojinmeat Project



PLANT BASED FOODS
INSTITUTE

OUR MISSION

To drive transformation to a plant-based food system that benefits people, the planet, and animals.

OUR ROLE

PBFI will incubate, employ, and evaluate impact of strategies for businesses and those across the food system, while advocating for systems change.



New Harvest publishes cell ag's
first safety paper



Our mission is to help farmers transition their industrial animal-agriculture operations to plant-focused farms raising crops for human consumption.

Food Tech Justice

Break the Alt Protein Matrix



“Moral imagination entails being able to see and think outside the box, envisioning moral alternatives that others do not.”

- Drumwright and Murphy (2004:17)

Food Tech Justice

Break the Alt Protein Matrix



Thank you Food Forum!

- Garrett & Rob

[@broad@rowan.edu](mailto:broad@rowan.edu)/[@garrettbroad](https://twitter.com/garrettbroad)
rchiles@psu.edu

Acknowledgements: USDA NIFA, Penn State, Fordham