Supplemental Material

Manuscript Title: Sociotechnical Imaginaries of Gene Editing in Food and Agriculture: A Comparative Content Analysis of Mass Media in the United States, New Zealand, Japan, the Netherlands, and Canada

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Supplemental Material Contents:

- Detailed codebook used for data collection

Codebook

Article Inclusion Criteria:

- The article must be at least 100 words long.
- The article must include at least one paragraph specifically about gene editing in the context of food or agriculture.

Data Collection Procedure:

1. Determine whether an article is eligible for inclusion based on the criteria noted above.
2. If the article is eligible for inclusion, note the following formal variables:
    a. Article ID number
    b. Title
    c. Author
    d. Date of publication
    e. The name of the newspaper in which it was published
3. Identify each actor in the article who expresses at least one imaginary.
4. For each actor identified, code:
    a. The specific dominant and/or counter imaginaries that the actor expresses
    b. Whether or not they mention the topic of regulation
        i. If yes, code whether they express a specific stance on regulation
            1. If yes, code the specific recommendation(s) they give.

General Coding Guidelines:

- Do *not* code articles that talk about gene edited animal agriculture
- *Do not* code actors that are mentioned if they *do not* have an associated imaginary.
    - i.e., Neil Patrick Harris or Dr. Mulligan in "These Foods Aren't Genetically Modified, But They Are Edited".
- Code as a benefit to consumer if specific crops with consumer-oriented traits are mentioned:
    - I.e., "non-browning mushrooms", "Sweeter peppers"
- Code as journalist if an imaginary is mentioned by the writer of the article but not attributed to a specific cited actor.
- Code generic actors as they are mentioned in the article.
    - E.g., "critics" would go under "other".
- Code multiple scientists from the same company separately.
    - Include "name of scientists, company name"
- If an article just *mentions* gene editing in agriculture once, code it. It does not need to go in depth, but it needs to at least have 1 imaginary. It does not need to be in the same sentence.
- Code non-academic researchers as the company and researchers name.
- If there is no distinction between gene editing, genetic engineering or GMO, then set the article aside for discussion with the full coding team to determine eligibility.

Code Descriptions/Coding Rationales:

1. Dominant Imaginaries

Imaginary	**Description/coding rationale**
Different & better than GMO	The actor expresses the view that gene editing differs from transgenic technology, describes it as an improvement over GM tools, and/or states that existing regulation of GMOs is not applicable to products of gene editing because of fundamental differences between the tools. The actor may also describe the products of gene editing as being equivalent to those that could be achieved through conventional breeding.
Benefits for consumers	The actor describes ways in which gene editing can be used to develop traits that will directly benefit consumers (as opposed to developers or farmers), including but not limited to lower costs, improved flavor, eliminating allergens, higher nutritional value, and reduced personal food waste. The actor may also mention that developing consumer-oriented traits is important for ensuring public acceptance of the technology.
Democratization of agricultural biotechnology	The actor describes gene editing as an accessible technology and/or claims that commercializing products will cost less if they are deregulated, which will allow smaller companies and university-based breeders to utilize the tool. The actor may also mention that this increased access will lead to a wider diversity of crops being improved.
Ensuring global food security	The actor describes gene editing as an tool that can help feed a growing world population by increasing crop yields and/or improving crop resilience to pressures such as drought or disease.
Benefits for sustainability	The actor describes ways in which gene editing could be used to improve the sustainability of agriculture. Common examples include reducing pesticide use, improving carbon sequestration capacity, decreasing water needs, and lessening post-harvest food waste.
Safe for humans and the environment	The actor emphasizes the safety of the process and/or products of gene editing for either human or ecosystem health. They may do so by mentioning the technology's precision, describing the rigorous pre-market testing of products, referring to a lack of negative impacts of previous transgenic crops, or expressing the position that gene editing is no riskier than other long-used conventional breeding methods.
Revolutionizing agricultural innovation	The actor emphasizes gene editing's potential to quickly provide unique benefits for agriculture that could not otherwise be realized. The actor may also state that a permissive national and/or global regulatory landscape is required to foster innovation.
Important for national economy	The actor describes how gene editing can bolster a particular national economy by improving specific crops and/or making the agricultural sector more

	competitive overall. The actor may also mention that failure to adopt gene editing technology could have negative economic consequences.

2. Counter Imaginaries

Imaginary	**Description/coding rationale**
Same as GMOs	The actor expresses the view that gene editing is the same as genetic modification. They may also use phrases such as “new GMOs” or “GMO 2.0” to describe gene editing. The actor may advocate for or speak in support of a regulatory framework that views the technologies as equivalent.
Pose risks for humans and environment	The actor expresses concerns that gene editing could pose safety risks for humans and/or the environment. The actor may mention a lack of sufficient research/data on product safety and/or the potential for off-target effects which lead to unintended consequences. The actor may also mention that a stringent regulatory framework, particularly one which applies the precautionary principle, is necessary to minimize public risk.
Encourage corporate control	The actor expresses concerns that widespread use of gene editing will exacerbate issues of corporate control in agriculture. Issues mentioned may include the negative impacts of restrictive intellectual property rights regimes, increasing farmers’ dependence on technology, trade-offs between investing in biotechnology and alternative approaches, and the relationship between economic and regulatory control.
Take away consumers’ right-to-choose	The actor expresses concerns that having unlabeled gene-edited products on the market will infringe on consumers’ rights to make personal risk-benefit decisions when purchasing food. The actor may advocate for greater transparency in labeling and/or a greater consideration of consumers' needs and wants in developing products and regulatory frameworks.
Not the solution to issues in the food system	The actor emphasizes that technological approaches like gene editing cannot address systemic issues in the food system and may in fact create more problems than they solve. The actor may also bring up alternative approaches, such as organic agriculture, agroecology, or traditional breeding, which they argue can accomplish the same things that proponents claim gene editing can but with less risk and required resources.
Harmful for national economy	The actor expresses concerns that adopting gene editing in agriculture will negatively impact a particular nation’s economy by decreasing the desirability of its exports in markets which are unfavorable towards genetically modified crops.

3. Recommendations for Regulation

Recommendation	**Description/coding rationale**

Government regulation	The actor expresses the stance that a particular governmental institution or institutions within the country being referenced should provide some level of regulatory oversight and/or labeling for all gene-edited crops, regardless of whether or not they contain any foreign DNA.
International government regulation	The actor expresses the stance that it would be appropriate for governments of different countries to cooperatively formulate common laws, policies, or standards to regulate gene-edited crops internationally.
Private/industry governance	The actor expresses the stance that it would be appropriate for the biotechnology industry to establish their own (voluntary) rules, standards, and policies for governing gene editing (including public engagement/transparency initiatives).
No regulation	The actor expresses the stance that gene-edited crops require no regulatory oversight.
Less regulation	The actor expresses the stance that gene-edited crops require less or less stringent regulatory oversight than the existing framework in the country being referenced.
Ban gene-edited foods	The actor expresses the stance that the cultivation of gene-edited crops should be prohibited (outside of laboratory settings) in the country being referenced.
Science-based regulation	The actor utilizes language which either directly or indirectly conveys the stance that regulatory oversight of gene editing should be “science-based”, potentially making arguments for/against substantial equivalence of gene-edited and conventional crops. Actors may either use this language to support stronger or weaker regulation.
Risk-based regulation	The actor utilizes language which either directly or indirectly conveys the stance that regulatory oversight of gene editing should be “risk-based”, potentially making arguments for/against the safety of gene-edited crops. Actors may either use this language to support stronger or weaker regulation.