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How should we choose the name for meat, poultry, and seafood made directly from the cells of animals?

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Background

- An experimental psychologist who studies consumer perceptions of food products.
- Faculty member at a Land-Grant University.
- Part of my line is in Rutgers Cooperative Extension.

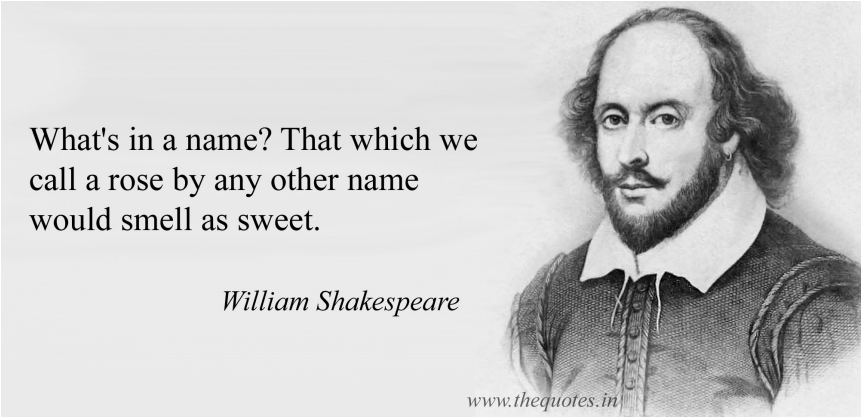
- My motivation:
  - Published one of the first studies of public perceptions of GMOs in the 1990s and continued to conduct research on the topic.
  - I'd like to help the cell-cultured protein sector avoid making the same mistakes as were made introducing GMOs.
  - That means choosing the right nomenclature.

Why is Finding the Right Name Necessary?

- "Common or usual names" are required by both FDA and USDA to appropriately identify food products.
- Consumers want transparency.
- Consistent use of a common name:
  - On products
    - can reduce confusion in the marketplace.
  - In marketing, news articles, regulatory documents, and social media
    - can make it easier for consumers to find information.

Consumer Perceptions and Understanding

- Names can evoke images, emotions, metaphors and meanings that can profoundly shape public perceptions and acceptance.



Claiming the Narrative

- Many names have been proposed by stakeholders seeking to influence public perceptions
  - Skeptics
    - “lab-grown meat,” “synthetic meat,” “artificial meat,” “fake meat,” “schmeat.”
  - Animal Advocates (and some companies)
    - “clean meat,” “animal-free meat,” “slaughter-free meat,” “cruelty-free meat.”
    - “cultivated” suggested as an alternative.
  - Producers
    - “cell-based meat,” “cell-cultured meat,” “cultured meat,” “cellular agriculture/aquaculture.”

Lab-Grown Meat Gets Closer to Store Shelves

MAR 22, 2019 Dan Nosowitz

Lab-grown meat—also known as cultured meat, cell-based meat, clean meat, and others—is on its way.

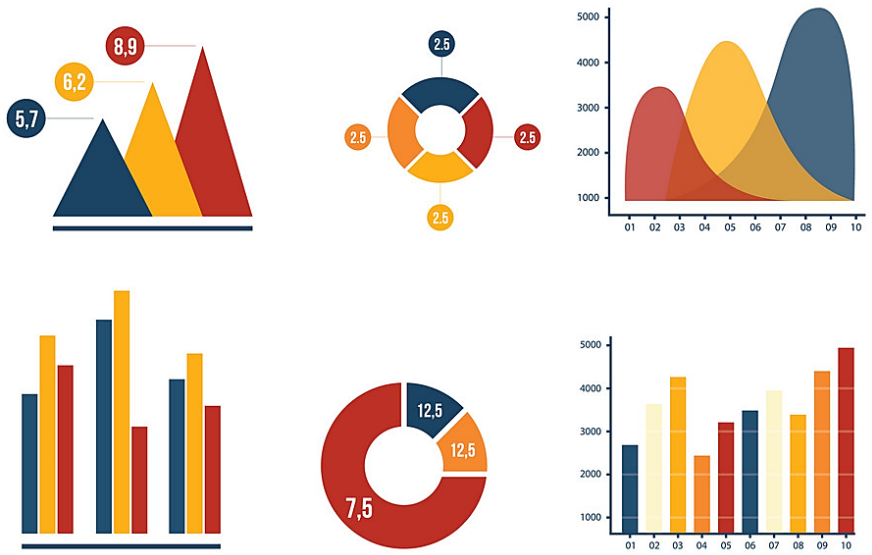
Would you eat slaughter-free meat?

By News GH - October 17, 2018

How Should We Choose What Name to Use?

This Not Simply a Marketing Exercise

- Much of the existing research has focused on what name is most appealing to consumers



21CFR102.5 – General Principles

- The common or usual name of a food, which may be a coined term, shall accurately identify or describe, in as simple and direct terms as possible, the basic nature of the food or its characterizing properties or ingredients.
- The name shall be uniform among all identical or similar products and may not be confusingly similar to the name of any other food that is not reasonably encompassed within the same name.
- Each class or subclass of food shall be given its own common or usual name that states, in clear terms, what it is in a way that distinguishes it from different foods.

Can't Assume Prior Knowledge

- Common or usual names must communicate to consumers *without* prior or additional explanation.

- Can't rely on consumers to already know what the product is.
  - Most U.S. consumers are unfamiliar with ***idea*** of cell-cultured meat.
    - No products are on the market.
    - Limited media coverage

    - GMOs have been on the market for 3 decades; many consumers still don't know what they are.

Transparency about the Process

- If cell-cultured meat, poultry, fish and other proteins are shown to be equivalent in composition and nutrition to their conventional counterparts, the key difference will be how they are produced.

- An appropriate name should capture and communicate the underlying intuitive meaning of the product/process.
  - Lack of transparency was a key mistake in introducing GMOs

- If the purported benefits of cell-cultured proteins are real, companies should want to clearly distinguish their novel products from conventional products.

An empirical assessment of common or usual names to label cell-based seafood products

William K. Hallman and William K. Hallman II

Abstract: An important consideration in the commercialization of cell-based meat, poultry, and seafood is what common or usual name to use on package labels to meet U.S. Food and Drug Administration (FDA) regulations. However, naming these products has been the subject of considerable debate. This study used a 3 × 10 between-subjects online experiment involving a quota sample of 3,186 U.S. adult panel participants to test common or usual names using images of realistic packages of three types of seafood that a consumer might encounter in a supermarket. The terms tested were, "cell-based seafood," "cell-cultured seafood," "cultivated seafood," and "cultured seafood" and the phrases, "produced using cellular aquaculture," "cultivated from the cells of ____," and "grown directly from the cells of ____," where the blanks are filled by the name of the seafood product. Five criteria were used for evaluation, including each term's ability to: enable consumers to distinguish cell-based seafood from wild and farmed fish, to signal potential allergenicity, be seen by consumers as an appropriate term to identify the product, not disparage either cell-based or conventional products, and not evoke thoughts, images, or emotions that are inconsistent with the idea that the products are safe, healthy, and nutritious. The results showed that "cell-based seafood" outperforms the other names tested. It enables consumers to recognize that the products are neither wild caught nor farm raised, signals potential allergenicity, is seen as an appropriate name for describing the technology/process, and it performs well with respect to measures of consumer acceptance, particularly in comparison to conventional products.

Keywords: Cell-Based, Cell-Cultured, Common or Usual Name, Nomenclature, Seafood

Practical Application: Creating consensus around a single common or usual name for cell-based meat, poultry, and seafood products is clearly important both for regulatory reasons and for shaping public perceptions and understanding of the products that are labeled with it. Our findings suggest that "cell-based" is the best common or usual name for seafood products that both meets FDA regulatory requirements and performs well with respect to potential consumer acceptance. Consistent use of this term by industry, advocates, and regulators would help orient consumers to what is likely to be a transformational food technology.

1. INTRODUCTION

The production of cell-based meats, poultry, and seafood involves new technologies that directly produce only the parts of animals that people prefer to eat, rather than deriving these from whole animals. Through *in vitro* production of specific muscle, fat, and connective tissues, producers are able to create food products that duplicate the taste, texture, nutritional, and culinary attributes of their conventional counterparts (Stephens et al., 2018).

Investment, research, and development in the technology are proceeding rapidly. Although no products have yet been approved for sale in any country, several companies have held events exhibiting various prototypes, and others are at various stages of planning and scaling up production (Kateman, 2020).

An important consideration in the pathway to commercialization is what to call the products derived from this technology. U.S. Food and Drug Administration (FDA) regulations (21CFR101.3) require that all foods that do not have defined *standards of identity* (21CFR130.8) be labeled with a "common or usual name" as a *statement of identity* so that consumers can make informed choices about the products they buy. Similarly, the U.S. Dept. of Agriculture (USDA) requires that common or usual names be used to label meat (9CFR317.2) and poultry products (9CFR381.117). Under 21CFR102.5, which is most prescriptive, the general principles for establishing the common or usual name of a food include:

> The common or usual name of a food, which may be a coined term, shall accurately identify or describe, in as simple and direct terms as possible, the basic nature of the food or its characterizing properties or ingredients. The name shall be uniform among all identical or similar products and may not be confusingly similar to the name of any other food that is not reasonably encompassed within the same name. Each class or subclass of food shall be given its own common or usual name that states, in clear terms, what it is in a way that distinguishes it from different foods.

Assuming that meat, poultry, and seafood products produced through *in vitro* tissue production are nutritionally equivalent to their conventionally produced counterparts, and are similar in form, taste, texture, and in nutritional and culinary attributes, the obvious dissimilarity that needs to be clearly communicated to consumers is that the product did not involve the growing or

JFDS-2020-0867 Submitted 5/25/2020, Accepted 7/2/2020. Author Hallman is with Human Ecology, Rutgers, the State Univ. of New Jersey, 55 Dudley Rd., New Brunswick, NJ, U.S.A. Authors Hallman and Hallman II are with Hallman and Associates, Rocky Hill, NJ, U.S.A. Direct inquiries to author Hallman (E-mail: hallman@sebs.rutgers.edu).

doi: 10.1111/1750-3841.15351

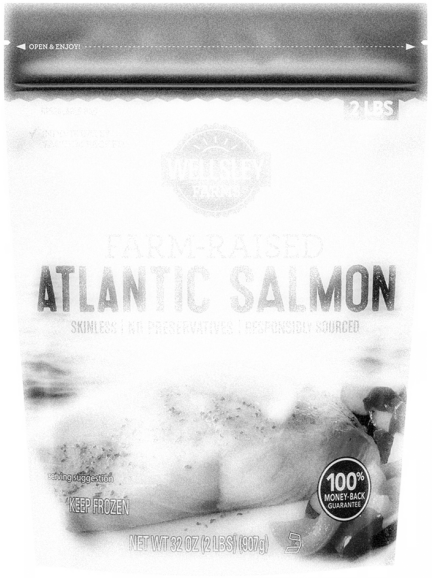
Journal of Food Science A Publication of the Institute of Food Technologists

Hallman, W. K., & Hallman, W. K. II (2020). An empirical assessment of common or usual names to label cell-based seafood products. *Journal of Food Science, 85*(8), 2267-2277. https://doi.org/10.1111/1750-3841.15351

Key Regulatory Criteria

The regulatory requirements suggest that, at minimum, an appropriate common or usual name should:

A. Enable consumers to distinguish cell-based seafood from both wild and farmed fish.



Key Regulatory Criteria – Seafood is Special

Federal requirements* also suggest that the common or usual name should:

B. Enable fish or shellfish-allergic consumers to identify these products as potential allergens.

* Food Allergen Labeling and Consumer Protection Act of 2004 (FALCPA)

Key Consumer Perception Criteria

For companies to be willing to adopt it, an appropriate common or usual name should also:

C. Not be disparaging to either cell-based seafood products or to conventional products.

D. Not evoke thoughts, images, or emotions that are inconsistent with the fact that the products are safe, healthful, and nutritious.

E. Be seen by consumers as an appropriate term to identify the product.

Created Packages Patterned on Those in Stores

Summary

- We tested seven potential common or usual names

Summary

- No Significant Interaction Effect with Species
  - The Common/Usual names aren't seen differently when attached to different seafood products.

Summary

- All communicated that those allergic to seafood should not eat the product.
- None were seen as inappropriate names.

Summary

- "Cultured, "Produced Using Cellular Aquaculture," and "Cultivated" failed to differentiate these products from conventional seafood.
  - "Cultivated" performed worst – 54% confused it with "farm-raised".

Summary

- The phrases “Cultivated from the Cells of,” and “Grown Directly from the Cells of”
  - Were seen as least positive
  - Do poorly with respect to consumer perceptions of:
    - safety
    - nutrition
    - taste
    - naturalness
    - likelihood to purchase

Summary

- "Cell-Based" and "Cell-Cultured"
  - Both do a good job of signaling that the product is different from both "Wild Caught" and "Farm Raised."
  - Are not significantly different from *each other* on most of the other key dependent measures.

Check for updates

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NEW HORIZONS IN FOOD RESEARCH

Journal of Food Science WILEY

A comparison of cell-based and cell-cultured as appropriate common or usual names to label products made from the cells of fish

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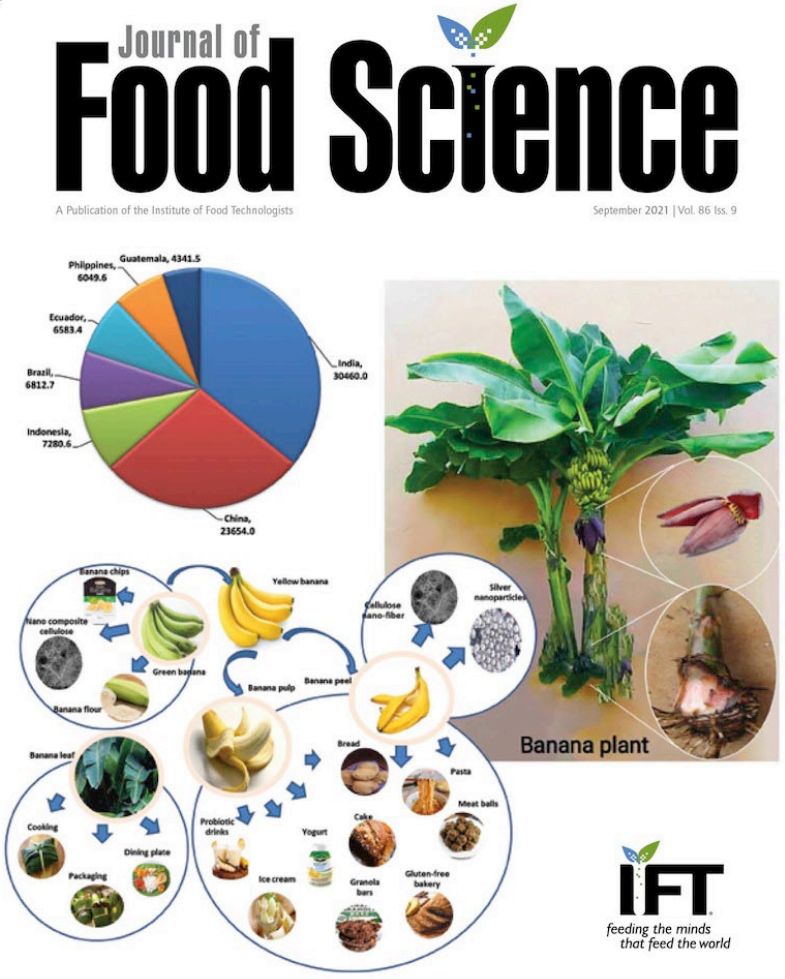
Abstract: Using an online experiment with a nationally representative sample of 1200 adult American consumers, two "common or usual names," "Cell-Based Seafood" and "Cell-Cultured Seafood," were assessed using five criteria. Displayed on packages of frozen Atlantic Salmon, both "Cell-Based" (60.1%) and "Cell-Cultured" (58.9%) enabled participants to differentiate the novel products from "Farm-Raised" and "Wild-Caught" fish and 74% also recognized that those allergic to fish should not consume the product. Thus, both names met key regulatory criteria. Both names were seen as appropriate terms for describing the process for creating the product, meeting the criteria for transparency. There were no significant differences in the perceived safety, naturalness, taste, or nutritiousness of the products bearing the two names. However, participants' overall impressions associated with "Cell-Based" were rated as more positive than those associated with "Cell-Cultured" ($P < 0.001$, $\eta^2 = 0.010$), as were their initial thoughts, images, and feelings ($P < 0.001$, $\eta^2 = 0.008$). The participants were also slightly more interested in tasting ($P < 0.05$, $\eta^2 = 0.004$) and in purchasing ($P < 0.01$, $\eta^2 = 0.006$) "Cell-Based" than "Cell-Cultured" seafood. After learning the meaning of the terms, participants' overall impressions of "Cell-Based" remained higher than "Cell-Cultured" ($P < 0.05$, $\eta^2 = 0.003$) and they remained slightly more interested in tasting ($P < 0.05$, $\eta^2 = 0.004$) and in purchasing ($P < 0.05$, $\eta^2 = 0.005$) "Cell-Based" than "Cell-Cultured" seafood. Therefore, "Cell-Based Seafood" should be adopted as the best common or usual name for seafood made from the cells of fish.

Practical Application: Widespread adoption and consistent use of a single "common or usual name" for "Cell-Based" seafood, meat, poultry, and other products by the food industry, regulators, journalists, marketers, environmental, consumer, and animal rights advocates, and other key stakeholders would help shape public perceptions and understanding of this rapidly advancing technol-



Hallman, W. K., & Hallman, W. K. II. (2021). A comparison of cell-based and cell-cultured as appropriate common or usual names to label products made from the cells of fish. *Journal of Food Science.* http://doi.org/10.1111/1750-3841.15860 -

THE NATIONAL LAW REVIEW

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Volume XI, Number 258

Comments Summary: Labeling Cell-Cultured Seafood

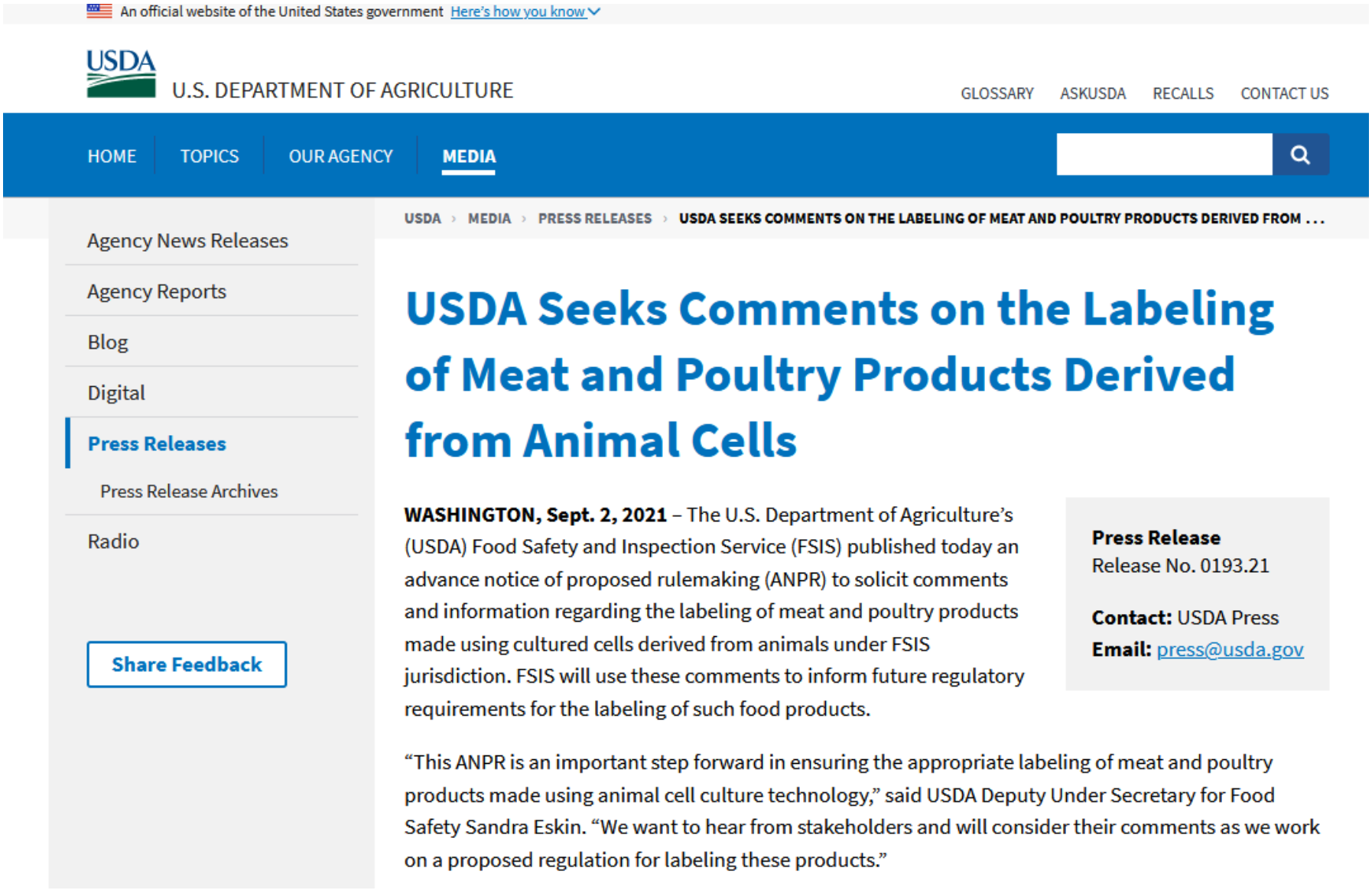
Friday, March 12, 2021

Comments for the Food and Drug Administration's (FDA) Request for Information (RFI) for labeling of foods made from cultured seafood cells became due on March 8, 2021. FDA posted the RFI in October 2020 and sought comments primarily on nomenclature concerns (we summarized the RFI here).

In addition to a handful of comments from consumers with varied views on cell-cultured meats, FDA received comments from stakeholders such as Memphis Meats, the Environmental Defense Fund, Finless Foods, Center for Science in the Public Interest (CSPI), and The Vegetarian Resource Group. Other comments not yet posted have been released from individual entities, including BlueNalu, Inc., Good Food Institute (GFI), and a joint comment from the Alliance for Meat Poultry and Seafood Innovation and the National Fisheries Institute. Some highlights from the comments are provided below.

- Most comments encouraged FDA to encourage product identity statements that differentiate seafoods cultured from cells from traditional farmed or wild-caught products. Many industry comments indicated support for the term "cell-cultured" seafood or "cell-based" seafood, which many said signal to consumers that the product is not plant based and is distinct from "wild caught" or "farm raised" seafoods. Many of these comments cited two studies from Rutgers University on consumer perceptions of potential labeling terms of cell-cultured meats: Hallman & Hallman (2020) and Hallman & Hallman (2021) (both underwritten by BlueNalu, which provided a detailed summary of the studies in its comment).

Perhaps the first time *ever* that the Industry, Center for Science in the Public Interest, the Environmental Defense Fund, and the National Fisheries Institute have ever mutually agreed on *anything*.



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USDA › MEDIA › PRESS RELEASES › USDA SEEKS COMMENTS ON THE LABELING OF MEAT AND POULTRY PRODUCTS DERIVED FROM . . .

USDA Seeks Comments on the Labeling of Meat and Poultry Products Derived from Animal Cells

WASHINGTON, Sept. 2, 2021 – The U.S. Department of Agriculture's (USDA) Food Safety and Inspection Service (FSIS) published today an advance notice of proposed rulemaking (ANPR) to solicit comments and information regarding the labeling of meat and poultry products made using cultured cells derived from animals under FSIS jurisdiction. FSIS will use these comments to inform future regulatory requirements for the labeling of such food products.

Press Release
Release No. 0193.21

Contact: USDA Press
Email: press@usda.gov

"This ANPR is an important step forward in ensuring the appropriate labeling of meat and poultry products made using animal cell culture technology," said USDA Deputy Under Secretary for Food Safety Sandra Eskin. "We want to hear from stakeholders and will consider their comments as we work on a proposed regulation for labeling these products."

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ARTICLE OPEN

Check for updates

Cell-based, cell-cultured, cell-cultivated, cultured, or cultivated. What is the best name for meat, poultry, and seafood made directly from the cells of animals?

William K. Hallman[1,2✉], William K. Hallman II[2] and Eileen E. Hallman[2,3]

To be sold in the United States, meat, poultry, and seafood products made from cultured cells must be labeled with a "common or usual name" to help consumers understand what they are purchasing. The terms "Cultured," "Cultivated," "Cell-Cultured," "Cell-Cultivated," "Cell-Based" and a control (without a common or usual name) were tested using an online experiment. Two regulatory criteria were assessed: that the term distinguishes the novel products from conventional products, and appropriately signals allergenicity. Three consumer acceptance criteria were assessed: that the term is seen as appropriate, does not disparage the novel or conventional products, nor elicit perceptions that the products are unsafe, unhealthy, or not nutritious. Each term was shown on packages of frozen Beef Filets, Beef Burgers, Chicken Breasts, Chicken Burgers, Atlantic Salmon Fillets, and Salmon Burgers. A representative sample of 4385 Americans (18 +) were randomly assigned to view a single product with a single term or the control. Consumers' ability to distinguish tested terms from conventional products differed by product category. "Cultured" and "Cultivated" failed to adequately differentiate the novel products from "Wild-Caught and Farm-Raised" salmon products. "Cultivated" failed to differentiate the novel Beef Filet product from "Grass-Fed" Beef Filets. "Cell-Cultured," "Cell-Cultivated," and "Cell-Based" each signaled that the products were different from conventional products across the proteins, and signaled allergenicity, meeting the two key regulatory criteria. They were not significantly different on most consumer perception measures. However, "Cell-Cultured" may have slightly better consumer acceptance across the novel beef, chicken, and salmon products, recommending its universal adoption.

npj Science of Food (2023)7:62; https://doi.org/10.1038/s41538-023-00234-x

INTRODUCTION

Meat, poultry, and seafood products produced through the in vitro cultivation of animal cells that are comparable to conventional products are poised to enter the marketplace[1,2]. More than 150 companies are currently involved in developing the technology worldwide, providing inputs or producing end products, with total invested capital of $2.8 billion by 2022[3].

The first "cultivated" chicken nugget product received regulatory approval for sale in Singapore[4,5] and regulatory processes for these products are being developed in many other markets[6]. In the United States, the US Food and Drug Administration (FDA) and the US Department of Agriculture (USDA) Food Safety and Inspection Service (USDA-FSIS) have formally agreed to jointly regulate cell-cultured meat and poultry products. Seafood products are to be regulated solely by the FDA[7,8].

In November 2022, the FDA completed its first pre-market consultation for a human food product made using cultured chicken cells. After evaluating the information provided to the agency by the petitioner, the FDA issued a statement that it had "no further questions at this time about the firm's safety conclusion"[9]. A second pre-market consultation was completed in March 2023 with "no further questions," again for a food product made using cultured chicken cells[10]. While the voluntary pre-market consultation is not an approval process and the food must meet other Federal regulatory requirements, it is a first step toward entry into the U.S. Market. In June 2023, the USDA announced that it issued grants of inspection to Upside Foods, Good Meat and Good Meat's manufacturing partner, Joinn Biologics, bringing the products closer to being sold in restaurants and grocery stores in the U.S.[11]

Both FDA regulations (21CFR101.3) and USDA regulations for meat (9CFR317.2) and poultry products (9CFR381.117) call for the use of "common or usual names" to inform consumers about the identities of food products. As cell-cultured animal products receive regulatory approval for sale in the US and other markets, a common term will be necessary to label them and to refer to them in marketing materials.

Anticipating the need for a common or usual name for cell-based seafood products, in 2020, the US Food and Drug Administration (FDA) requested public comments on how seafood products made from the cells of fish should be labeled (85 FR 63277). Most respondents encouraged the FDA to require product identity statements that would clearly delineate cell-cultured seafood products from conventional farmed and wild-caught product, with many in the industry supporting the term "cell-cultured" seafood or "cell-based" seafood[12], citing two studies on consumer perceptions of potential labeling terms by Hallman and Hallman[13,14]. These two terms and the five criteria used to determine them have received joint support from the main industry organization of producers of foods comprised of cultured meat, poultry, and seafood cells and the conventional seafood industry (The Alliance for Meat, Poultry and Seafood Innovation and The National Fisheries Institute)[15], as well as from the Center

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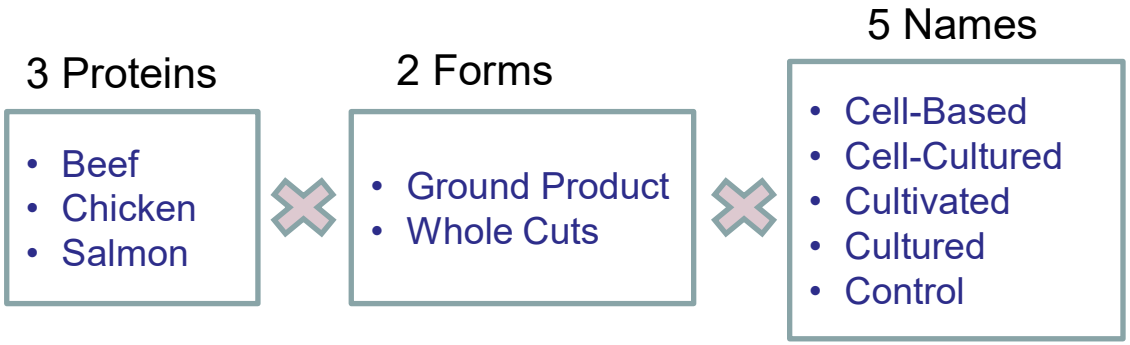
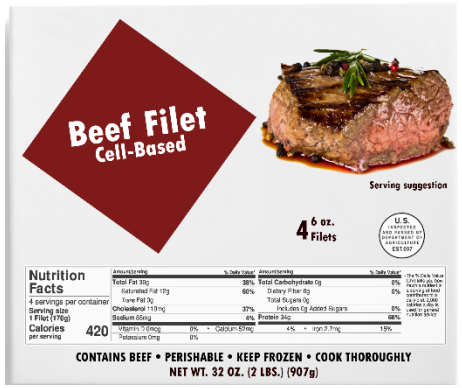
Products to Test

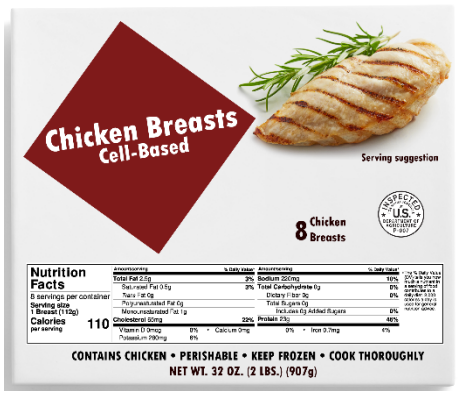


36 cells x ~120 per cell = 4,320

Total N collected = 4,385

Final Package Designs





Evaluation of "Cell-Based Beef" in Population

Consent and Screening

Frequency of Consumption – (Beef)

Reason for Not Consuming

1st Thought +/- Evaluation

2nd Thought +/- Evaluation

Overall Reaction?

Interest in Tasting?

Likelihood to Buy in 6 Months at Grocery Store?

Likelihood to Order it in a Restaurant?

Familiarity with Beef Filets?

Ever Tasted?

Like Taste?

How often Ordered in a Restaurant?

Ever Bought?

Ever Cooked?

Anyone in Household Allergic to Beef?

Participant Allergic to Beef?

Grass-Fed Grain-Fed Or Neither?

Made from Cells of Cattle, Plants, or Neither?

If Allergic to Beef, how safe to eat this?

If not Allergic to Beef, how safe to eat this?

How Natural?

GMO?

Organic?

Likelihood to Search for Online Info?

Likelihood to use QR code?

How Nutritious?

How Do You Think it Tastes?

How Healthy?

Likelihood to Recommend that Pregnant Women Eat it?

Likelihood to Recommend that Children Eat it?

Likelihood to Serve it to Guests?

Description of Process

Familiarity with Idea?

How Appropriate is the Term?

How Clear not Grass Fed?

How Clear not Grain Fed?

How Clear not Plant-Based?

Sell Next to Grass-Fed and Grain-Fed Beef?

Overall Reaction?

Interest in Tasting?

Likelihood to buy in 6 months at grocery store?

Likelihood to Order it in a Restaurant?

Likelihood to Recommend that Pregnant Women Eat it?

Likelihood to Recommend that Children Eat it?

Likelihood to Serve it to Guests?

How Nutritious?

How Does it Taste?

How Natural?

GMO?

Organic?

Key Regulatory Outcome Variables

A. Enable consumers to distinguish cell-based products from conventional products with which they are already familiar.

Which of the following best describes this Beef/Chicken/Salmon?

Grass-Fed
Grain-Fed
Or Neither?

→ Made from Cells of Cattle, Plants, or Neither?

Free-Range
Raised Indoors
Or Neither?

→ Made from Cells of Chicken, Plants, or Neither?

Wild-Caught
Farm Raised
Or Neither?

→ Made from Cells of Salmon, Plants, or Neither?

Key Regulatory Outcome Variables

B. Enable allergic consumers to identify these products as potential allergens.

If Allergic to Beef, is it safe to eat this?

If Allergic to Chicken, is it safe to eat this?

If Allergic to Salmon, is it safe to eat this?

Key Results

- Cultured and Cultivated failed to differentiate the novel salmon products from farm-raised salmon.
- Cultivated failed to differentiate the novel beef filet product from Grass-fed beef.
- Neither Cultured or Cultivated performed as well as the control in signaling that the novel chicken burgers were different from conventional chicken burgers.

Key Results

- The three names containing the word “cell,” “Cell-Based,” “Cell-Cultured,” and “Cell-Cultivated”
  - met the two regulatory criteria
  - were not significantly different on most consumer perception measures.

- The overall pattern of results suggests that the term “Cell-Cultured” may have a slight edge with respect to consumer acceptance.
  - Compared to the control products, the participants were as interested in
    - tasting them,
    - purchasing them,
    - ordering them in a restaurant,
  - and as likely to serve them to guests

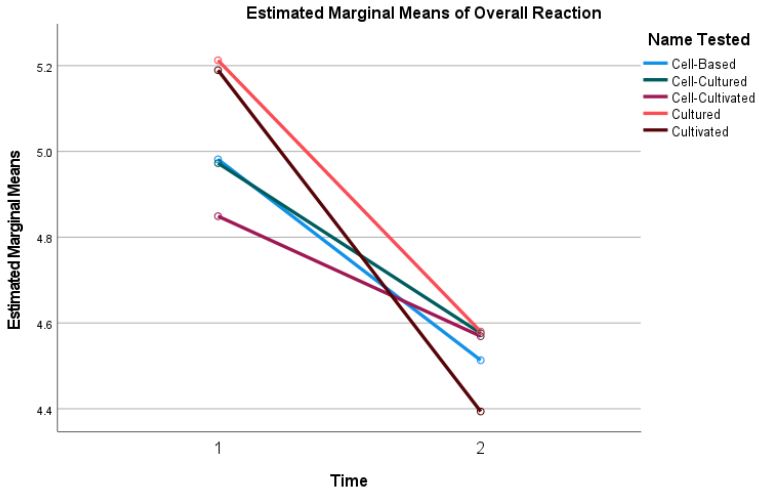
Describing the Process

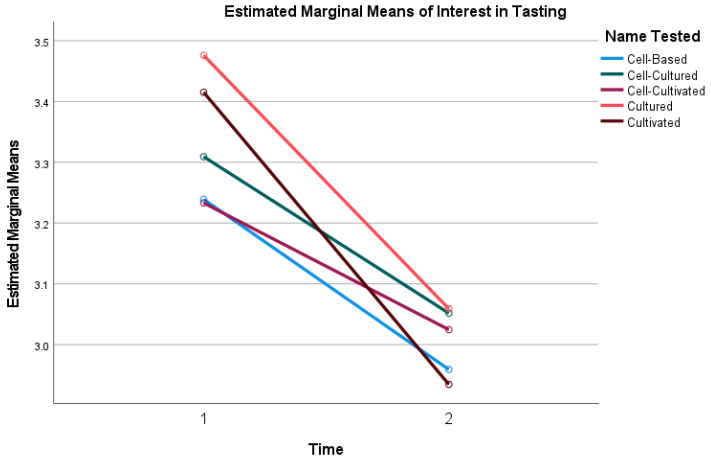
Cell-Based Beef Filet Example:

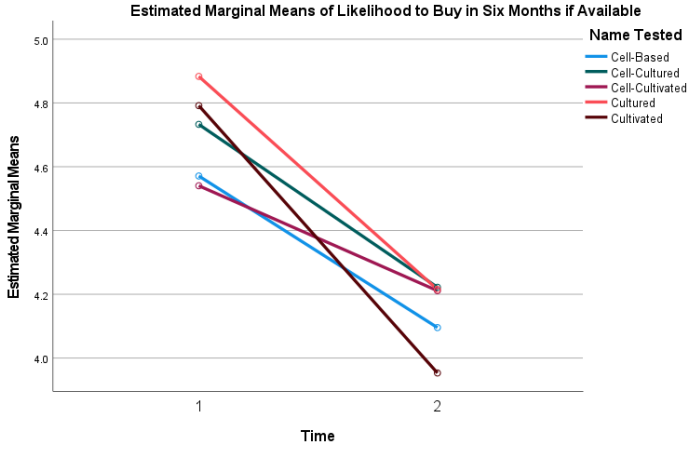
The term **Cell-based Beef** indicates that this beef differs from both grass-fed and grain-fed beef from cattle raised on a farm or a ranch. It tastes, looks, and cooks the same and has the same nutritious qualities as beef produced in traditional ways. Yet, it involves a new way of producing just the parts of beef that people eat, instead of raising them whole and harvesting them.

Cell-based beef means that a small number of cells from selected cattle were placed in a nutrient solution, where they grew and reproduced many times. The resulting meat was then formed into filets that can be cooked and enjoyed in the same way as other beef products.

Key Marketing Variables Before/After Description







A final word

- It is important that a *single* term be used to identify meat, poultry, seafood, and game products that are produced using the same process.
  - It will help consumers understand what they are buying
  - Provide greater transparency in the marketplace
  - Permit unified regulatory oversight
- Either Cell-based or Cell-cultured should work well.

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