

# Cultivate Tomorrow Hackathon 2022

Track 1 Report: Advertising Strategy and Platform

<b>Introduction</b>	<b>2</b>
<b>Background Consumer Research</b>	<b>2</b>
<b>Model</b>	<b>3</b>
<b>Results</b>	<b>4</b>
<b>Ad Campaign</b>	<b>5</b>
Facebook	18
Instagram	18
<b>Potential Obstacles, Opponents, and Proponents</b>	<b>19</b>
<b>Conclusion</b>	<b>20</b>
<b>References</b>	<b>20</b>
<b>Appendix A (Survey Questions)</b>	<b>21</b>
<b>Appendix B (Ads)</b>	<b>22</b>
<b>Appendix C (Code)</b>	<b>23</b>

## Introduction

Team TreeFiddy presents this proposal for an advertisement campaign for cell based meat products that can be adapted to serve different cell based meat companies. This ad campaign is based on consumer research conducted by team member 1 for their graduate education and modeled by remaining team members to predict which demographics to target as advertising strategy.

## Background Consumer Research

Team member 1 conducted research into consumer perception of cell based meat as a food product for as a graduate student in 2020, including a survey of 204 people. The purpose of this research was to understand if consumers will eat cell based meat products when they become available to the market in the coming years. This research can be helpful to marketing teams of cellular agriculture companies, but also serves a larger purpose of understanding consumer

behavior around animal products and food in general. The goal of this research was to identify consumer apprehensions towards cell based meat in order to overcome them, which ultimately, is a goal of consumer education. In order to answer this question, a team member developed a mixed methods study, including a survey. The survey was administered via Qualtrics between December 1st, 2019 and February 29th, 2020. Responses were solicited using the method of snowball sampling, which relies on social networks for dissemination; links to the survey were sent out via email and on social media including Facebook and Instagram. We utilized 198 respondent's answers (omitting respondents who did not answer the majority of survey questions) for our Cultivate Tomorrow Hackathon project. See Appendix A for a full list of survey questions.

## Model

We had results from a survey of 198 people with various demographics data, their familiarity of certain aspects of cultivated meat, and an open ended question inviting them to talk about any thoughts they have about it. The responses to this open question were analyzed as “cost concerns”, “health concerns”, “environmental and animal welfare concerns”, “technological and resource allocation considerations”, any combination of these, or none of them. Part of the limitation here is that the survey was not conducted with this specific application in mind. In the future, we could conduct a more expansive survey with questions that would examine people's concerns with certain aspects of cultivated meat directly. We chose to feed this data into a tree style model because of the relatively small data set, the desire to have an interpretable model, combined with categorical variables and the desire to predict a categorical variable - “Will you try cultivated meat” - with categories “yes, maybe, no”. The model was made in R and overfitting was avoided by setting limitations on the tree depth and the size of predicted groups. Team members created the following tree model (Figure 1).

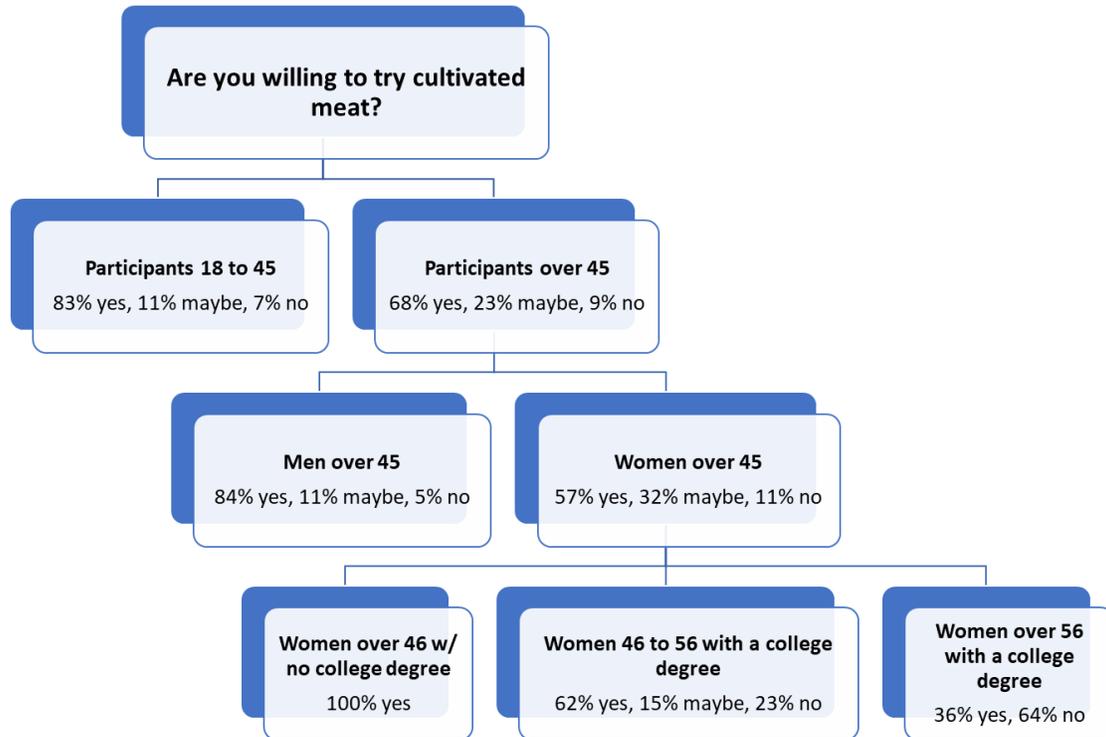


Figure 1: Predictive Tree Model

The R package “rpart” was used to generate the tree model. To avoid overfitting, we implemented a minimum split size of 12, meaning groups could only be split if they contained 12 participants, and set a minimum bucket size of 4, prohibiting splits that generated groups smaller than 4. The max depth of the final tree model was limited to 4 generations from the root. See Appendix C for full code.

## Results

The overall findings were that people under the age of 46 were very likely (83% yes to 7% no) to try cultivated meat. Men 46 and over were a smaller group (so less statistically significant) but were found to favor trying it (84% yes to 5% no). There were only four women 46+ without a college degree, all of whom said they would try it. Women 46+ with a college degree split in the model again with one group being aged 46-56 and the other 57+. The first group said they would try it (62% yes to 23% no) and the second group were very likely to try it (64% maybe, 36% yes). A further analysis was carried out just on the 45- group, but there was no statistically significant difference among that age group. Additionally, the analysis of the open-ended

questions found that people 45- were likely to cite animal welfare and environmental concerns as a reason to try cultivated meat, while people 75+ were likely to cite health considerations as a reason not to try it. A separate analysis of the 45- group showed that there was only a minor difference within the group in terms of willingness to try cultivated meat (with those 28- being more likely) and no difference at all in terms of care for the environment.

## Ad Campaign

Using the results of the predictive tree model, we formulated the following ad campaign(s) to target specific age groups that cited concerns or motivations behind trying cell based meat products. See Appendix B for link to high res ads.



**CLEAN  
MEAT**

\*BRAND WEBSITE\*

CAN USE

98% LESS LAND  
96% LESS  
WATER

96% LESS  
GREENHOUSE  
GASSES

AND 100%  
FEWER  
ANIMALS

Figure 2: Men and women under 30, concerned about environment and animal welfare.

<https://drive.google.com/file/d/1n2sAG3y9drfYW79w1CZCX4ptjQJLmkCa/view?usp=sharing>

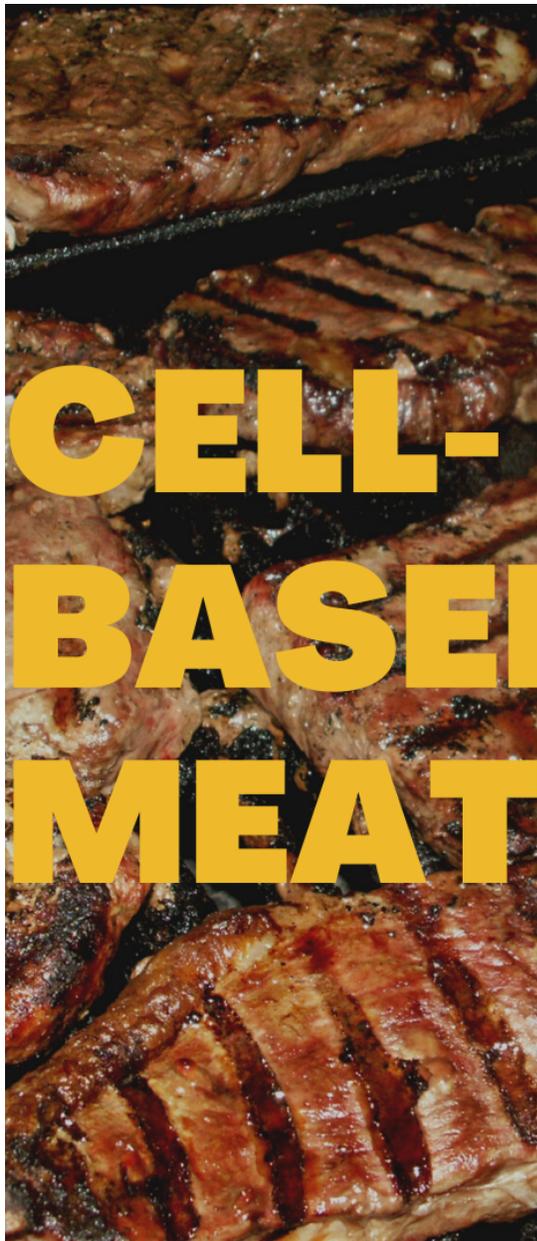


Figure 3: Men and women under 30, concerned about the environment and animal welfare.  
<https://drive.google.com/file/d/1f1MAUZCDefkkaA9a3Mczy4FyNGGRnhwY/view?usp=sharing>



Figure 4a: Men and women under 46, concerned about environment and animal welfare.  
New-Harvest used a brand example.

<https://drive.google.com/file/d/1nx8kzrJTYJm1ZBJqCSTA4MgYroqGGPuY/view?usp=sharing>



**CELL-BASED MEAT:**

CAN USE  
98% LESS LAND  
96% LESS  
WATER

96% LESS  
GREENHOUSE  
GASSES

AND 100%  
FEWER  
ANIMALS

Visit [new-harvest.org](https://new-harvest.org) to learn more

Figure 4b: Men and women under 46, concerned about environment and animal welfare.  
New-Harvest used a brand example.

[https://drive.google.com/file/d/1A6ql81sbHQaH5IJtyIO-H\\_isYKSW0WR/view?usp=sharing](https://drive.google.com/file/d/1A6ql81sbHQaH5IJtyIO-H_isYKSW0WR/view?usp=sharing)

**ITS NOT  
PLANT-BASED**

**ITS CELL-BASED.**

**MEAT.  
BUT BETTER.**



VISIT \*BRAND WEBSITE\* TO LEARN MORE

Figure 5a: Men over 46, concerned about health.

<https://drive.google.com/file/d/10HDxgUYQP7xv3F2PRzQtLCMANKhqsOM/view?usp=sharing>

**ITS NOT  
PLANT-BASED**

**ITS CELL-BASED.**

**MEAT\***

**\* BUT BETTER.**



**\*BRAND WEBSITE\***

Figure 5b: Men over 46, concerned about health.

<https://drive.google.com/file/d/18RnalHnC0l1wyyEtLG142zM9ODa7Tv-U/view?usp=sharing>

**ITS NOT  
PLANT-BASED**

**ITS CELL-BASED.**

**MEAT.  
BUT BETTER.**



VISIT \*BRAND WEBSITE\* TO LEARN MORE

Figure 6: Women over 46, concerned about health.

[https://drive.google.com/file/d/1Pyr-KKc5KQD4ojF83CzGCJPMzgc80\\_nD/view?usp=sharing](https://drive.google.com/file/d/1Pyr-KKc5KQD4ojF83CzGCJPMzgc80_nD/view?usp=sharing)



**IT'S NOT  
PLANT-BASED**

**CLEAN MEAT IS BETTER**

**IT'S CELL-BASED**

VISIT \*BRAND WEBSITE\* TO LEARN MORE

Figure 7: Women and men, 56+, concerned about health.

[https://drive.google.com/file/d/1kB\\_J-tLix7l\\_ascN-uFdlmYY4Bd1kad2/view?usp=sharing](https://drive.google.com/file/d/1kB_J-tLix7l_ascN-uFdlmYY4Bd1kad2/view?usp=sharing)



**SAME TASTE**

**ITS NOT  
PLANT-BASED,  
IT'S CELL-BASED**

**CLEAN MEAT IS BETTER**

**\*BRAND WEBSITE\***

Figure 8: Women and men, 46-56, concerned about health.

<https://drive.google.com/file/d/15RfEEXMIP61CZYcbvHFM57Ngjg4DoVVf/view?usp=sharing>

**CELL BASED MEAT**

**HEALTHY**

**TASTY**

**CLEAN**

VISIT [NEW-HARVEST.ORG](https://www.new-harvest.org)  
TO LEARN MORE

Wavy line graphic

The image is a vertical advertisement. On the left, a close-up photograph of various sushi pieces (salmon nigiri, tempura, shrimp, and tuna) is shown on a dark plate with chopsticks. The right side of the image has a teal background with three white rounded rectangular boxes containing the words 'HEALTHY', 'TASTY', and 'CLEAN' in blue capital letters. At the bottom right, there are two white wavy line graphics. At the bottom left, white text reads 'VISIT NEW-HARVEST.ORG TO LEARN MORE'.

Figure 9: Women and men, 75+, concerned about health. New-Harvest used as brand example.  
<https://drive.google.com/file/d/18BIUtNJdix-wu4xHGmUzYs9DkE2KqC/view?usp=sharing>



Figure 10: Women and men under 46, concerned about health.

[https://drive.google.com/file/d/14ZhvnfG71YX4RSO\\_5vBdqPAjU18ftI/view?usp=sharing](https://drive.google.com/file/d/14ZhvnfG71YX4RSO_5vBdqPAjU18ftI/view?usp=sharing)



Figure 11: Women and men under 46, concerned about the environment.

<https://drive.google.com/file/d/1C99-HhLwEsuQCA7BV91GvIXYFpkvst6f/view?usp=sharing>

These ads are recommended to be distributed as paid advertisements on the social media channels with the following targeted audience parameters:

## Facebook

### Audience 1:

- Region: US
- Age: 46+
- Gender: Men and women
- Interests: Plant-based diet, flexitarian diet, weight loss, healthy eating, health, nutrition, human nutrition, wellness, vegetarianism, nutritionist, Beyond Meat, Impossible Foods

### Audience 2:

- Age 36-45
- Region: US
- Gender: Men and women
- Interests: Plant-based diet, flexitarian diet, sustainability, food sustainability, animal rights, animal welfare, activism, environment, natural environment, vegetarianism, food technology, veganism

### Audience 3:

- Age 56-75+
- Region: US
- Gender: Men and women
- Interests: Plant-based diet, flexitarian diet, weight loss, healthy eating, health, nutrition, human nutrition, wellness, vegetarianism, nutritionist

## Instagram

- Region: US
- Age: 46-
- Gender: Men and women
- Interests: Plant-based diet, flexitarian diet, sustainability, food sustainability, animal rights, animal welfare, social activism, food systems, food activism, accessible food, environment, natural environment, vegetarianism, veganism

## Potential Obstacles, Opponents, and Proponents

Using tissue-engineering methods, several companies have made significant strides in creating a cell based product for human consumption. A leading firm in the cell ag meat industry, Memphis Meats, raised \$161 million for a production facility and is working closely with government agencies such as United States Department of Agriculture (USDA) and the Food and Drug Administration (FDA) to ensure product safety, some key indicators that cell-based meat products are on their way to market in the coming years. In March 2019, USDA and FDA, responsible for ensuring goods are safe for the public to use and consume on or in their bodies, established “an inter-agency framework for regulating food items produced using cellular agriculture.” (Stine, 2019)

The debate over labeling of cellular agriculture products is ongoing. The debate between proponents and opponents of cell-based meats is rooted in the competition that cell-based meat may present to the existing livestock sectors if it comes to market. Opponents argue that cell-based meat should not be called “meat” nor should it use labels that enlighten consumers to the negative aspects of “traditional” meats, such as labeling cell-based products “slaughter-free” or “no kill” meat. Many opponents of cell-based meats are stakeholders in the traditional livestock industry, including meat and poultry farmers who stand to lose from competing meat products on grocery store shelves. Traditional meat distributors, like Tyson Foods, who are also stakeholders in the animal agriculture industry, face competition and risk from cell-based meats coming to market and thus can argue against the labeling of cell-based meats as “meat.” However, large-scale meat distributors also stand to gain from potential success of cell-based meats on the market as owners or investors in cell-based meat companies. For example, as of January 2018 Tyson Ventures, the venture capital arm of Tyson Foods, became a core investor of Memphis Meats (Tyson Foods Inc, 2018). The farmers that grow livestock for companies like Tyson Foods are at greater risk from market competition from cell-based meat products than are large meat distribution companies. Tyson foods also has existing technology (bioreactors) needed by the cell based meat industry, and partnerships between them will simplify the production process. It is unlikely and not recommended that meat imitation products and brands such as Beyond Meat or Impossible Foods stand as a potential partner for cell-based meat companies because of the consumer confusion that exists between plant-based and cell-based products (based on the research conducted above). In addition, Tyson Ventures exited its partnership with Beyond Meat in 2019, creating distance between them and plant-based products like Beyond burgers and instead focused on funding meat based products like cell based meat.

There is also a large push back from the National Cattlemen's Beef Association (NCBA), which represents many cattle and beef livestock farmers across the U.S. The NCBA policy “explicitly supports ‘the definition of beef to only include products derived from actual livestock raised by cattle farmers and ranchers and harvested for human consumption’ (NCBA, 2020) and exclusively refers to cell-based meat as “Lab Grown Fake Meat” across their website as well as all their publications, showcasing their resistance to any label that would indicate or imply lab based meats are comparable to traditional meats. This could cause strain on potential partnerships between cell based meat companies and food conglomerates like Nestle who could help scale cell based meat up in the market and incorporate it into consumer packaged goods, as many of these products already include “traditional” meat based in strong allyship between meat and dairy farmers/industries and consumer packaged brands like Nestle. However, brands like Nestle have shown serious interest in the emerging field of cell based products in recent years (Nestlé Global). A hackathon team member presented their consumer research on cell based meat to Nestle corporate during an internship in 2020. Nestle stands as a strong potential partner to a cell based meat brand.

## Conclusion

Cellular agriculture is a new technology and its products are untested on the market as a food source. The debate surrounding the benefits and risks of cellular agriculture calls to attention issues of environmental sustainability, animal welfare, natural resource use including land, water, and fossil fuels, human health, financial costs associated with producing and consuming food, government regulation, technology, accessibility, and validity of food sources. If cell-based meat companies hope to bring their products to market and sell them to consumers successfully, they will need to address these concerns from their customers. If they hope to achieve wide-scale acceptance of cell-based meats, a top priority for these companies will need to be consumer education and brand transparency as it pertains to the inputs and process of creating cell-based meat.

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## Appendix A (Survey Questions)

Survey Questions Have you ever heard of the term "cellular agriculture" or "cell ag"?

1. Have you ever heard of the following terms?

- a. Clean meat
  - b. Lab meat
  - c. Slaughter-free meat
  - d. Cultured meat
  - e. I have not heard of any of these terms
2. Please read a provided description about cellular agriculture. Based on this description, how well would you say you understand cellular agriculture?
  3. Assuming the taste, texture, and nutritional levels of cell ag meat are identical to traditional meat, how comfortable would you be regularly eating cell ag meat?
  4. Would you be willing to try cell ag meat just once?
  5. How do you generally view cell ag meat?
  6. Do you consider the following issues when thinking about cell based meat coming to market:
    - a. Price/cost
    - b. Effect on human health
    - c. Effect on the environment and animal welfare
    - d. Technology, production methods, or human intervention
  7. Which classification best describes your diet?
    - a. Omnivore (eats meat)
    - b. Pescetarian (eats fish, no meat)
    - c. Vegetarian (no meat or fish)
    - d. Vegan (no animal products)
    - e. Flexitarian
  8. How old are you?
  9. What is your gender?
  10. What is the highest degree or level of school that you have completed?
  11. Do you have any other thoughts on cell based meat? (Open ended)

Processed survey data used for tree model:

<https://docs.google.com/spreadsheets/d/1UZjZCKkzzZ616l0RVqCSwKewdg0CTQMqDvFBBcmjzoM/edit#gid=2089994297>

## Appendix B (Ads)

See all high res ads here:

<https://drive.google.com/drive/folders/1kgXC9VNnsa94-g5nRQO5eKraJEDfkXOj?usp=sharing>

## Appendix C (Code)

```
library(dplyr, warn.conflicts = FALSE)
library(rpart)
library(rpart.plot)
table<-read.csv(file.path("data_all.csv"), header = TRUE)
table <-mutate(table, age = as.numeric(age), dur =as.numeric(dur))
fit<-rpart(Try ~age+gen+Q13+Q15+edu+Q14.1+Q14.2+Q14.3+Q14.4+Q18.2+Q18.3+Q18.4+
Q18.5, data=table,method="class",control = rpart.control(minsplit = 12, minbucket = 4,
cp=0.01,maxdepth=4))
library(rattle)
fancyRpartPlot(fit)
summary(fit)
```